



1st Onsite Training

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

Rice
Cultivation

Farming
Management

Land
Development

Extension

Other

This chapter includes 10 topics;

1. Bush and grass Clearing
2. De-stumping
3. Land Demarcation
4. Virgin land ploughing
5. Grading and Levelling
6. Bunds Construction
7. Bunds Construction using tractor
8. Land levelling
9. Water harvesting
10. Maintenance of bunds



Land Development and Preparation

From a Virgin Land to an Arable Land



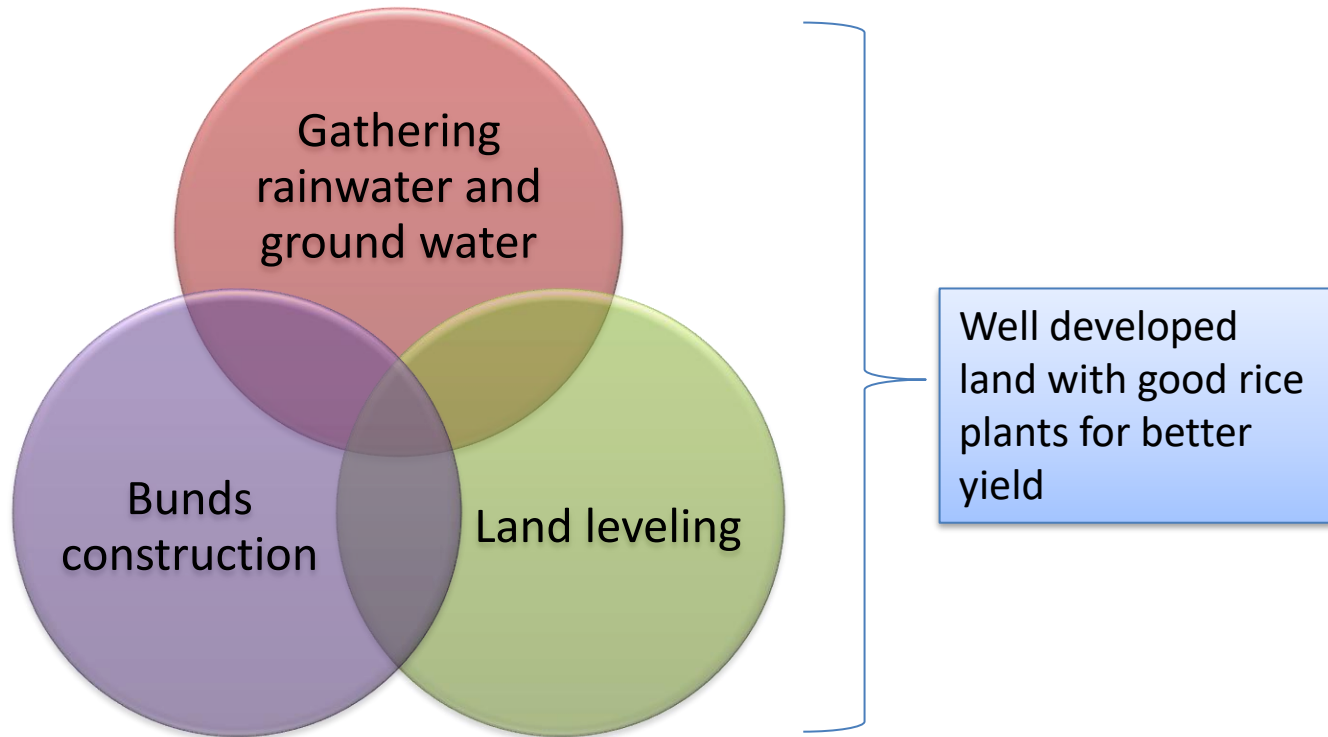


MOFA/JICA TENSUI RICE

Land Development and Preparation

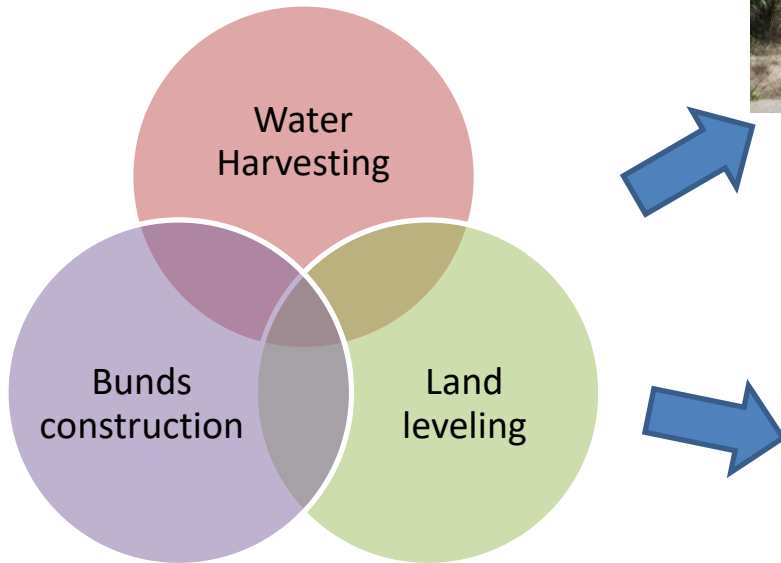
From a Virgin Land to an Arable Land

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. De-stumping
3. Land Demarcation
4. Virgin land ploughing
5. Grading and Levelling
6. Bunds Construction
7. Bunds Construction using tractor
8. Maintenance of bunds
9. Land levelling
10. Water harvesting

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. De-stumping
3. Land Demarcation
4. Virgin Land Ploughing
5. Grading and Levelling
6. Bunds Construction
7. Bunds Construction using tractor
8. Maintenance of bunds
9. Land Levelling
10. Water Harvesting

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. De-Stumping



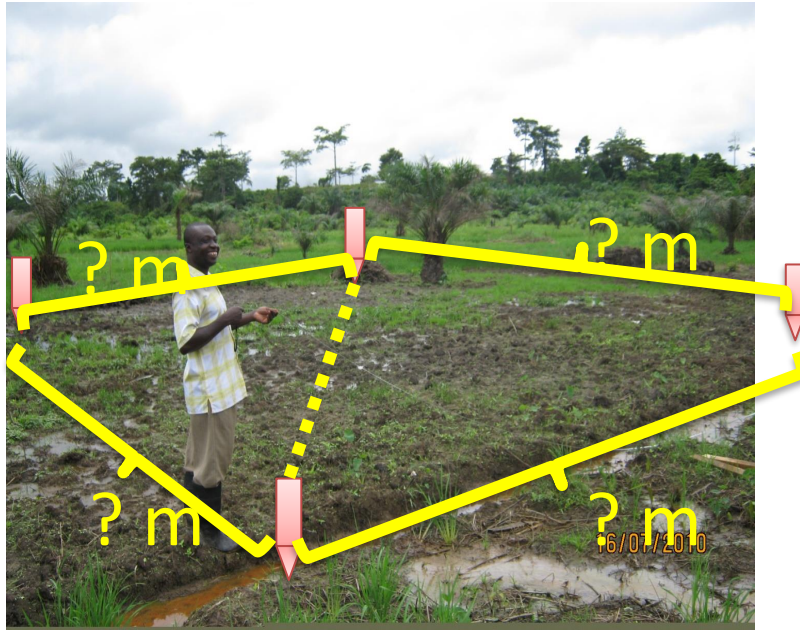
Explanation

- Remove the roots
- Group work
- Get it out from field

2. De-Stumping



3. 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.

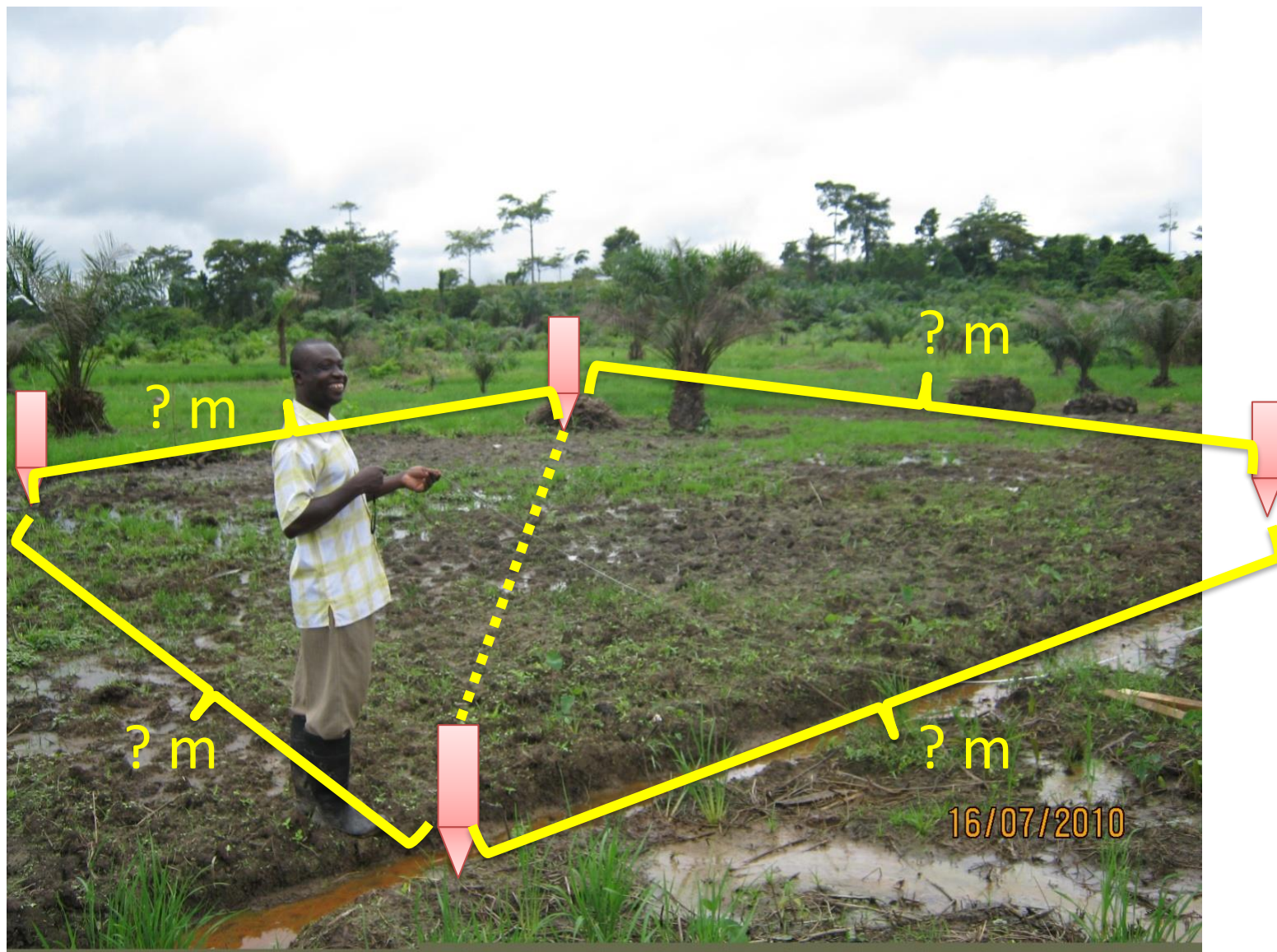
How

1. Peg should be put at each corner

Then

1. Area should be around measured and calculated

3. Land Demarcation



4. 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

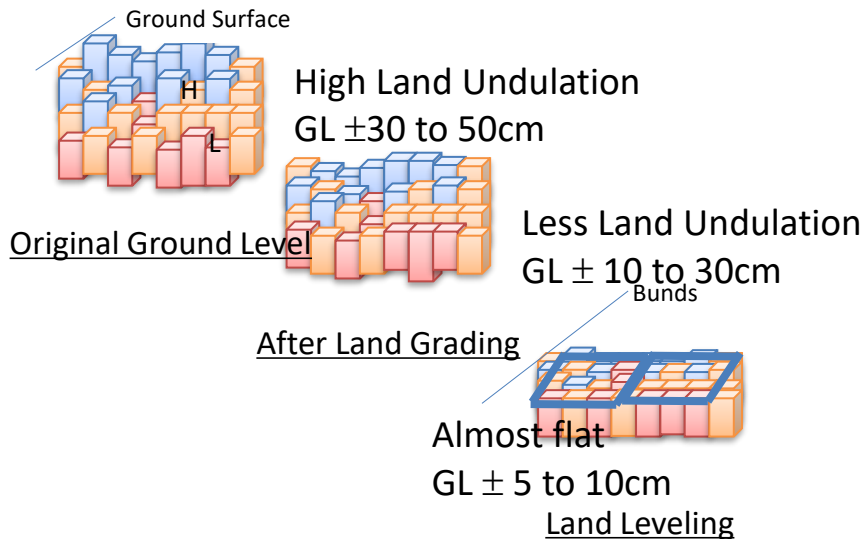
How

- 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)

4. Virgin land ploughing



5. Grading and leveling



Uniform
water
depth

- Uniform growth of rice
- Effective fertilizer and herbicide utilization

Drainage
of surface
water

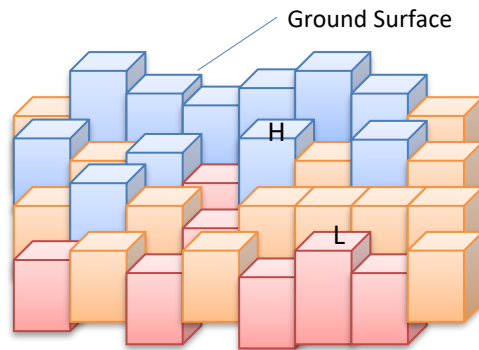
- For agric. Machinery application in the field
- For harvesting of rice under dry field condition

Better
yield

Why grading and land leveling are necessary?

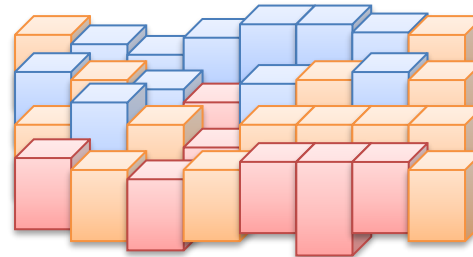
- Minimize the undulation levels,
- Ensure equal distribution of water in the field,
- Ensure adequate use of water by the plants,
- Enhances the optimum usage of fertilizer by the plants

5. Grading and leveling



Original Ground Level

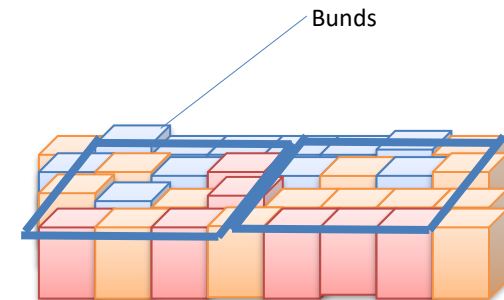
High Land Undulation
GL ± 30 to 50cm



After Land Grading

Less Land Undulation
GL ± 10 to 30cm

Almost flat
GL ± 5 to 10cm



Land Leveling

6. Bunds Construction (1)



- **Without Bunds**

- Lack of water in the field,
- Frequent floods or over flows,
- Poor drainage problems,
- Difficulty in applying fertilizer

- **Why bunds are necessary for rice cultivation?**
 - Helps in conserving water in the field for the rice plants,
 - Direct water in and out of the field for water, management
 - Controls floods,
 - Avoid loss of fertilizer through moving water,
 - Walk ways and boundaries

6. Bunds Construction (1)

Purpose and Functions



6. Bunds Construction (2)



Spilled water over bunds



- Purpose
To prevent spilling of water over bunds
- How to determine?
Height = (Maximum water level from last few years) + (Freeboard 20 cm)
- **Other factor to be considered**
Land slope (inclination)

6. Bunds Construction (2)

Determination of height of bunds



6. Bunds Construction (3)

Earth Bunding



Contour Bunds



Bunds with sand bags



Interlocking Bunds

material	Earth	
	Advantage	Disadvantage
Contour Bunds	<ul style="list-style-type: none"> ➤ Easy construction ➤ Low cost 	<ul style="list-style-type: none"> ➤ Weak to erosion
Bunds across the water flow direction		
Bunds along the water flow direction		
Interlocking bunds		

6. Bunds Construction (3)

Earth Bunding



Contour Bunds



Bunds with sand bags



Interlocking Bunds

6. Bunds Construction (4)

Stone Bunding

Stone Bunding

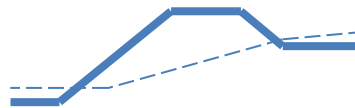


Stone Bunding
(across the water
flow direction)

Combined earth &
Stone Bunding with
impermeable sheet



Contour Bunds



material	Stone	
	Advantage	Disadv.
Contour Bunds	<ul style="list-style-type: none"> •Strong against heavy water flow •Resistant to erosion 	<ul style="list-style-type: none"> •Expensive •Might be scattered on field
Bunds across the water flow direction		
Bunds along the water flow direction	<p>Not appropriate (ploughing with tractor)</p>	
Interlocking bunds		

6. Temporary Bunds Construction (4)

Stone Bunding

Stone Bunding

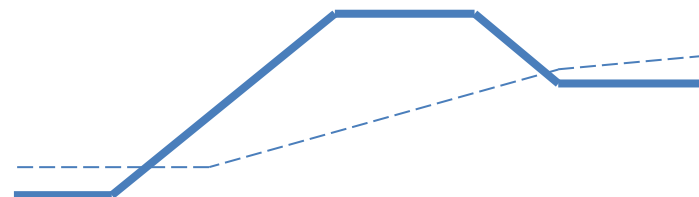


Stone Bunding
(across the water flow direction)

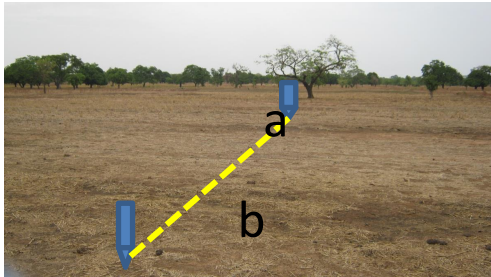
Combined earth & Stone Bunding with
impermeable sheet



Contour Bunds

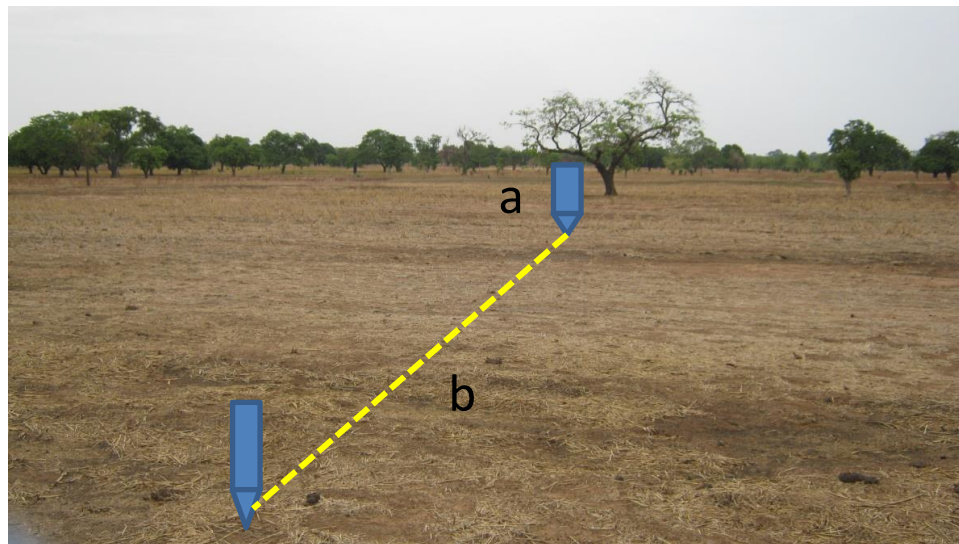


7. Bunds Construction using tractor (1)



1. Construction work with Tractor
 - a. Determine and mark out with pegs the portion to bund.
 - b. Determine the center line of the area to bund.
 - c. Plough with tractor to heap soil at one end.
 - d. Plough the other side of the center line to heap soil at the other end.

7. Bunds Construction using tractor (1)



7. Bunds Construction using tractor (2)



2. Hilling -Up

- a. Hill-up soil around the center point to the desired height of bund needed (with shovels and hand)
- b. Measure with a ruler to verify height.

7. Bunds Construction using tractor (2)



7. Bunds Construction using tractor (3)



3. Compaction

- a. Sprinkle water (1st layer) over heaped soil (with watering cans, buckets, etc)
- b. Compact with round compactors, stamping with feet.
- c. Heap more soil after 1st compaction.
- d. Sprinkle more water (2nd layer) and compact again. Compact about 5 times before moving to the next area.

7. Bunds Construction using tractor (3)



7. Bunds Construction using tractor (4)



4. Reshaping

- a. Shape the sides with the back of the shovel and compact with the side compactor.
- b. Check height and width of bunds.

8. Bunds Construction using tractor (4)



8. Maintenance of Bunds

During cropping season

- Minor repairs such as hilling up the soil, reshaping and cutting grasses should be done to maintain the function of bunds.

During off-cropping season

- Cutting grass, re-compaction of bunds and reshaping of bunds should be done
- Reinforcement of bunds where weak should also be done



Using Sand bags with wooden materials

8. Maintenance of Bunds



9. Land Levelling



- Without leveling
 - Uneven water distribution
 - Difficult in controlling water in the field
 - Difficulty in applying fertilizer and its usage by the plants
 - Low yields of the rice plants

- Importance of Land levelling
 1. Land level should be flat as much as possible
 2. Water-logging in the field tell where land is high and low. (mark those places for next rice cultivation)
 3. Continues land leveling works year by year is a key factor for good yield. (not possible to achieve leveled land once)

9. Land Levelling



10. Water harvesting

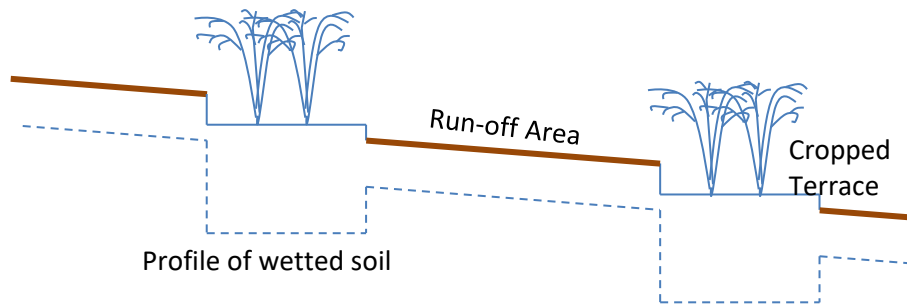
Purpose

Water harvesting is a series of methods to increase the amount of moisture stored in the soil profile or where there is some small movement as surplus runoff.

Where water harvesting is being applied?

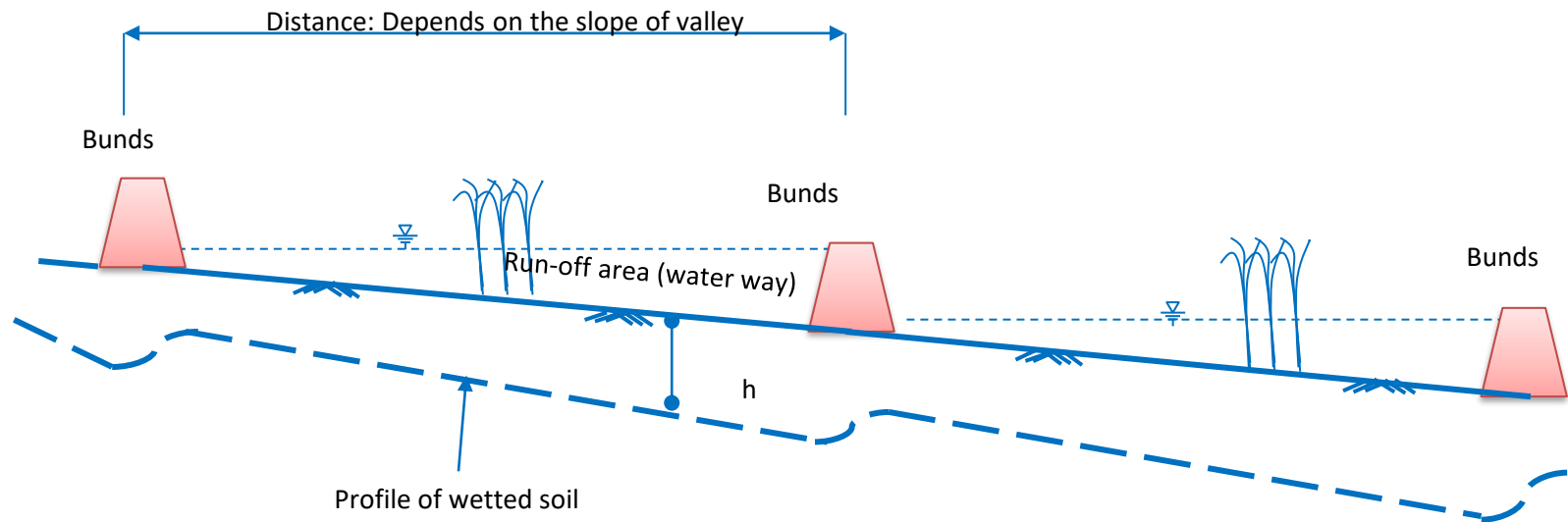
Marginally inadequate rainfall by concentrating runoff from an uncultivated part of the land onto a cultivated part which then receives enough moisture to grow a crop.

10. Water harvestings



Increase soil moisture
Storage under the terrace

Bunds



- 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.

SEED PREPARATION

Seed selection

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- Seed soaking is the second step of seed preparation.
- 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.



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SEED PREPARATION

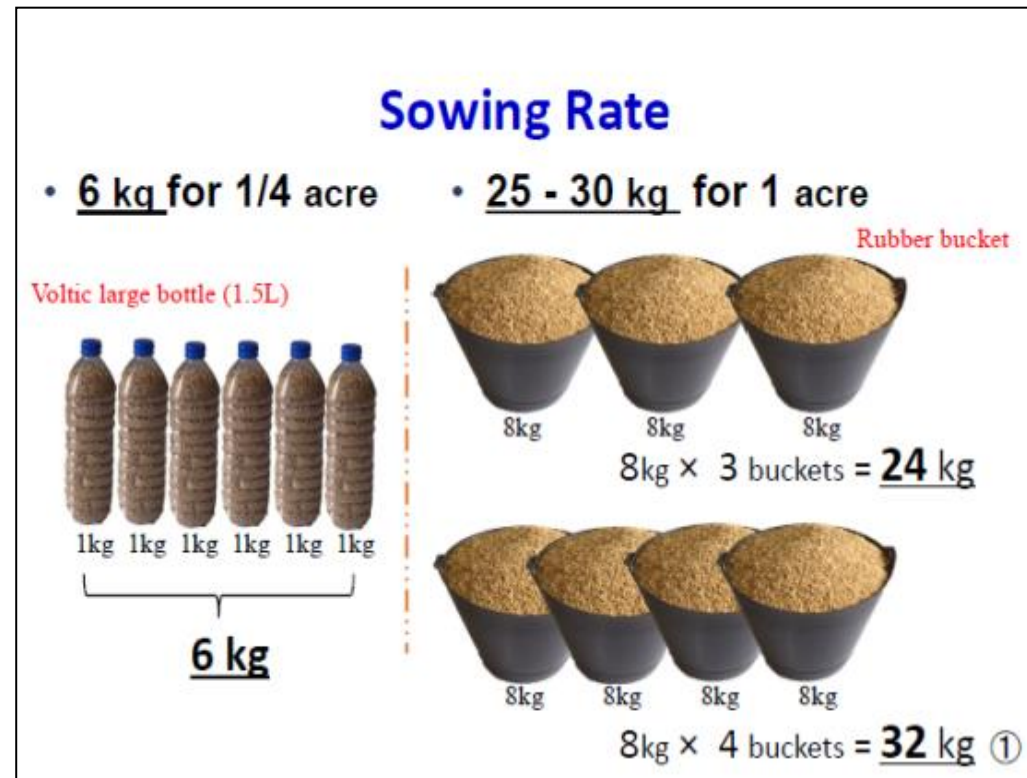
Seed selection

Rice
CultivationFarming
ManagementLand
Development

Extension

Other

- 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 seed 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

- 25 - 30 kg for 1 acre

Rubber bucket

Voltic large bottle (1.5L)



1kg 1kg 1kg 1kg 1kg 1kg

6 kg



8kg

8kg

8kg

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



8kg

8kg

8kg

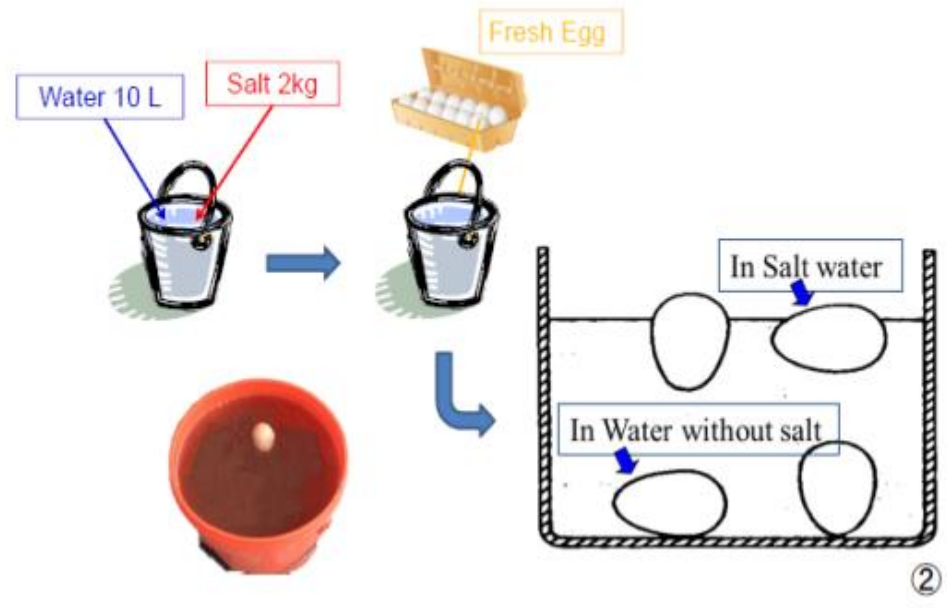
8kg

$$8\text{kg} \times 4 \text{ buckets} = \underline{32 \text{ kg}} \text{ ①}$$

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

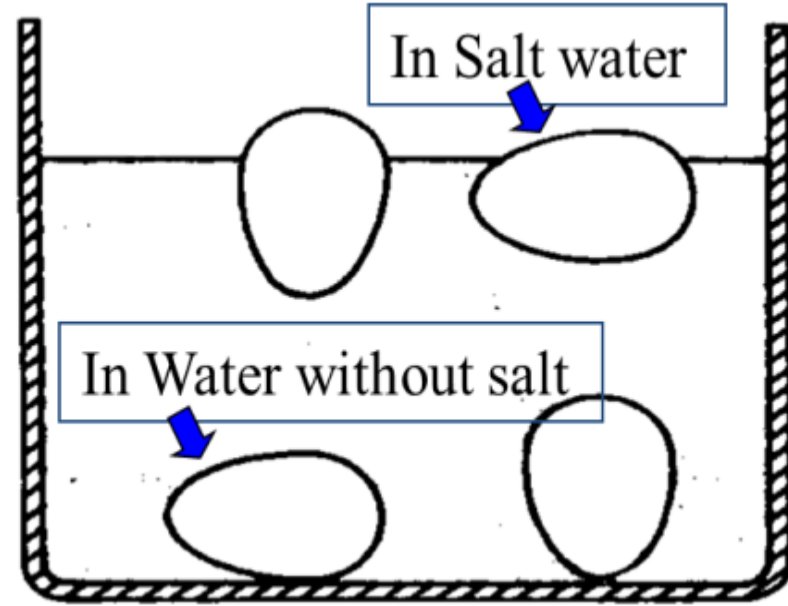
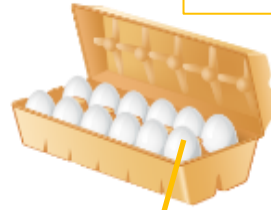
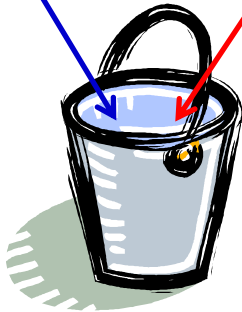
- The heavier seeds normally germinate uniformly and give sufficient nutrients to become healthy seedlings

Seed selection by salt water method

Fresh Egg

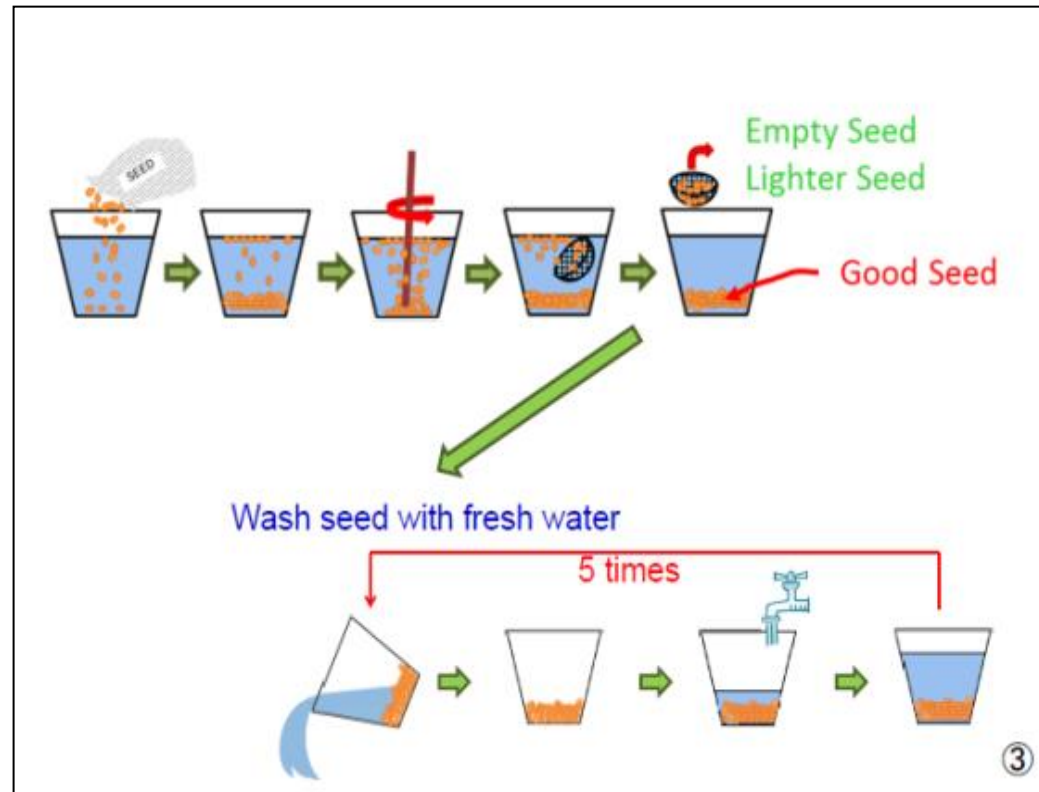
Water 10 L

Salt 2kg

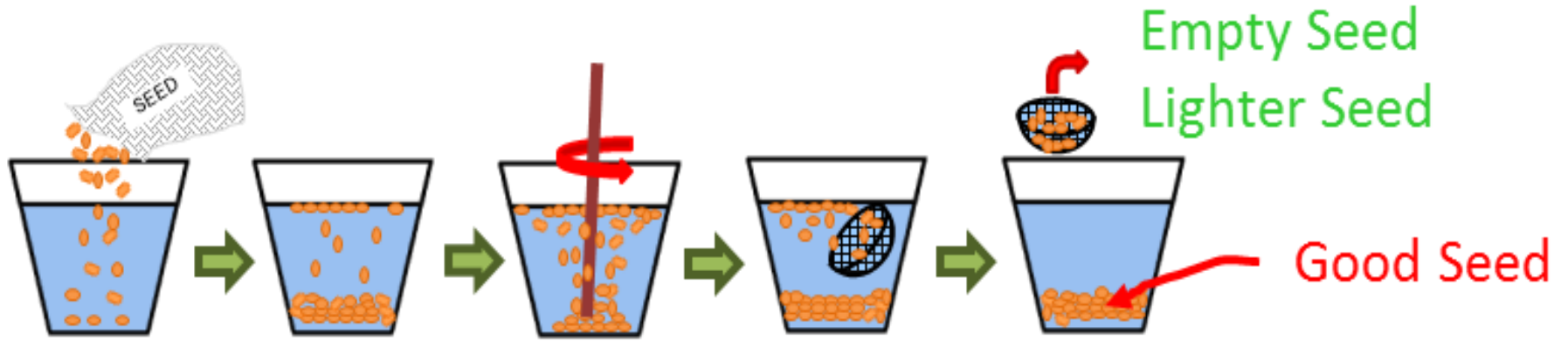


Seed selection by salt water method (Cont.)

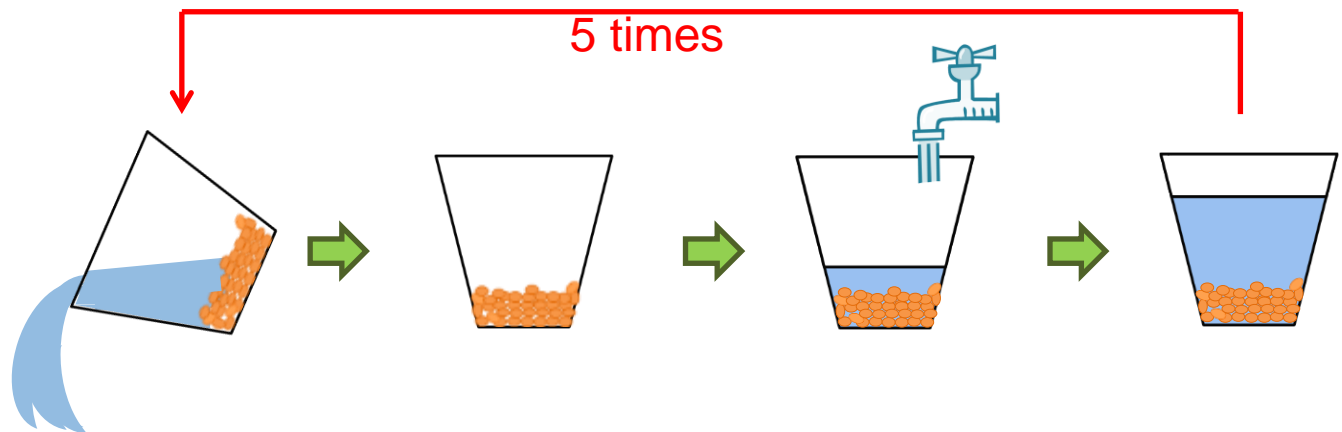
4. Remove the egg and put seeds.
5. Remove the floating seeds.
6. Wash the remaining seeds with fresh water 5 times.
7. Quantity of seeds should be fully submerged into the solution.
8. The solution can be used for several times.



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.



Wash seed with fresh water



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

Direct Sowing

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- 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

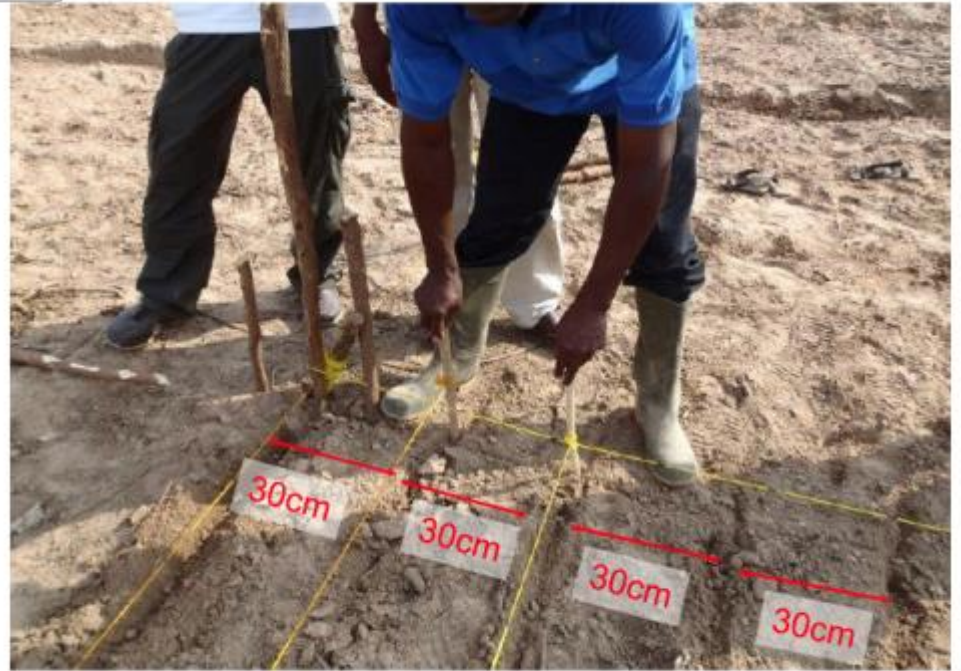
Rice
Cultivation

Direct Sowing

Back side

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

Face



①



Back side

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

Face





Back side

- ▶ Sowing method:
Drilling
- ▶ Seeding depth: 2 to 3
cm

Face



③



Back side

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

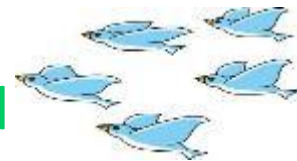




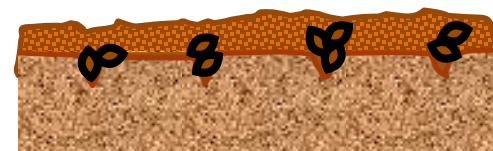
Uncovered

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.





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.



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

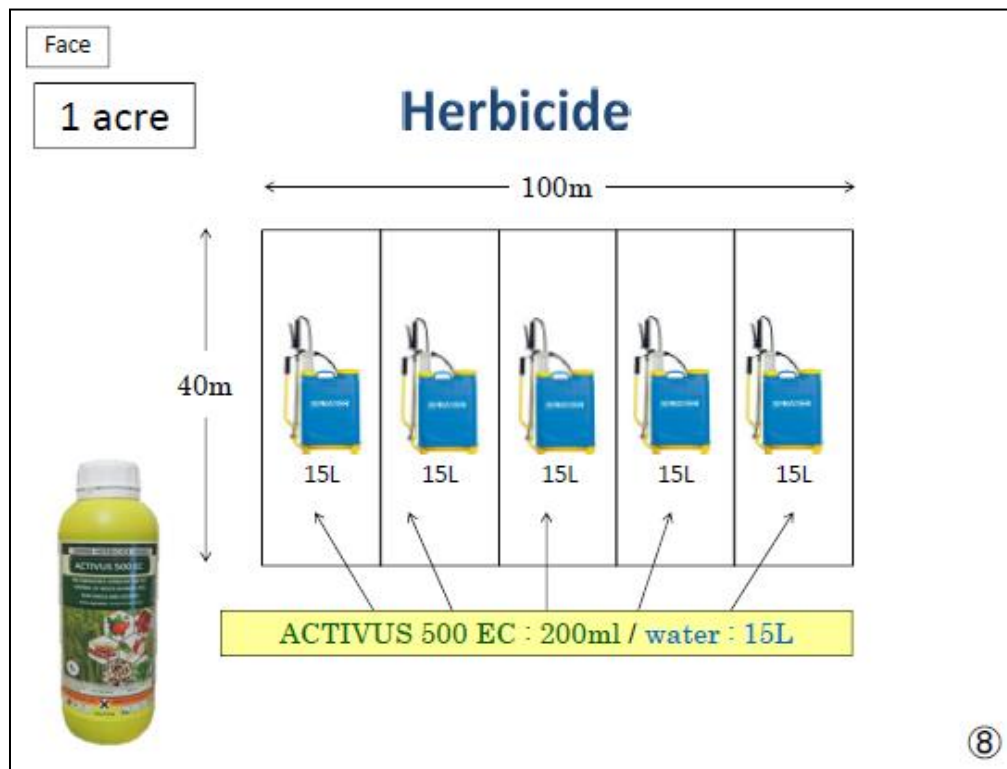


Back side

Method of spraying the herbicide

[Example] ACTIVUS 500EC

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

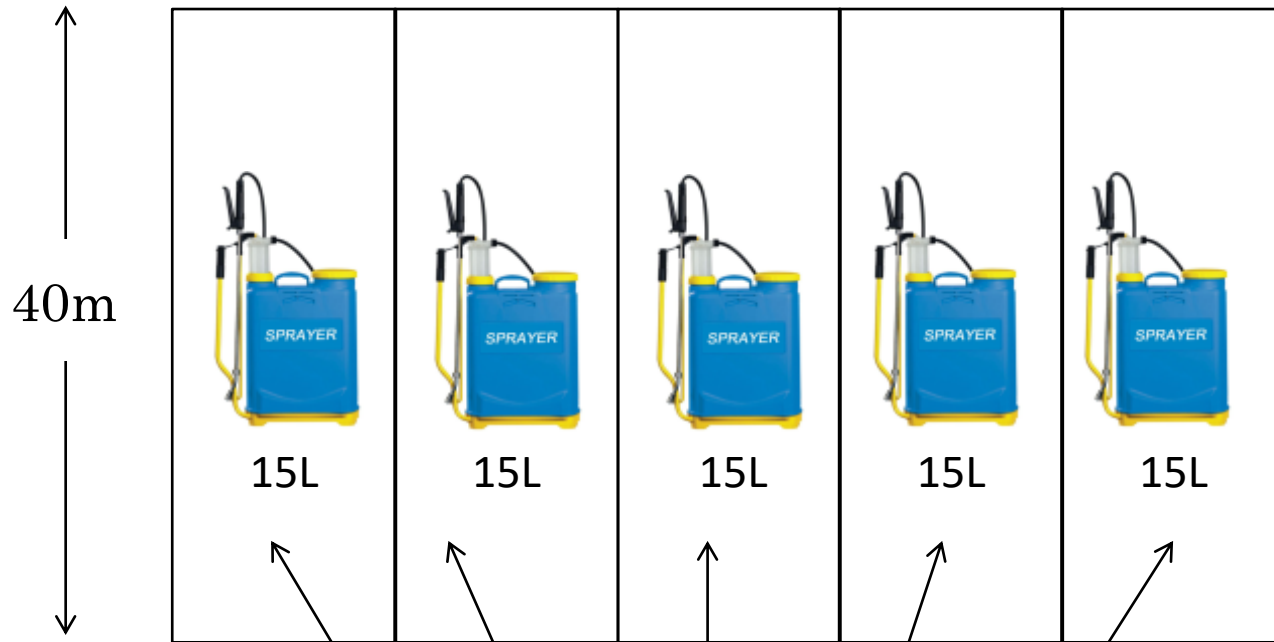


- First mix 15 litres of water and 200 mL of the herbicide and spray it to 1/5 of 1 acre field.
- Then mix another 15 litres of water and 200 mL of the herbicide and spray it to next 1/5 of the field.
- Repeat it 3 more times.

1 acre

Herbicide

← 100m →



ACTIVUS 500 EC : 200ml / water : 15L

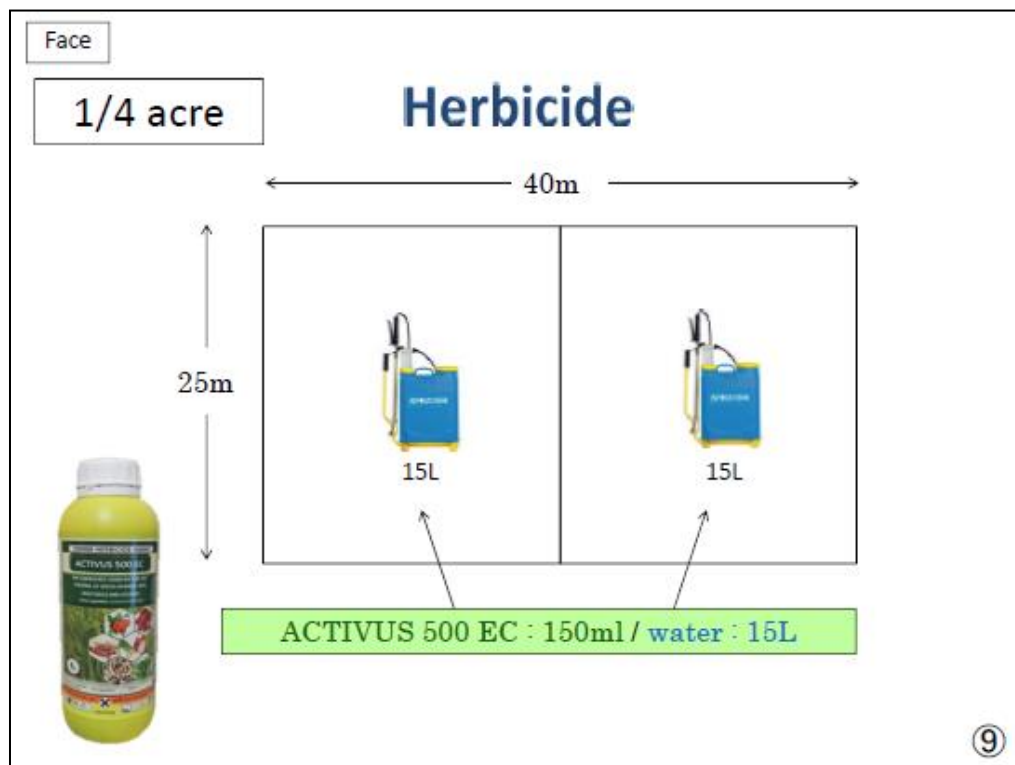


Back side

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.

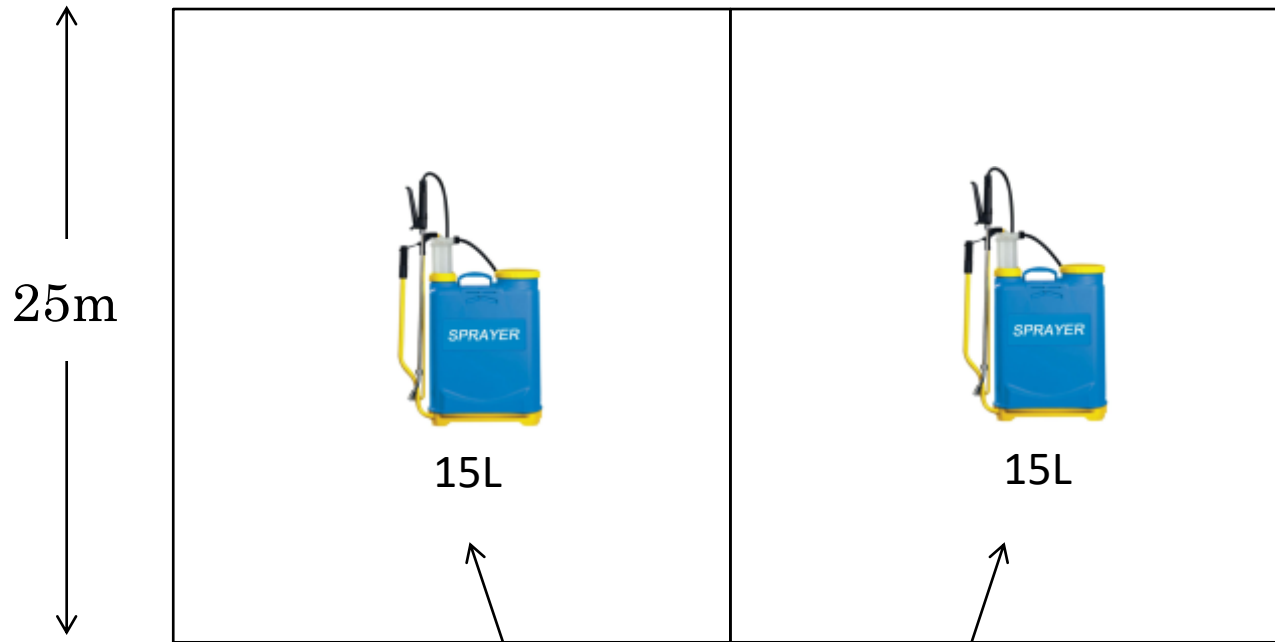
Face

RC OST 1-2-2

1/4 acre

Herbicide

← 40m →



ACTIVUS 500 EC : 150ml / water : 15L

Back side

Face

RC OST 1-4

On-farm Water Management

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



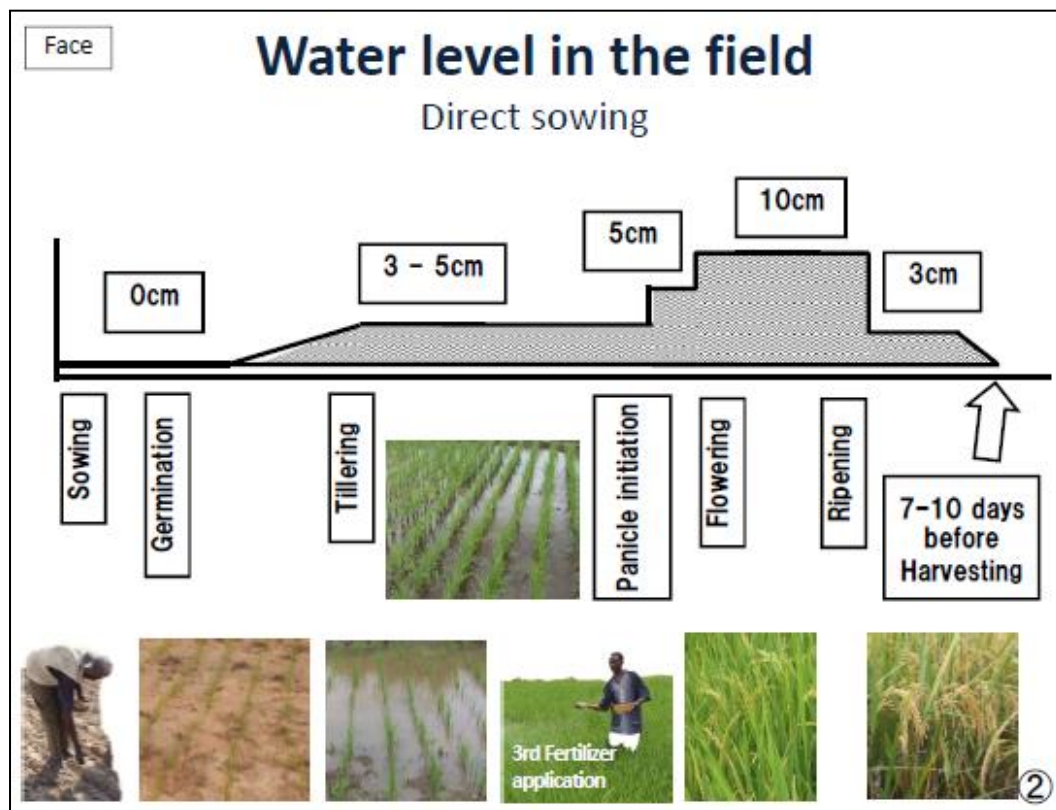
MOFA/JICA TENSUI RICE

Rice
Cultivation

On-farm Water Management

Back side

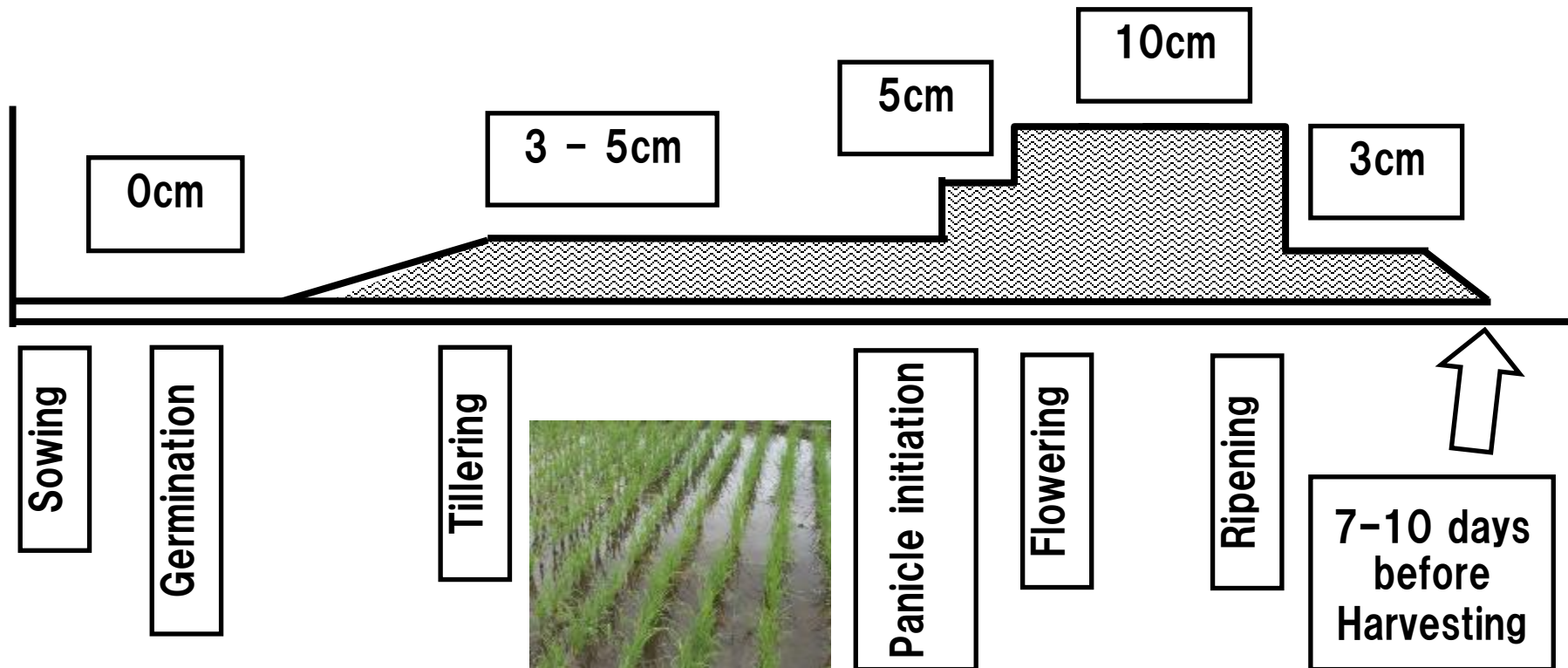
- In direct sowing cultivation, on-farm water management is more difficult than that in transplanting cultivation.
- However, it is important to understand an ideal way of on-farm water management and to try to collect and keep water in the field as much as possible for maintaining good growth condition.



1. Increase water level gradually after germination.
2. Keep 3 – 5 cm depth of water up to panicle initiation stage (at 3rd 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



3rd Fertilizer application



Discuss with the farmers:

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

FM-OST-1



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Farm management is fun!!

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

Farming Management

Page 1(Front)

Sustainable Development of Rain-fed Lowland Rice Production
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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?



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?



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!

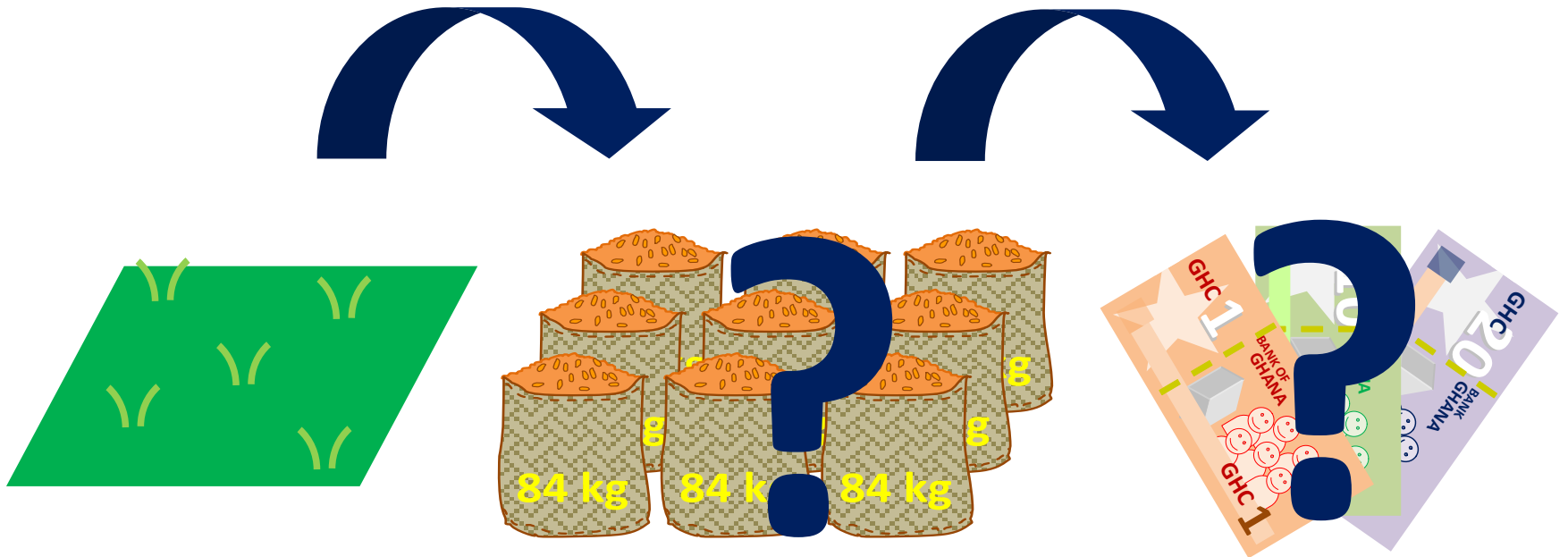
How many bags can you produce?
How much money can you earn?

The diagram illustrates a process flow. On the left, a green field with small yellow plants represents the production area. Two blue curved arrows point from the field to a central stack of five brown bags, each labeled '84 kg'. A large blue question mark is superimposed over the bags. From the bags, another blue curved arrow points to a stack of colorful banknotes (1, 2, 5, 10, 20, 50, 100). A second large blue question mark is superimposed over the money. This visualizes the uncertainty in production and revenue.

Page 5(Front)

1. Let's get information!

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



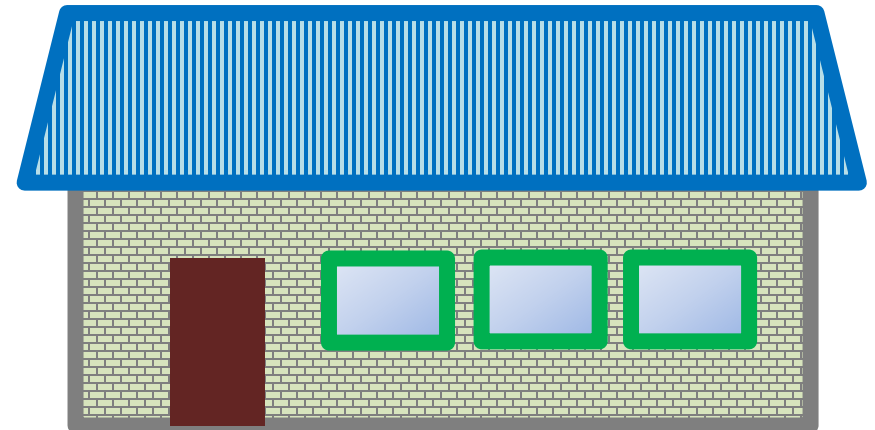
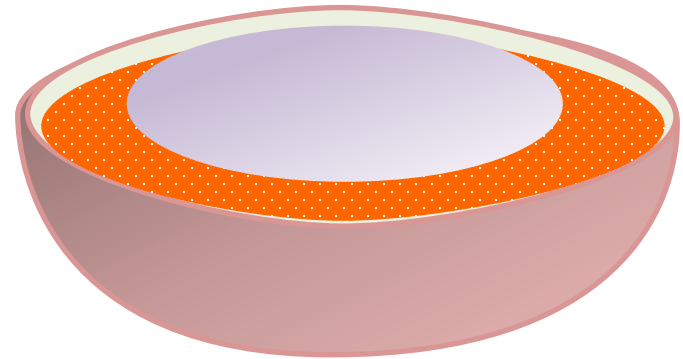
Discuss with the farmers:

- 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?



2. Let's set a target!

How much do you need?

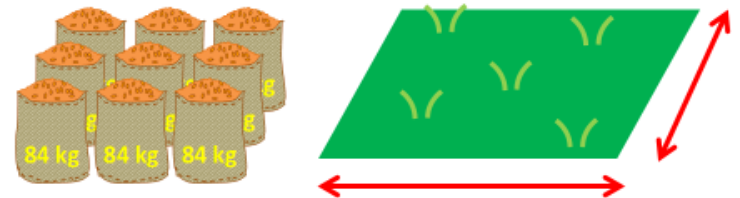


Discuss with the farmers:

- 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?

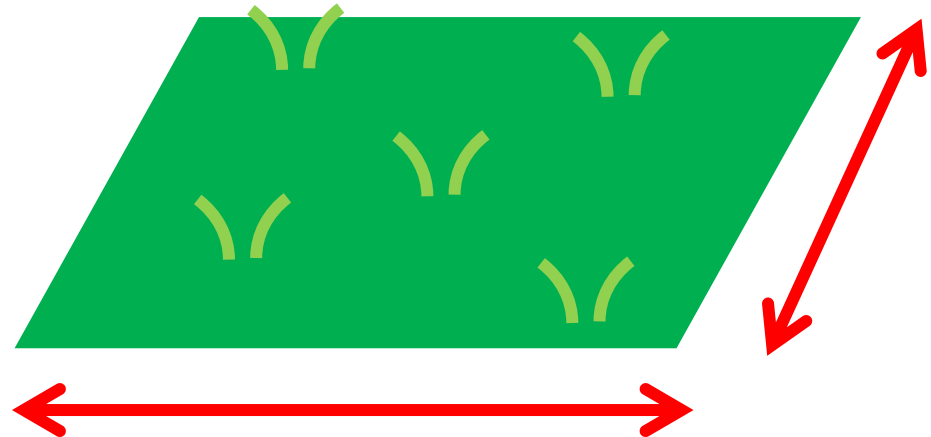
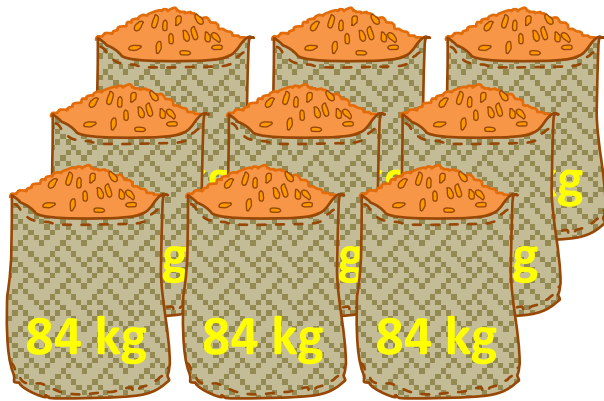
2. Let's set a target!

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



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				

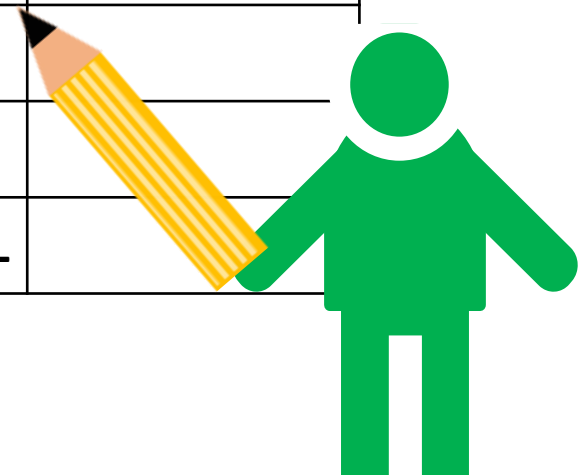


Page 10(Front)

3. Let's make a plan!

Let's budget what you want to do!

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



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...

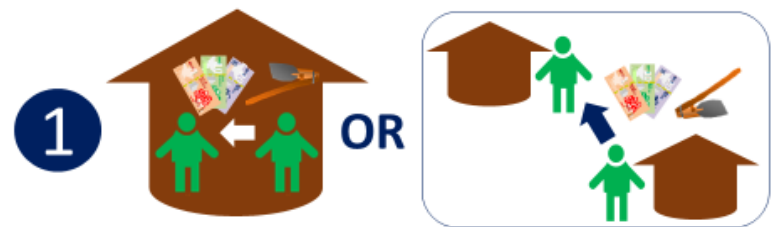


Discuss with the farmers:

- 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?

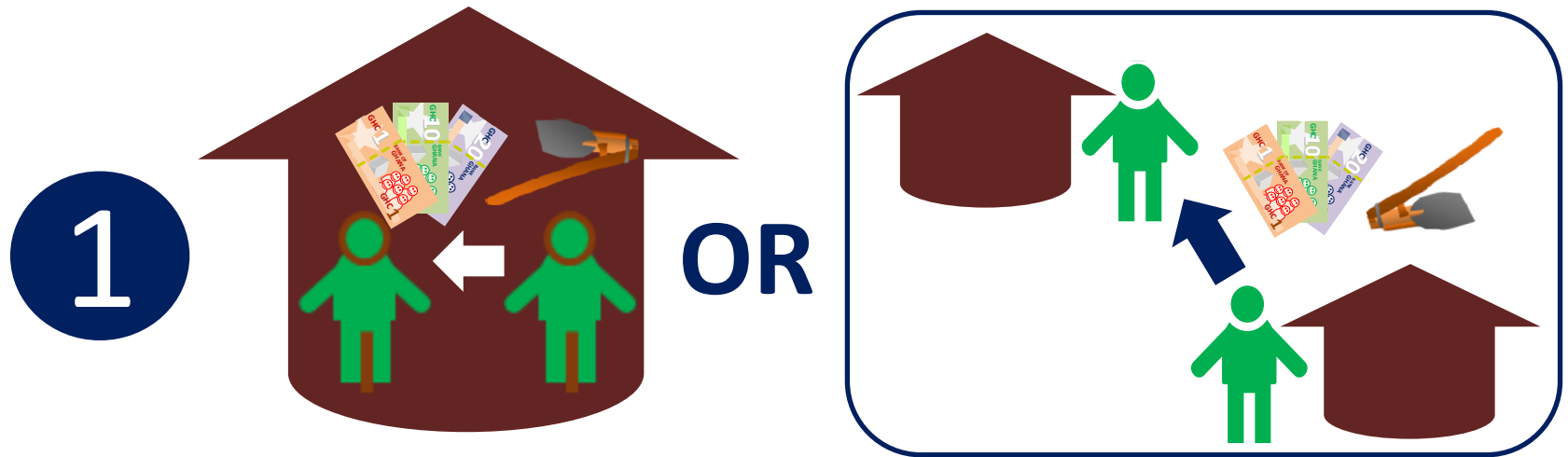


2 Micro-finance??

Block-farm programme??

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



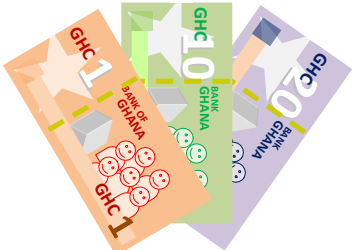
Demo-plot management



Leader



Input procurement



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?

Production (grain)

Self-consumption

Seeds for
the following season

Cash income

Inputs for
the following season

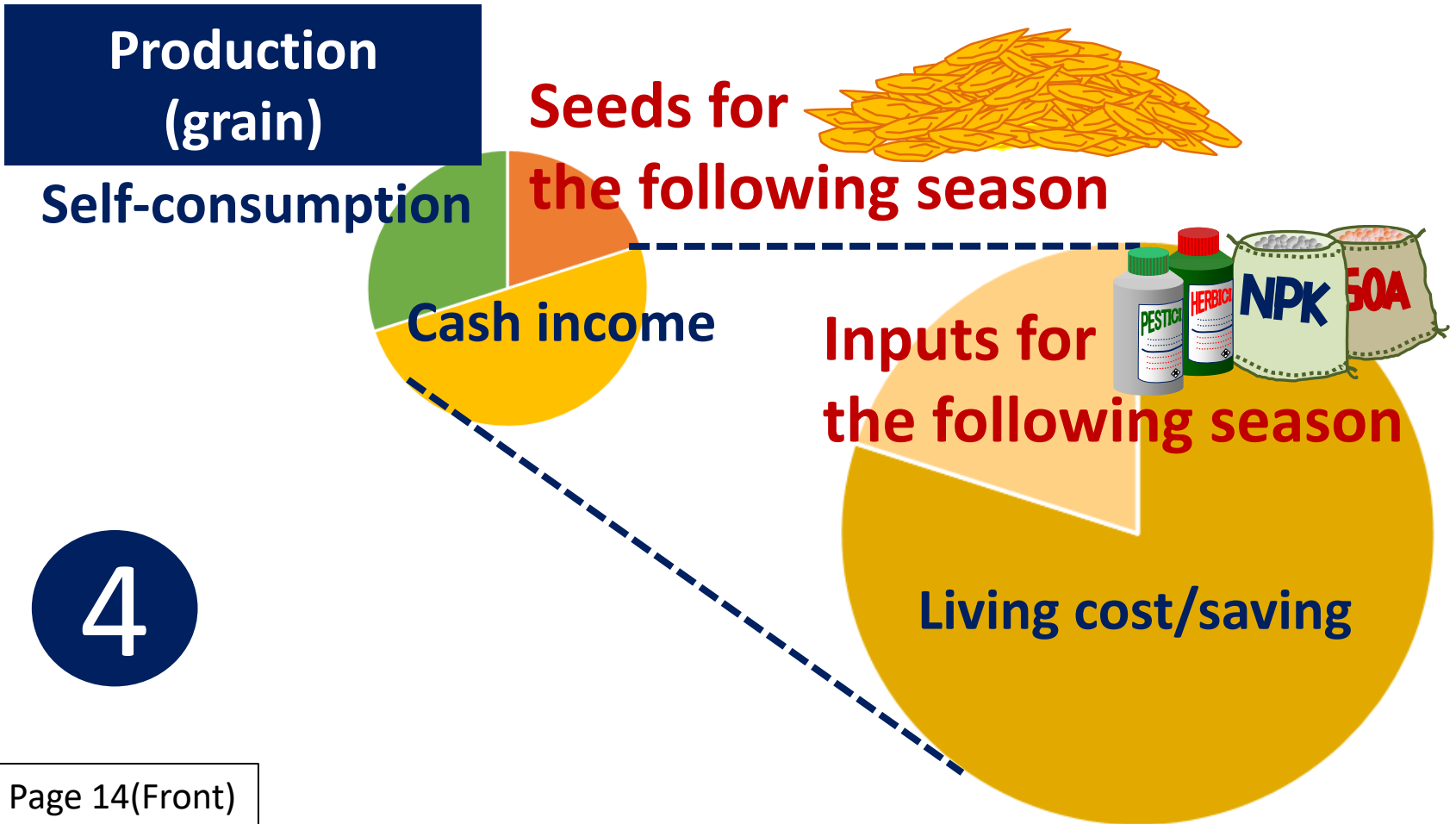
Living cost/saving

4

Page 14(Front)

3. Let's make a plan!

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



4

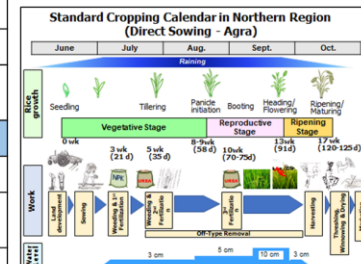
Discuss with the farmers:

- 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
Weeding	3-13 weeks	Weeding hoe
Fertilizer application	3-13 weeks	Fertilizer, container, scale
Off-type removal	13-16 weeks	Hand removal
Harvesting	18 weeks	Sickle



Sample action plan

Rice cropping calendar

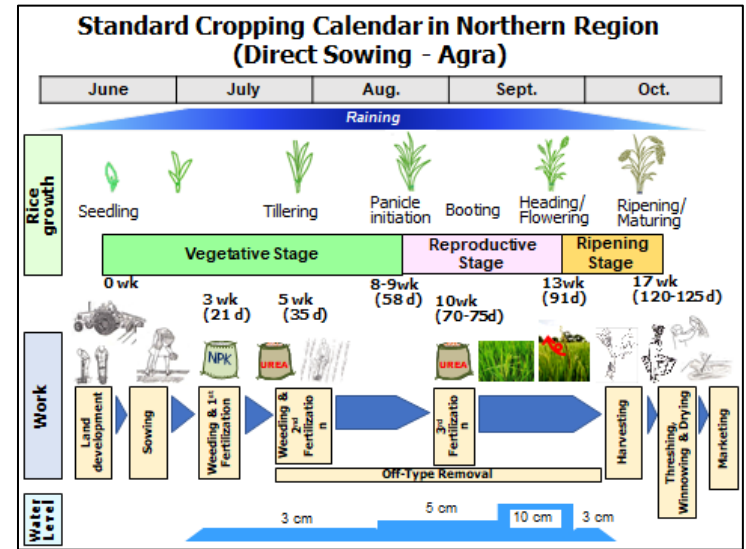
Let's prepare Action plan!

3. Let's make a plan!

Action plan and Rice cropping calendar

Field work	Time frame	Tool and inputs
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Off-type removal	13-16 weeks	Hand removal
Harvesting	18 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

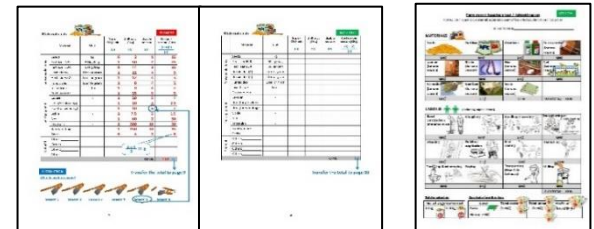
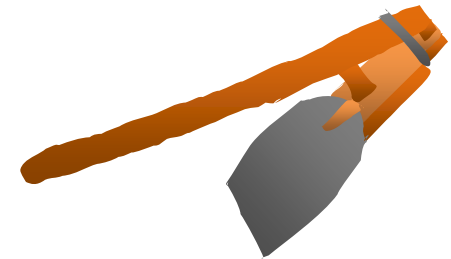
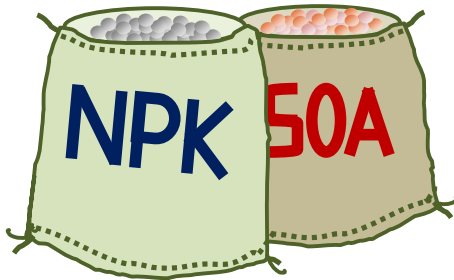
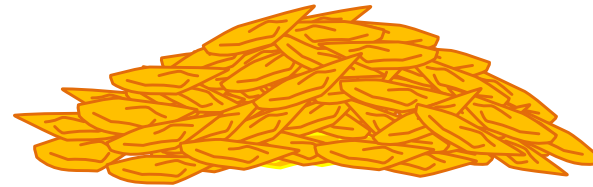
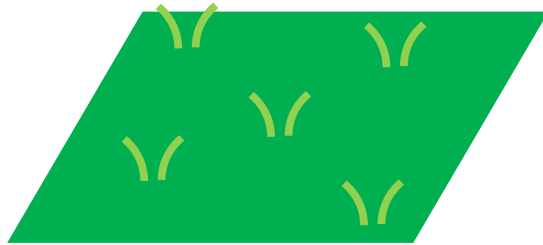


Page 16(Front) Farm record keeping book or sheet



4. Let's implement!

Start recording your expenditure

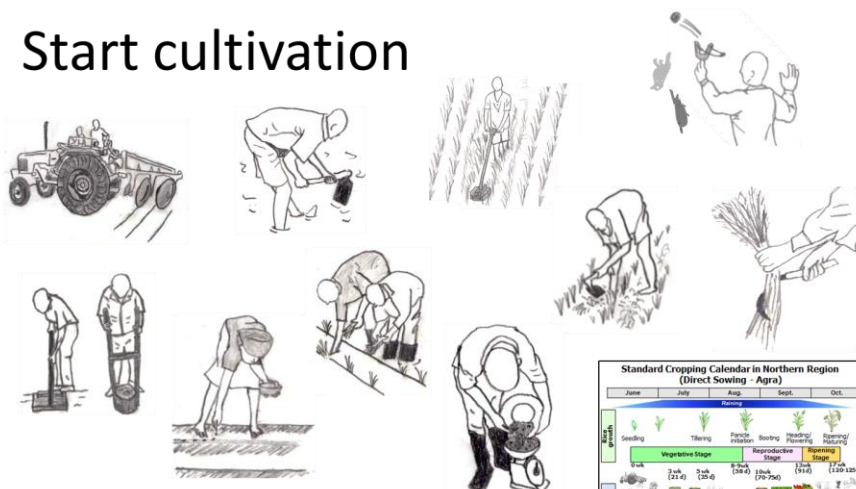


Discuss with the farmers:

- Start cultivation, following Action plan and Rice cropping calendar

4. Let's implement!

Start cultivation



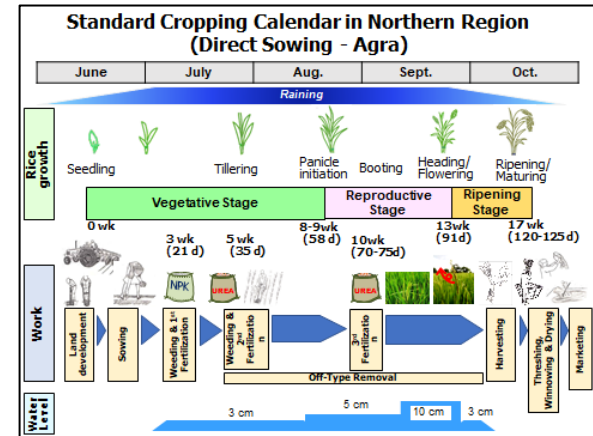
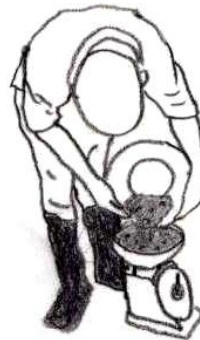
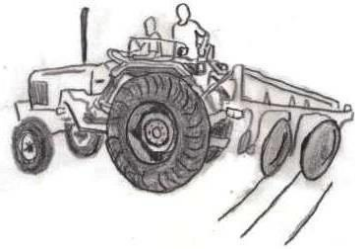
Standard Cropping Calendar in Northern Region (Direct Sowing - Agra)

	June	July	Aug.	Sept.	Oct.
Planting					
Seedling					
Transplanting					
Harvesting					
Threshing					
Winnowing					
Drying					
Storage					
Marketing					
Planting					
Seedling					
Transplanting					
Harvesting					
Threshing					
Winnowing					
Drying					
Storage					
Marketing					

Page 17(Front) **Action plan/Rice cropping calendar**

4. Let's implement!

Start cultivation

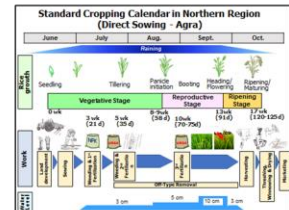


Discuss with the farmers:

- Continue to follow Action plan and Rice cropping calendar

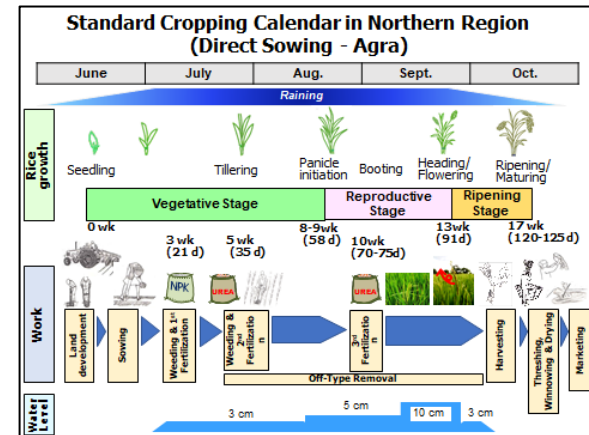
4. Let's implement!

Apply post-harvest techniques



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 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

GHC ?



GHC ?



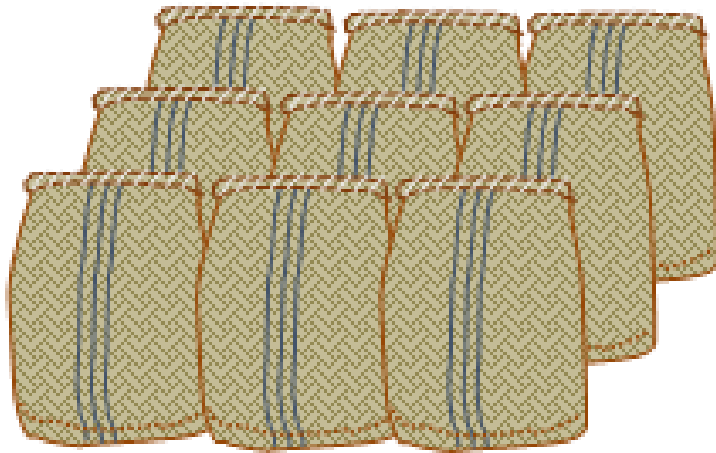
Page 20(Front) Farm record keeping book or sheet



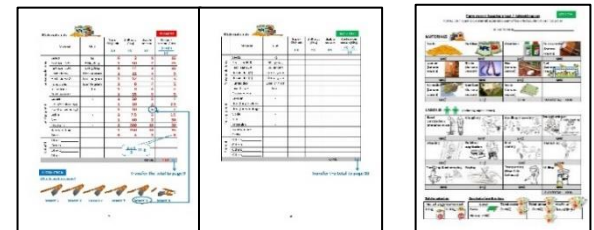
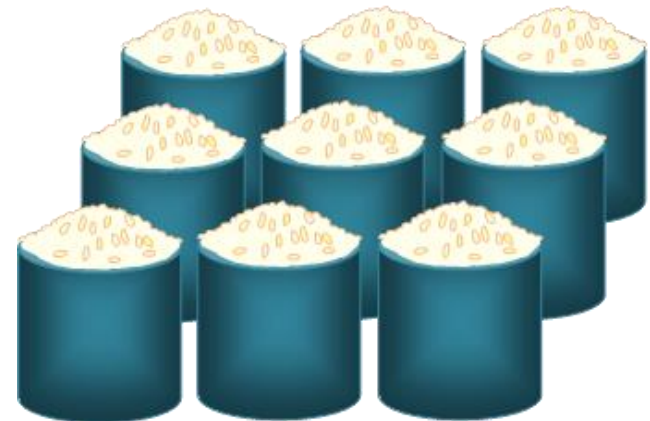
4. Let's implement!

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)

5. Let's review!

Confirm the profit or loss

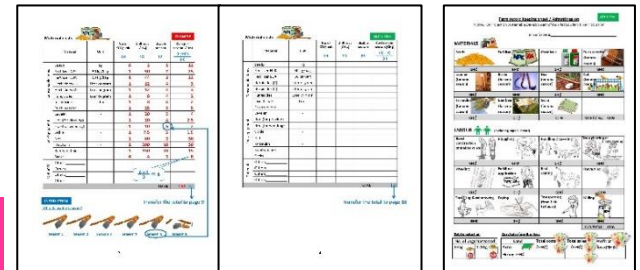
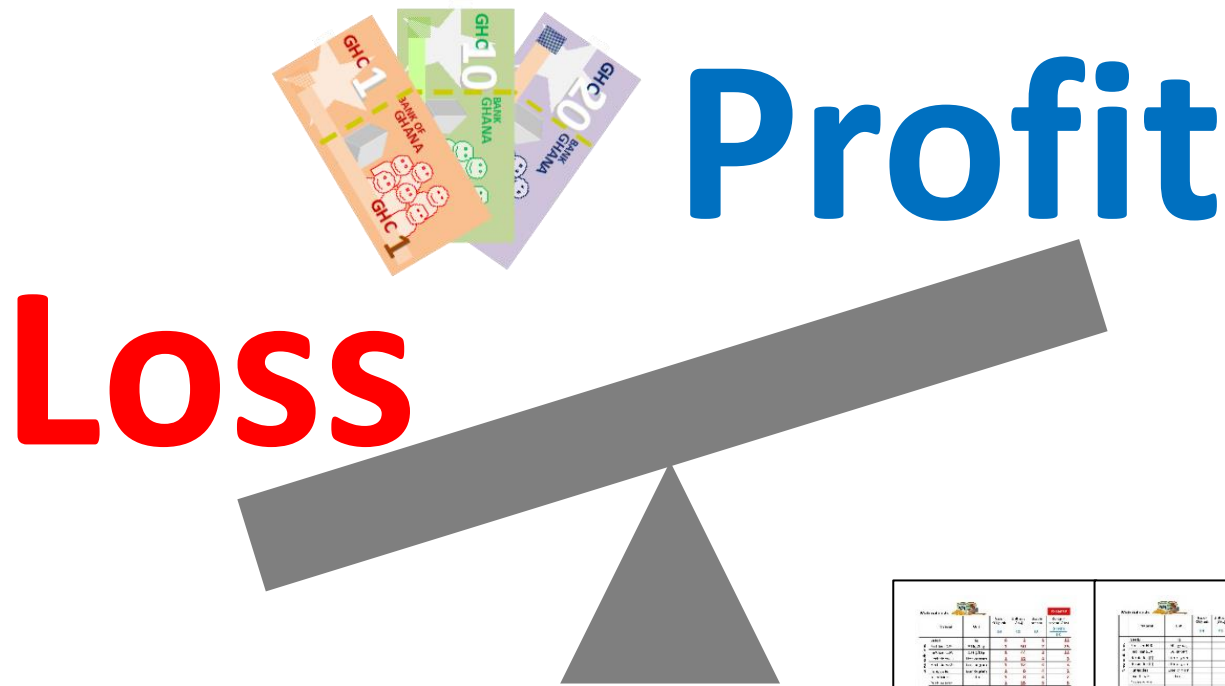


Loss Profit

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 book or 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

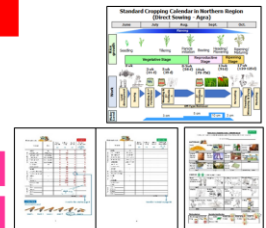
5. Let's review!

What went good? What went wrong?



Action plan/Rice cropping calendar

Farm record keeping book or sheet



5. Let's review!

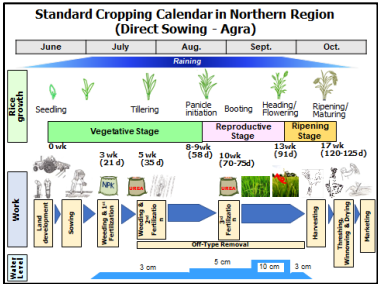
What went good? What went wrong?

GOOD?

Profit

Loss

WRONG?



Action plan/Rice cropping calendar

Farm record keeping book or 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!

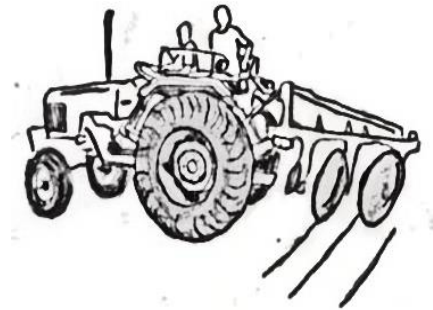
Plan for the following season





MOFA/JICA TENSUI RICE PROJECT

Good Practices of Tractor Access Improvement -Northern Region-



Rice Cultivation

Farming Management

Land Development

Extension


Other



Good Practices of Tractor Access Improvement

- In Northern State, issues of tractor access are facing many farmers. Today, let's learn about good practices of improving tractor access in the TENSUI Project farmers' field!

FM-OST-XX



MOFA/JICA TENSUI RICE PROJECT

Good Practices of Tractor Access Improvement -Northern Region-

Farming Management



Farmers AEA Tractor Owner Tractor Operator

Page 1 (Front)

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



Case 1:

Finding a Flexible Tractor Owner

-Wungu, West Mampursi-



Case 1:

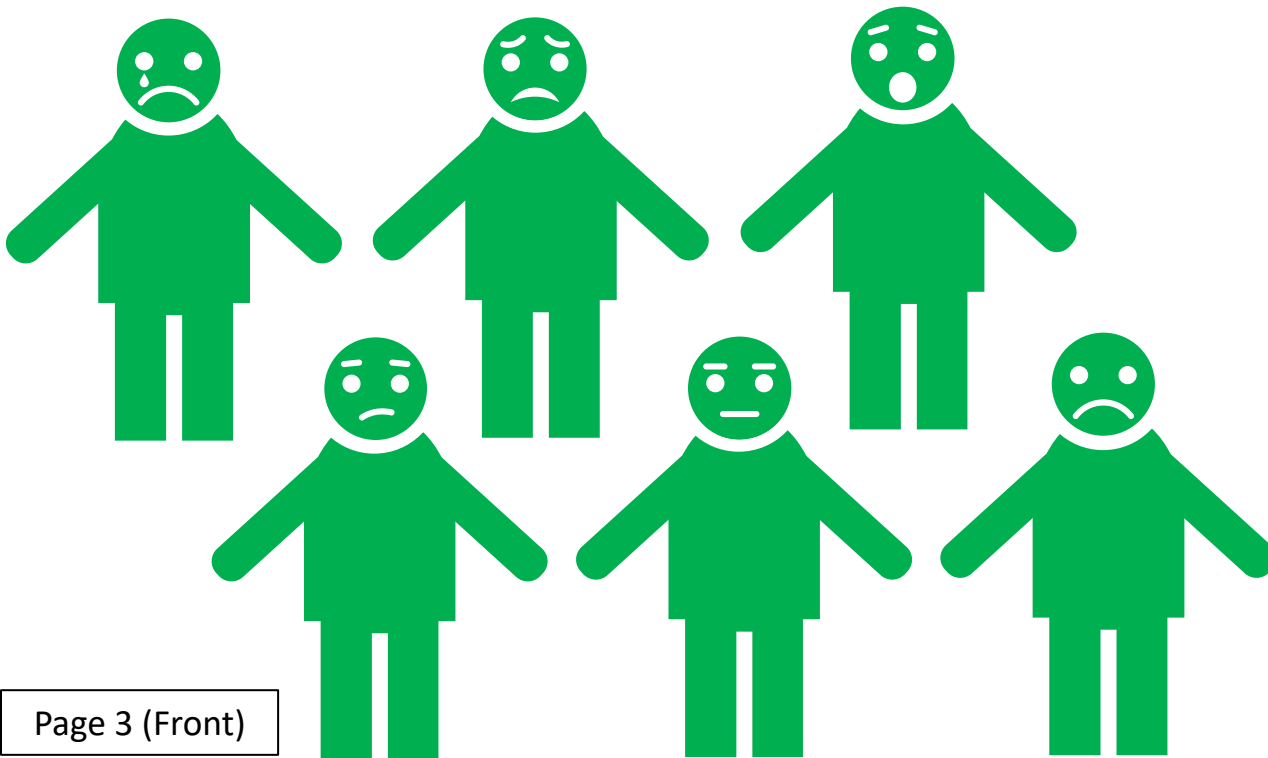
- Let's learn about the good practice of Wungu Community in West Mampursi District!

(shared in August 2014)

Case 1:

**Finding a Flexible
Tractor Owner
-Wungu, West Mampursi-**

At the Beginning...



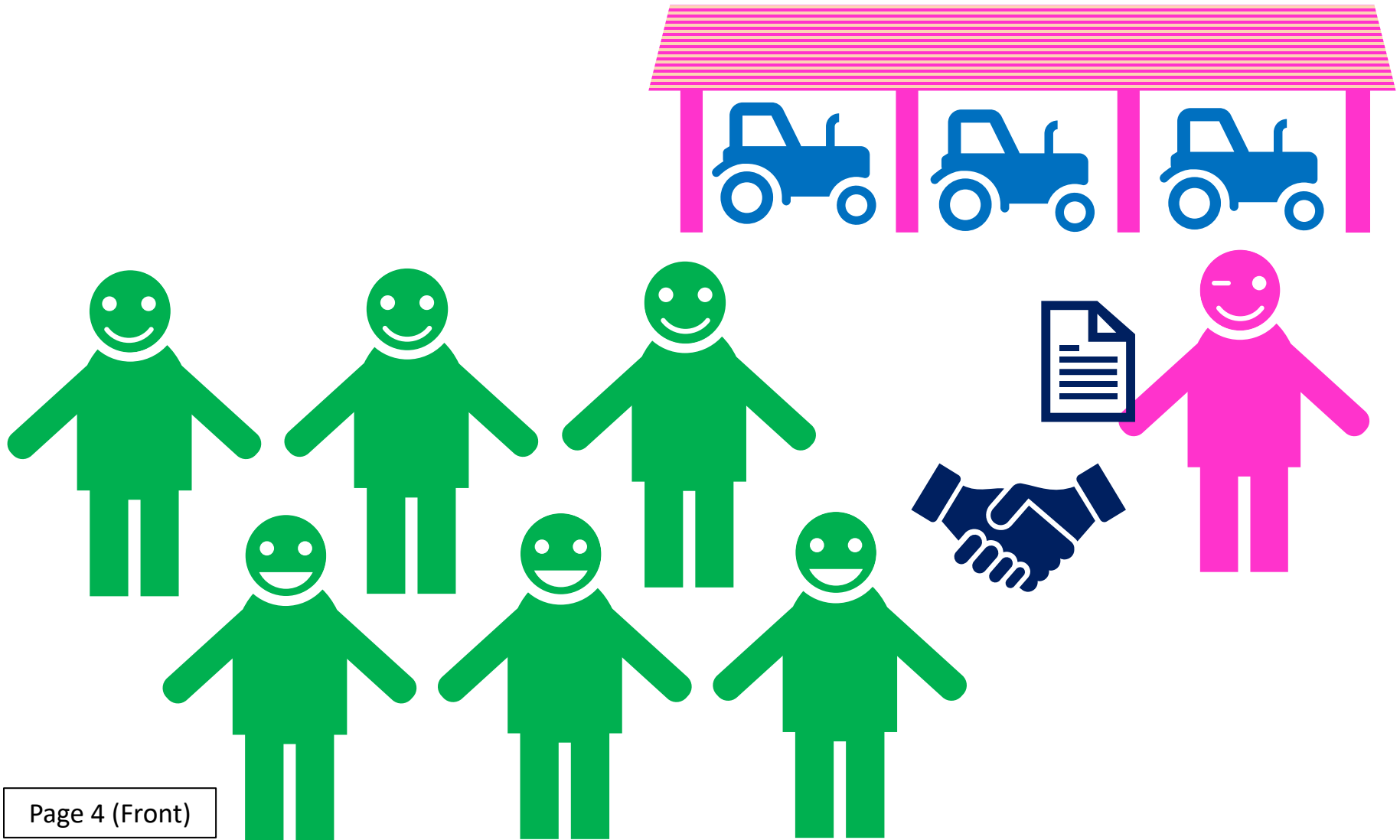
At the Beginning...



- Wungu Farmers Group (45 members: 1 acre per member) had initially failed to have peaceful agreement with a tractor owner because they thought he sounded too bossy during the negotiation. The owner was almost threatening them of police arrest in case members fail to make the balance payment in kind.



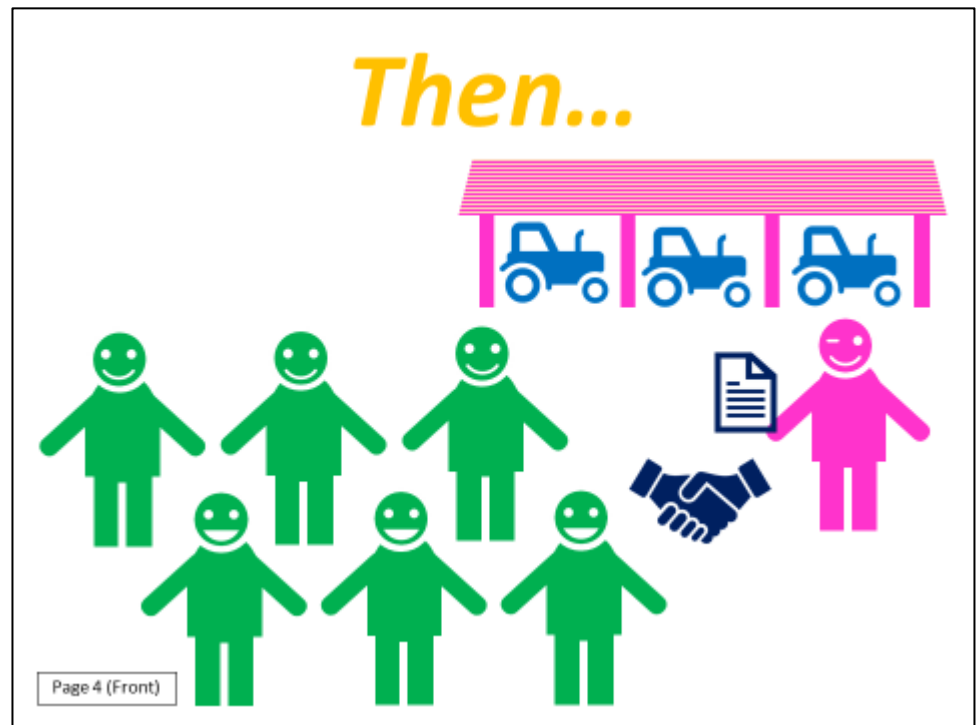
Then...



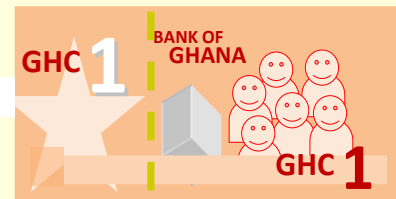
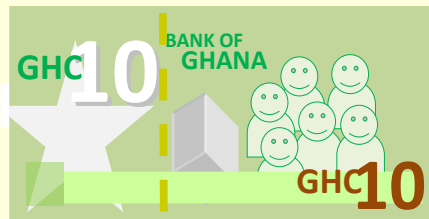
Then...



- Then, members found another tractor owner in Walewale who was more flexible on agreement.
- The new tractor owner understood the situation well that no farmer can guarantee sufficient rice yield before they start cultivation.



Agreement!



+



Deposit GH¢12

Wungu Farmers' Group:



Payment in Kind

Tractor Owner:

Kaku Baba



Agreement!



- The members and the tractor owner came up to agree over deposit GHC12 and payment in kind with 84kg paddy rice even if the members have to sell other crops to buy 84kg paddy rice and use it to pay to the tractor owner.
- The members appreciated this flexibility of payment in kind and they finally reached a peaceful agreement with the tractor owner.

Agreement!

GH¢10 BANK OF GHANA
GH¢10

GH¢1 BANK OF GHANA
GH¢1

GH¢1 BANK OF GHANA
GH¢1

+

84 kg

Deposit GH¢12 **Payment in Kind**

Wungu Farmers' Group: Tractor Owner:
Kaku Baba

Page 5 (Front)



Case 2:

Timely Operation by a Tractor Owner *-Nachimbiya, Tamale Metro-*



Case 2:

Let's learn about the good practice of
Nachimbiya Community in Tamale Metro!

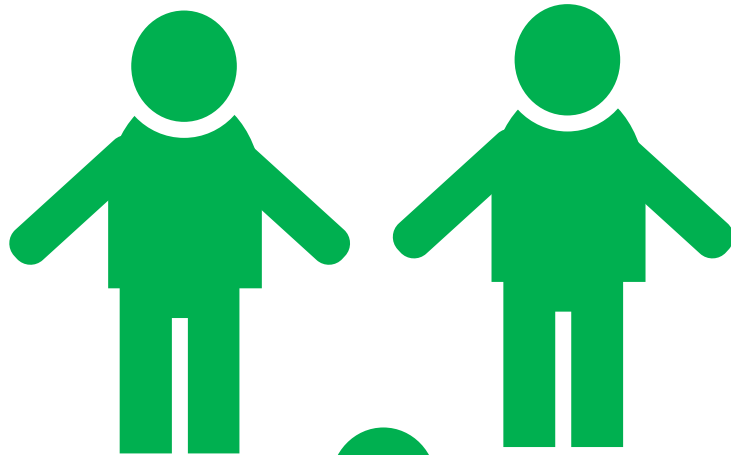
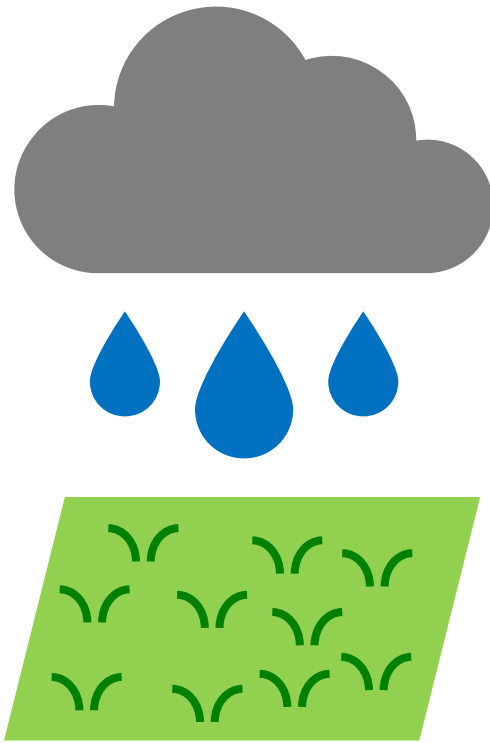
(shared in August 2013)

Case 2:

**Timely Operation by a
Tractor Owner**

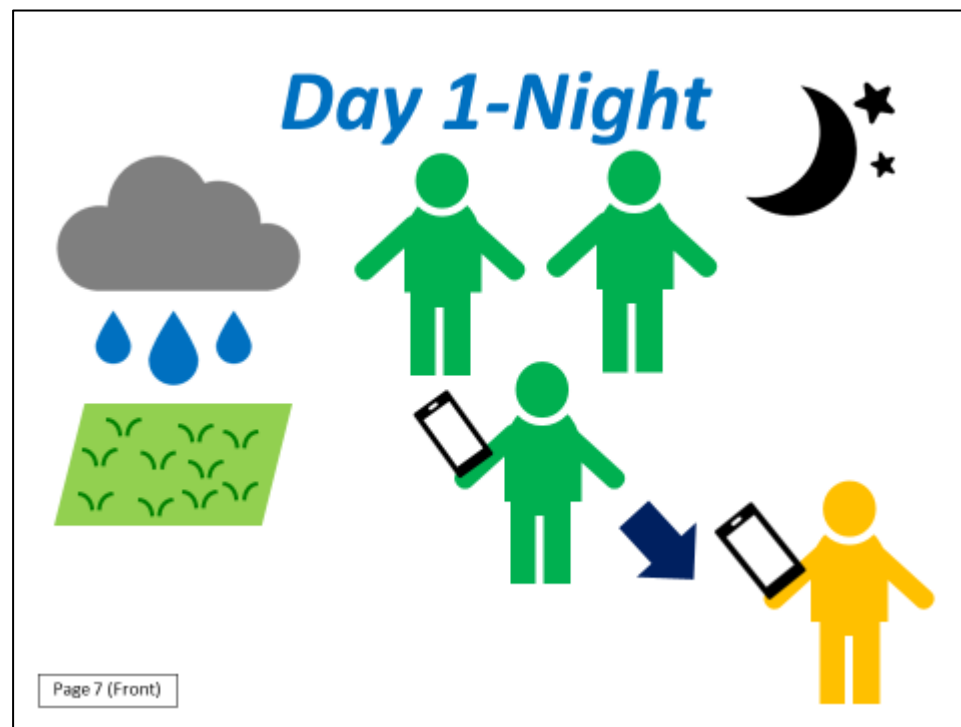
-Nachimbiya, Tamale Metro-

Day 1-Night

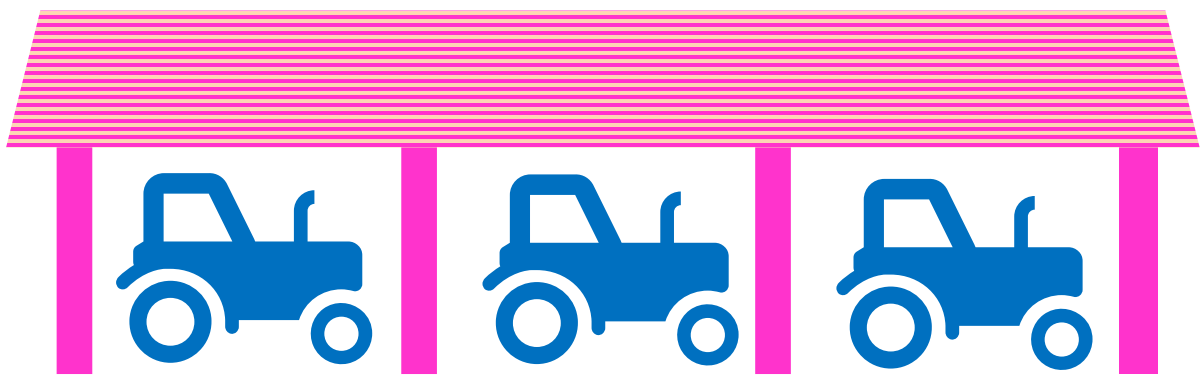
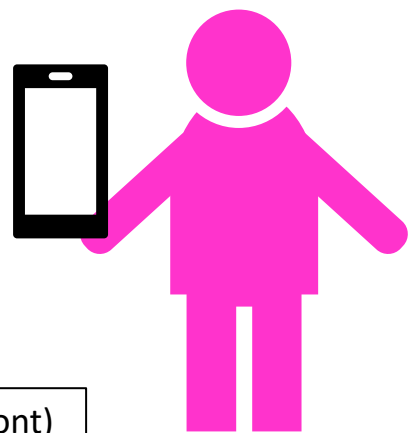
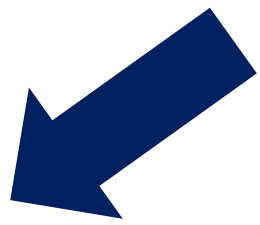


Day 1-Night

- The Nachimbiya farmers' group (30 members: 1 acre per member) had agreed with a tractor owner over GHC10 deposit and payment in kind after harvest.
- Members called the AEA at night of Day 1, when they had a good rainfall.

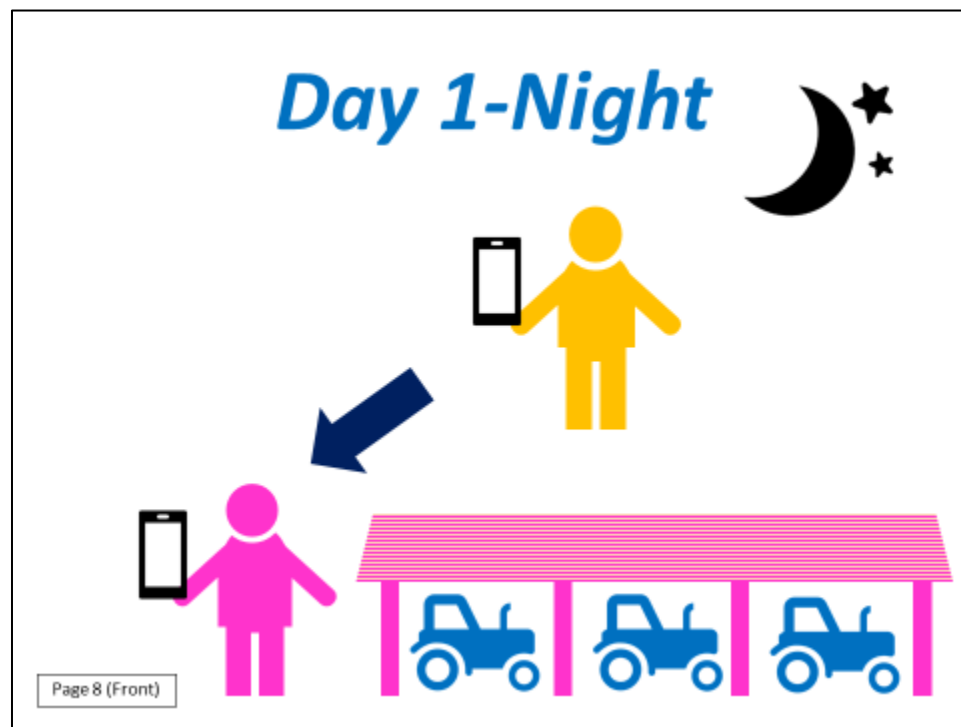


Day 1-Night



Day 1-Night

- Then, the AEA asked the tractor owner to come as soon as possible.
- Although that was late night, the tractor owner gave a positive response to the AEA as he understood the urgent situations in the field.



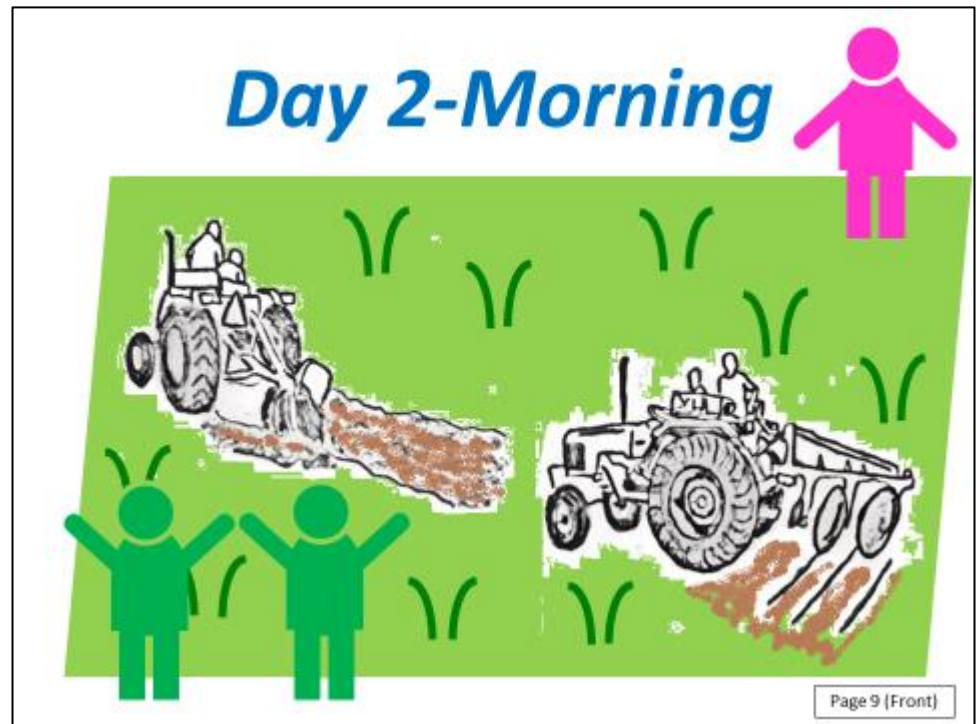
Day 2-Morning



Day 2-Morning



- The tractor owner came to the community at about 5:00am to 6:00am of Day2.
- This is how the members were able to stick to the agreement with loyalty without engaging any other tractor owners.
- Smooth contact between farmers and AEAs, as well as between AEAs and tractor owners, is important.





Case 3:

***If There is No Nearby Tractors
Which Can Plow for the
Community...
-Kpegu of Kumbung-***



Case 3:

- Let's learn about a good practice of Kpegu Community in Kumbung District!

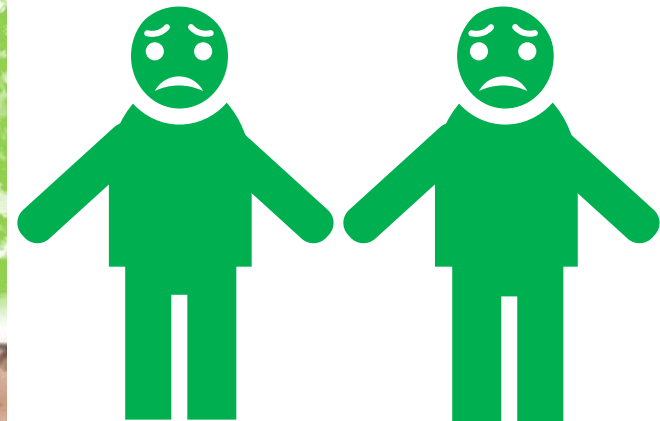
(shared in May 2018)

Case 3:

*If There is No Nearby Tractors
Which Can Plow for the
Community...*

-Kpegu of Kumbung-

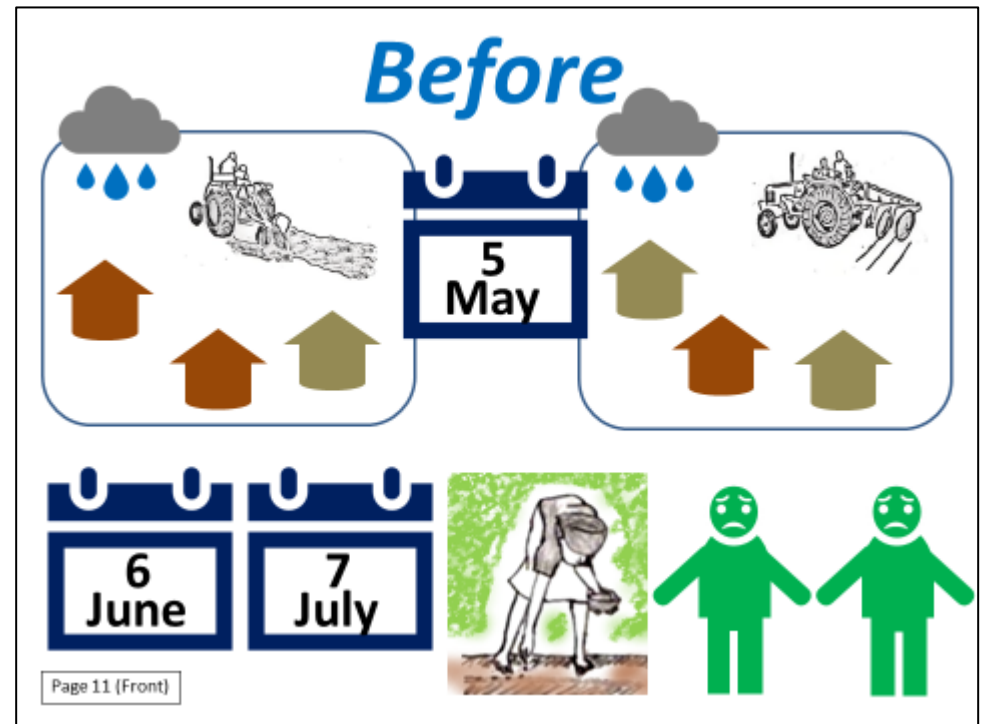
Before



Before



- Farmers in Kpegu community in Kumbungu District always had challenges in accessing tractor services during farming seasons.
- They tried to ask tractor owners as a group to plough for them. However, the fundamental problem was that the demand was outstripping the supply and ploughing had to be done here and there around the same time in neighboring communities.
- Then, tractor operators left for next communities before ploughing for Kpegu.
- This always called for late planting of their crops, leading to low productivity and low yield due to shortage of rain.

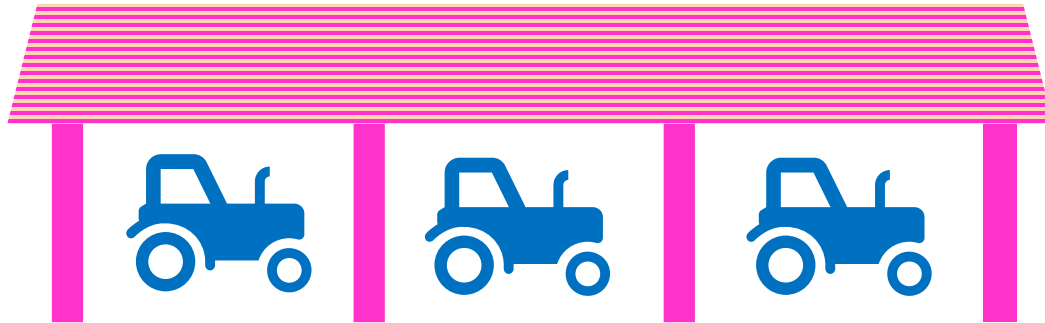


Then, in 2018..



5
May

Tamale Metro



40km

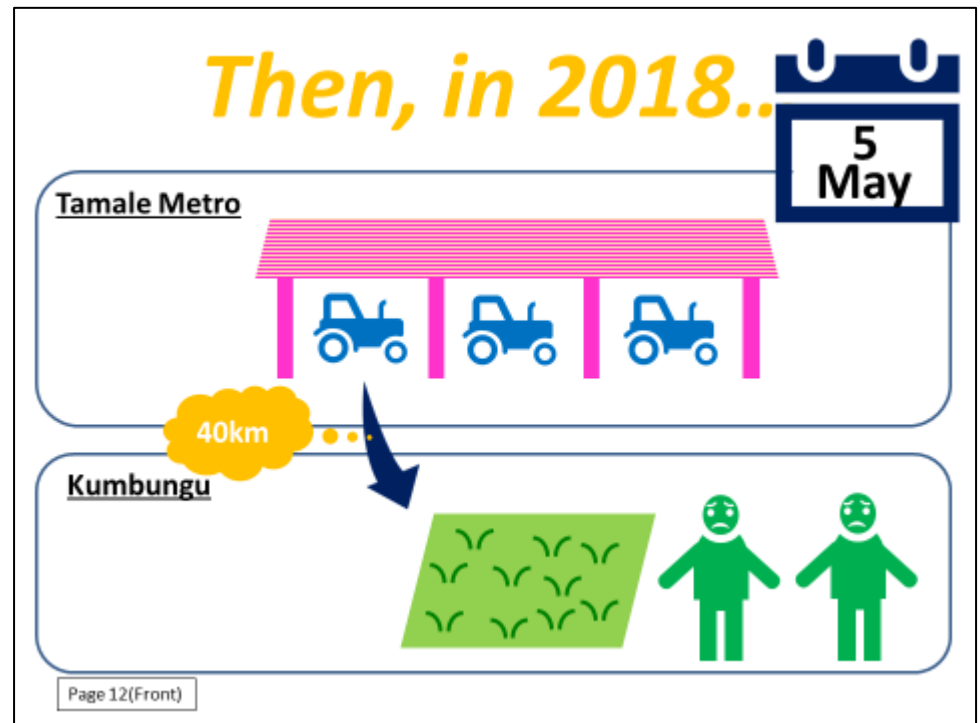
Kumbungu



Then, in 2018...



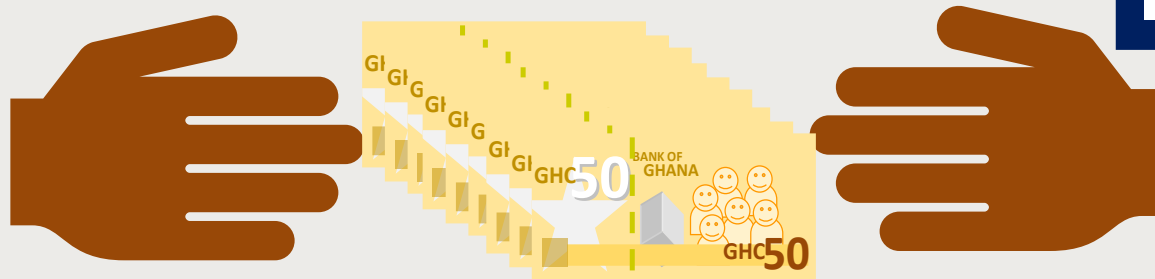
- To solve the problem, in 2018, farmers were connected by the TENSUI2 Project with a tractor owner in Tamale Metro, which was 40km away from their community, for the first time. It was possible to find tractors which were free in May because many tractor owners were still waiting for a rainfall before ploughing their own farms.
- The idea was realized also considering that transportation fee is generally not included in operation fee.



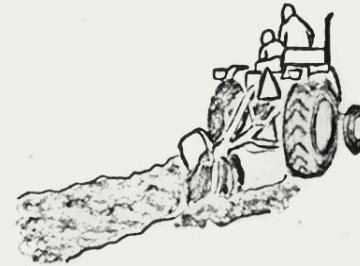
Agreement!



5
May



Payment in Cash in Advance for 100 acres



Immediate Release of a Tractor upon a Rainfall

Kpegu Farmers' Group:



Tractor Owner:

Kaku Baba



Agreement!



- Farmers were finally able to hold a meeting with a tractor owner early in May 2018 in Kpegu.
- During the meeting, farmers assured the tractor owner that they are ready to pay cash for his services even if they have to provide the payment in advance.
- They also assured the tractor owner that the tractor could get more than 100 acres (40 hectares) to plough once it comes to their community.

Agreement!

5 May

Payment in Cash in Advance for 100 acres

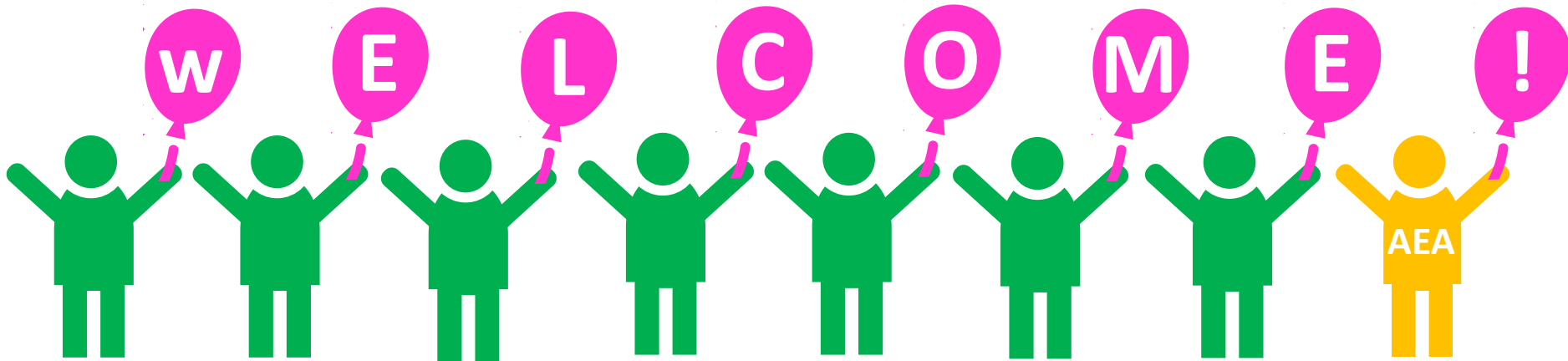
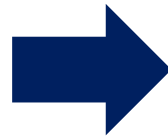
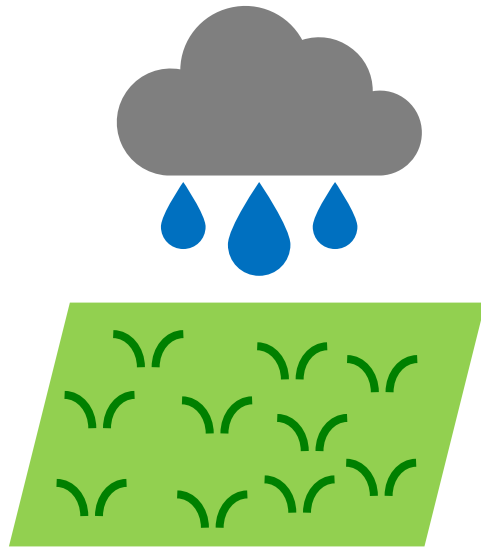
Immediate Release of a Tractor upon a Rainfall

Kpegu Farmers' Group: _____

Tractor Owner: Kaku Baba

Page 13 (Front)

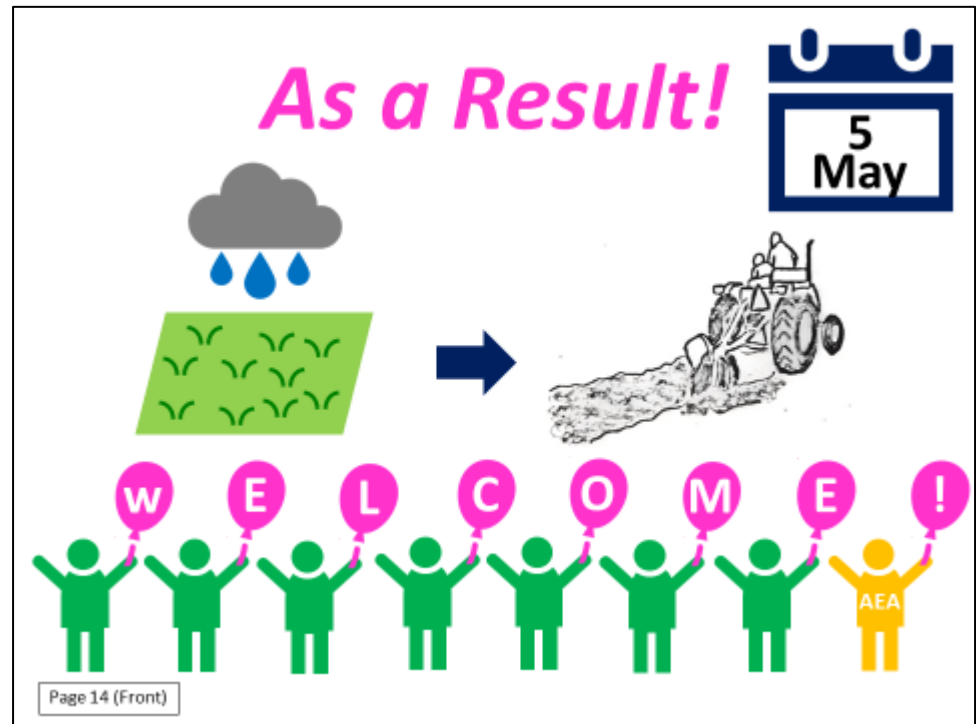
As a Result!



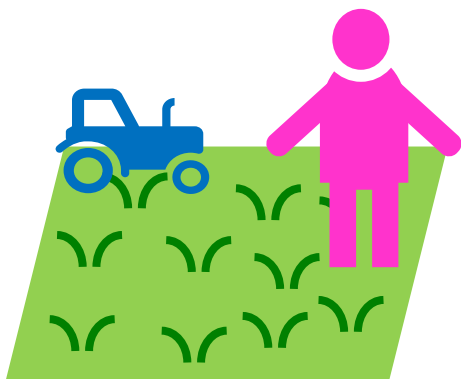
As a Result!



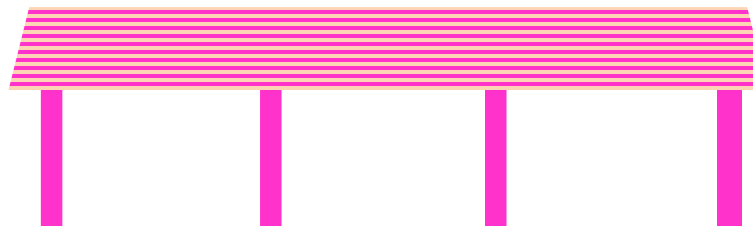
- After a week, when the community had a heavy rainfall, they access the tractor owner through the Project and tractor operators already started ploughing in the morning of the following day with assistance by the AEA and farmers.
- Although the tractor owner called the operators 2 days later to stop ploughing the rest of the land and come back to plough his own farm, tractor operators stayed in the community to finish all the work as they were very happy with the reception given to them by community farmers.



Lesson Learnt...



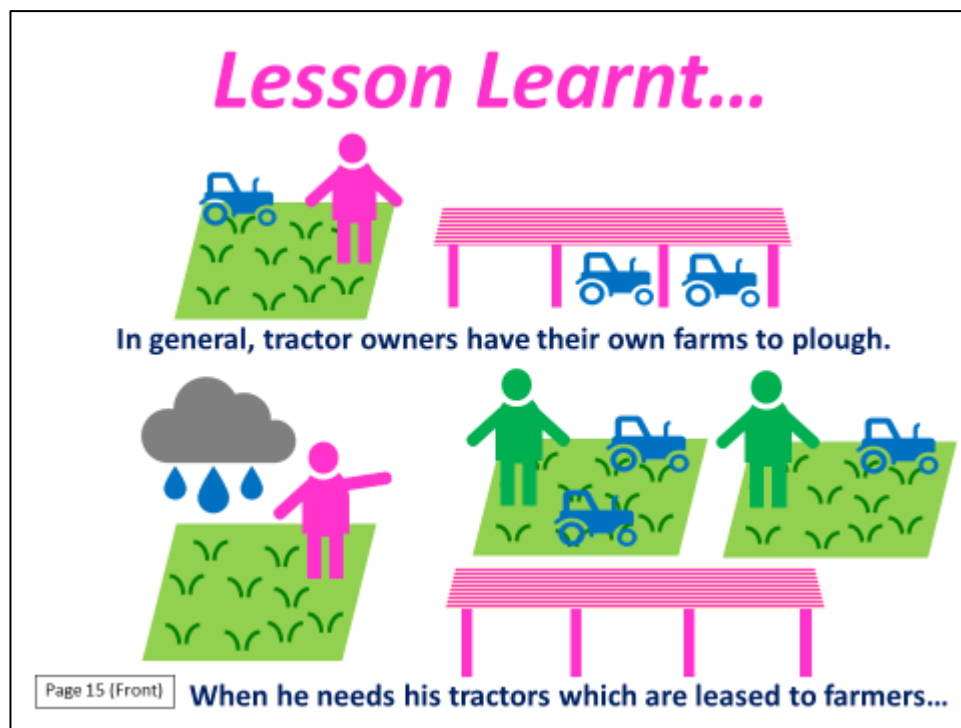
In general, tractor owners have their own farms to plough.



When he needs his tractors which are leased to farmers...

Lesson Learnt...

- In general, most tractor owners have their own farms and they use their tractors to plough the farms. In this good practice, the tractor owner tried to interrupt the operators' works in Kumbungu because he wanted the tractors to plough his own farm just after having a heavy rainfall.
- To avoid this kind of troubles, farmers and a tractor owner should agree on the number of working days and having as good relations as possible with both operators and owners.





- 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.

1st Onsite Training

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

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



- 1st 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

2nd 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 Direct Sowing)

On-Site Training

Rice
Cultivation

Farming
Management

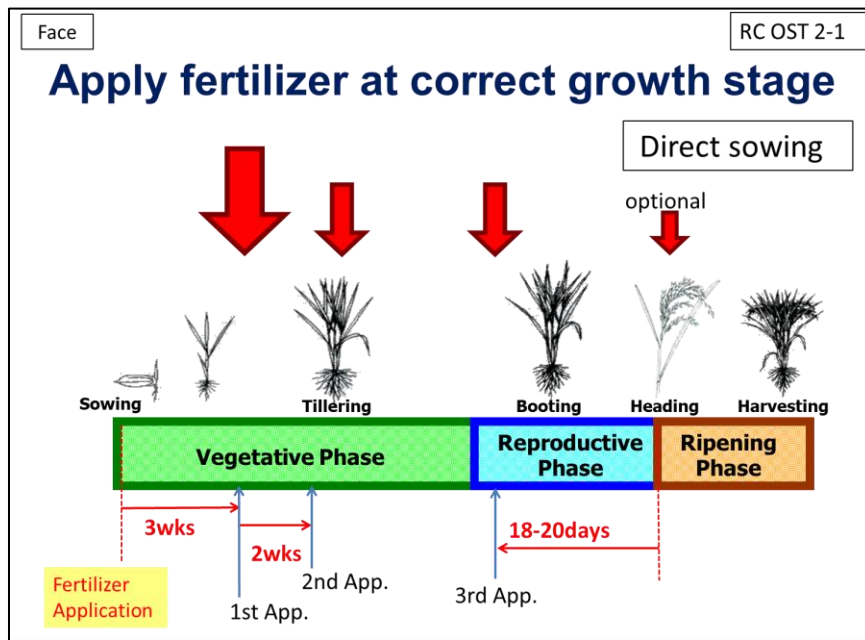
Land
Development

Extension

Other

Back side

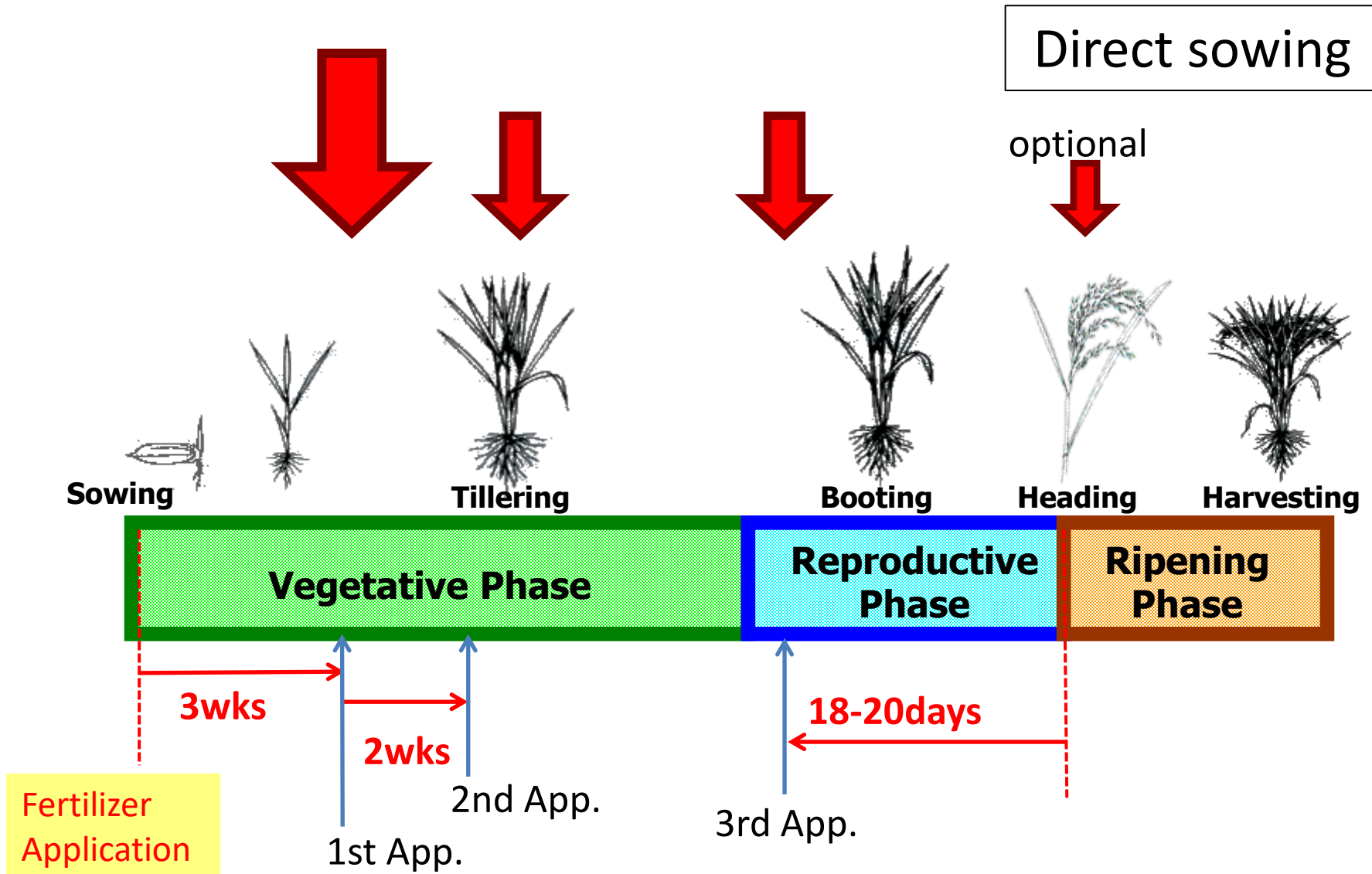
Fertilizer is applied 3 times at particular times according to growth stage.



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 3rd 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).
- 2nd and 3rd application are done by either Urea or SoA (Ammonium Sulfate).

Face

Amount of fertilizer application (60 - 30 - 30)



For 1 acre (4,000 m²)

Frequency	1 st	2 nd	3 rd
Type of fertilizer	N-P-K (15-15-15)	Urea (N:46%)	
Amount of application	80 kg	13 kg	13 kg

or

Frequency	1 st	2 nd	3 rd
Type of fertilizer	N-P-K (15-15-15)	SOA (N:21%)	
Amount of application	80 kg	29 kg	29 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 acre (4,000 m²)

Frequency	1 st	2 nd	3 rd
Type of fertilizer	N-P-K (15-15-15)	Urea (N:46%)	
Amount of application	80 kg	13 kg	13 kg

or

Frequency	1 st	2 nd	3 rd
Type of fertilizer	N-P-K (15-15-15)	SOA (N:21%)	
Amount of application	80 kg	29 kg	29 kg

Measurement of fertilizer

- If a scales are not available, container, bowl, 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 weigh of NPK (15-15-15)



➤ When NPK is heaping up of color container, it equivalent to 5kg.

[Discussion]

Ask farmers how to measure 80 kg of NPK by using a colour container.



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



NPK

= 50 kg



= 5 kg

Colour container



+



80 kg

-



50kg + 50kg - 20kg

Face

RC OST 2-1

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

13 kg

= 3 kg

Colour container

= 2 kg

Bowl

- When Urea is heaping up the height of 1.5 cm - 2 cm below the upper end of the colour container, it equivalent to 3kg.
- 1.5 -2 cm is almost same length of a thumbnail.
- When Urea is heaping up of a bowl, it equivalent to 2 kg.

[Discussion]

Ask farmers how to measure 13 kg of Urea by using a container and a bowl.



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



= 3 kg

Colour container

13 kg



= 2 kg

Bowl



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



- When SOA is filled up to the line of a colour container, it equivalents to 5 kg.
- When SOA is filled up to the line of a bowl, it equivalents to 2.5 kg.

[Discussion]

Ask farmers how to measure 29 kg of SOA by using container and bowl.



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



= 5 kg

Colour container



= 2.5 kg

Bowl

29 kg

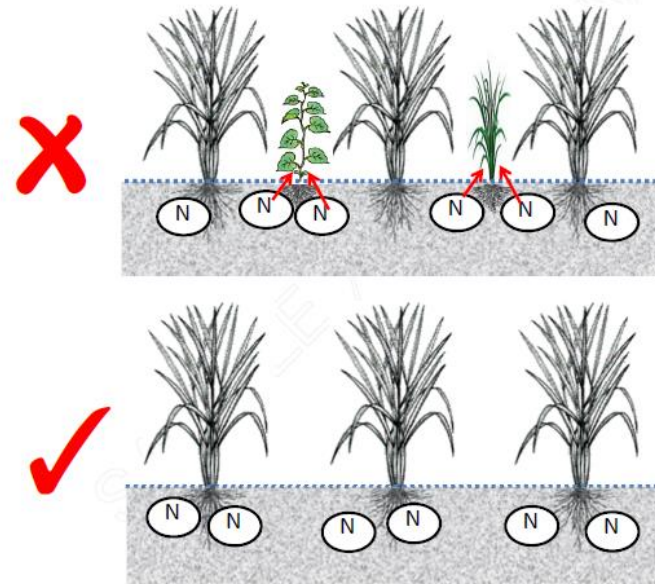


Back side

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

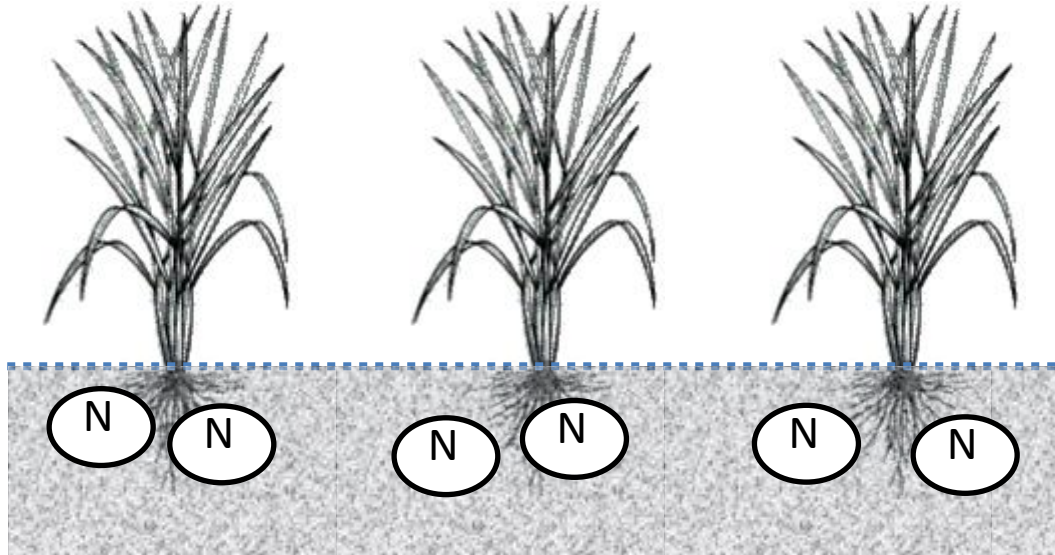
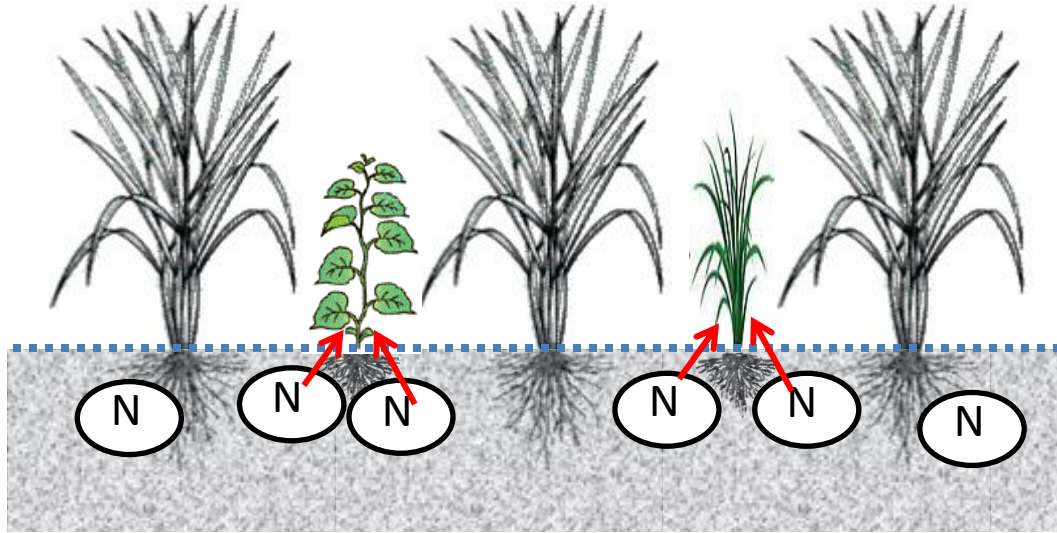
Face

Ensure the field free from weeds

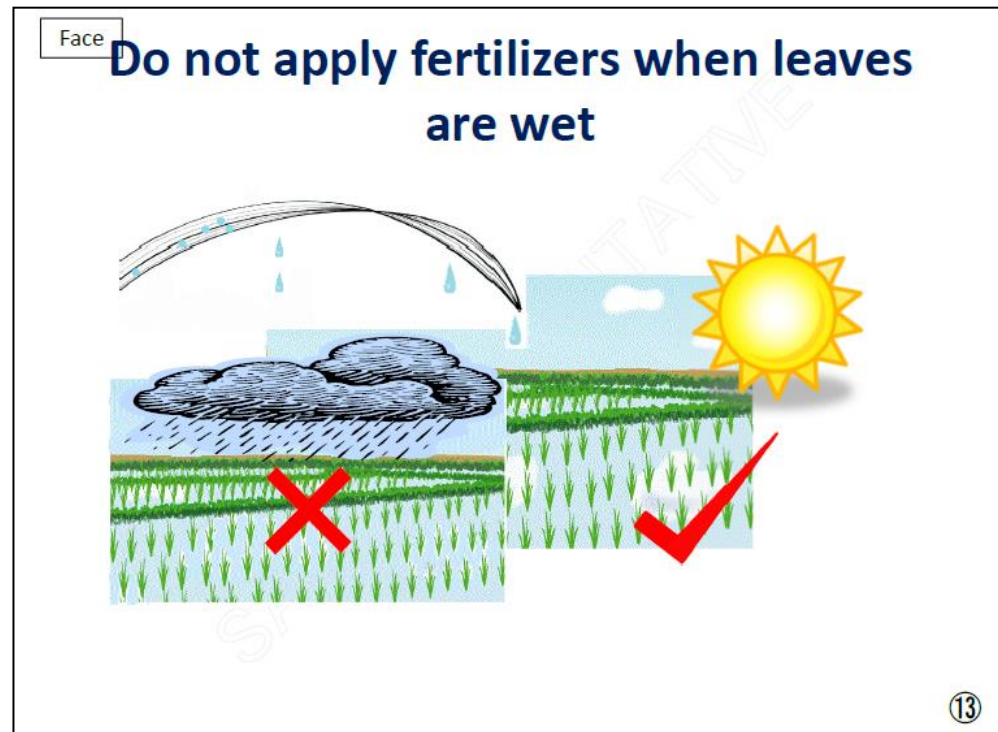




Ensure the field free from weeds

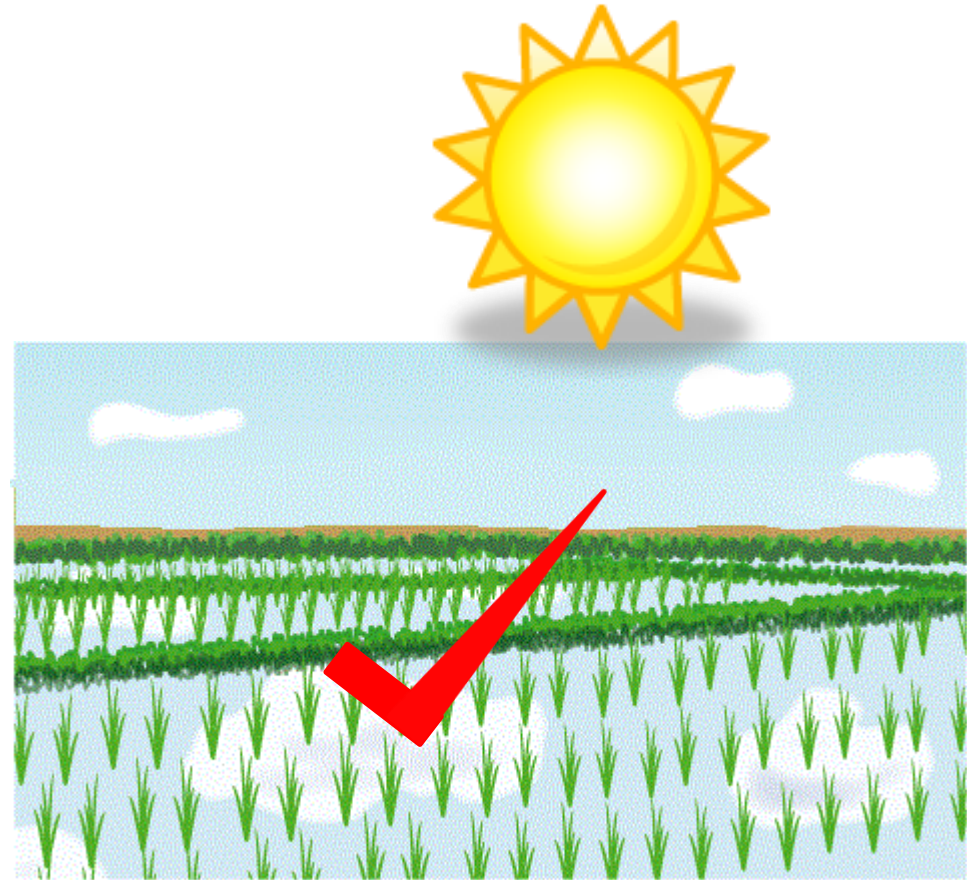
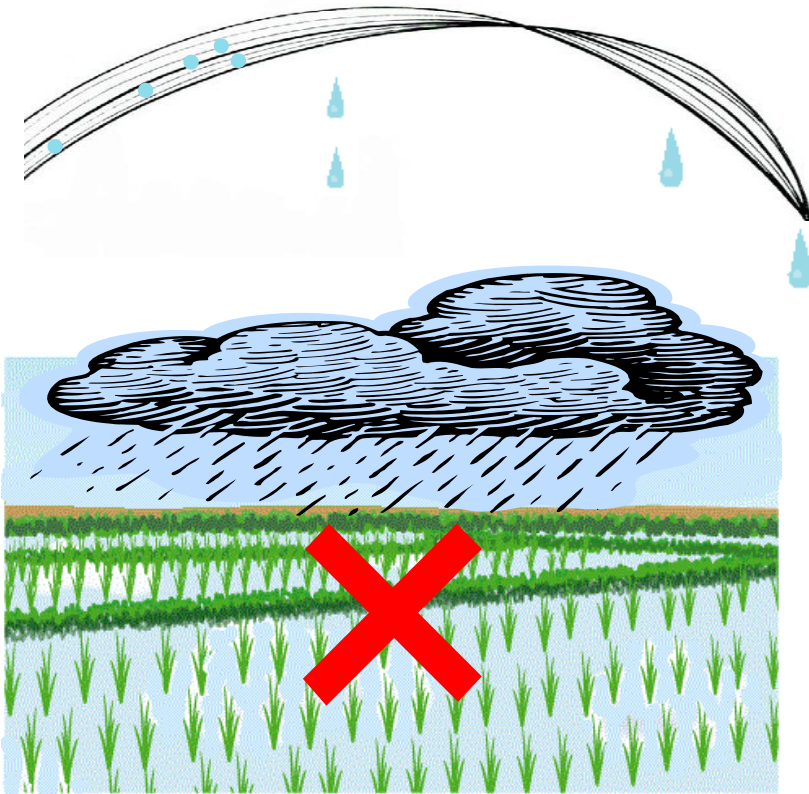


- When it is raining or immediately after rain, fertiliser should not be applied.
- If the grain of fertiliser is wet, it becomes soft and sticks to other, which becomes difficult to spread evenly.
- If leaves are wet, grains of fertiliser stick to leaves and leaves are damaged.





Do not apply fertilizers when leaves are wet



Back side



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



MOFA/JICA TENSUI RICE

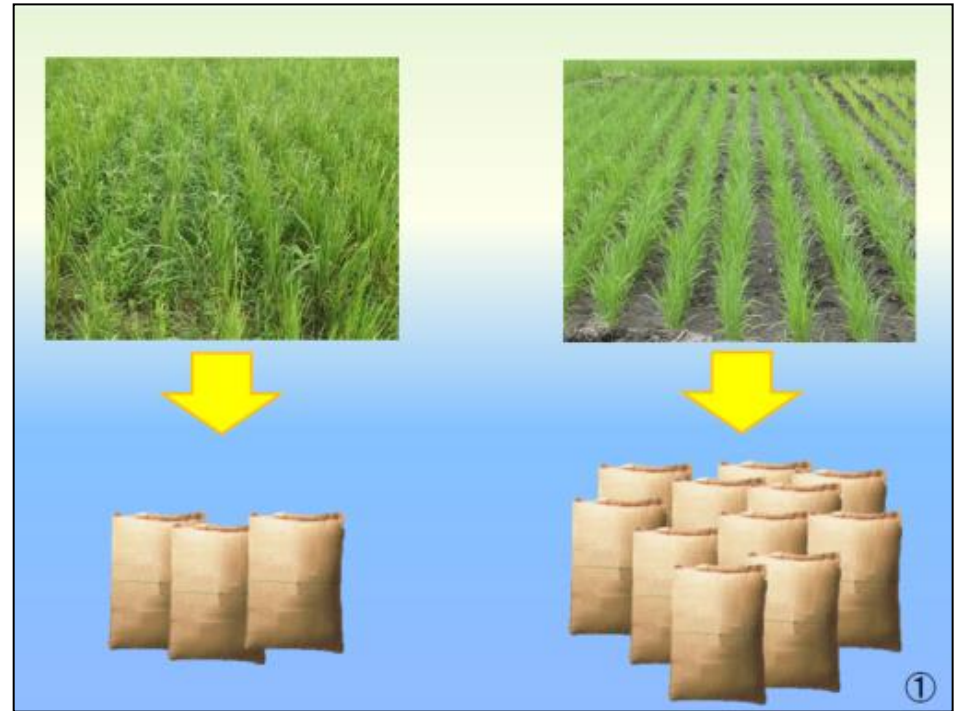
Rice
Cultivation

Weed Control

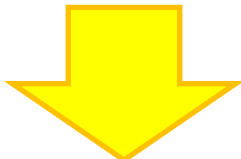
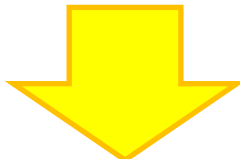


Sustainable Development of Rain-fed Lowland Rice Production
MOFA/JICA TENSUI RICE PROJECT

Back side



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



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.

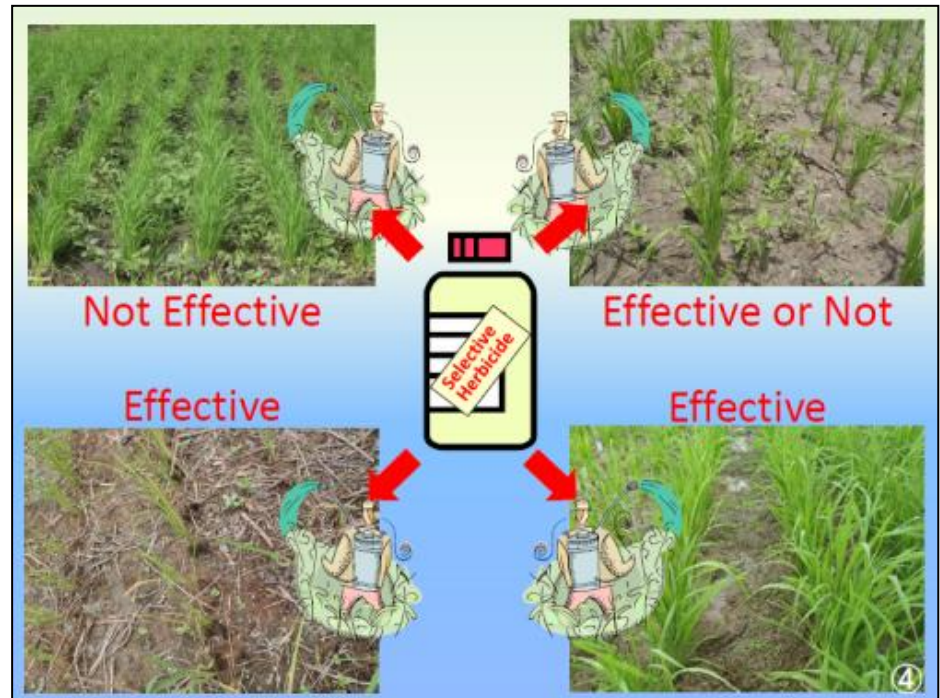
Control weeds before it is too late!



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

Face

RC OST 2-3

Chemical Control (General)



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

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



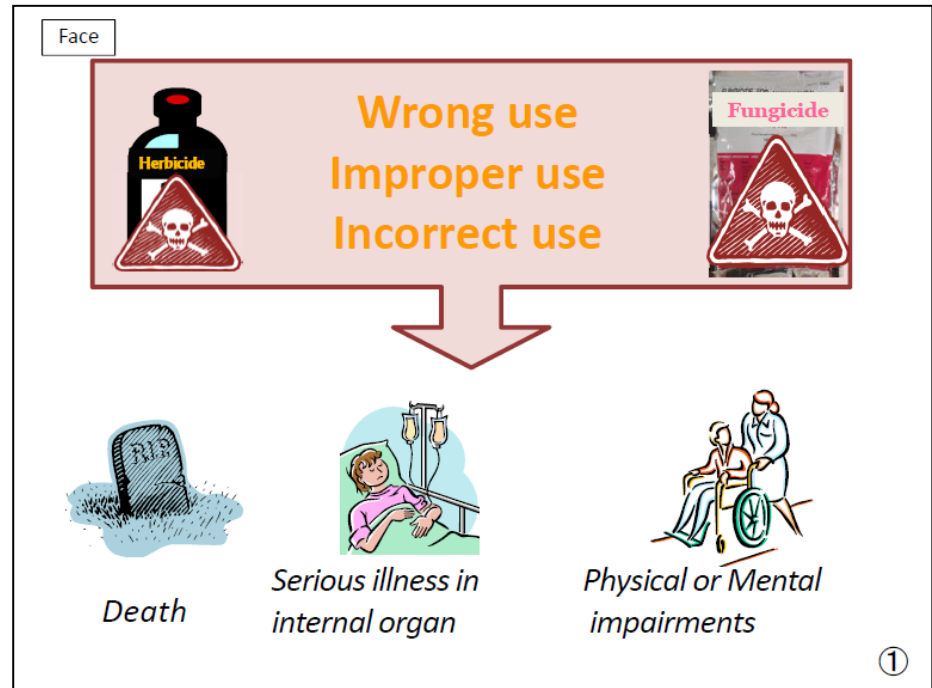
MOFA/JICA TENSUI RICE

Rice
Cultivation

Chemical Control (General)



Back side



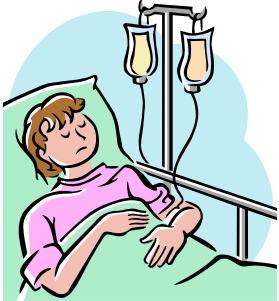
- Wrong, improper and incorrect usage of agro chemicals cause serious problem on people's health.

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

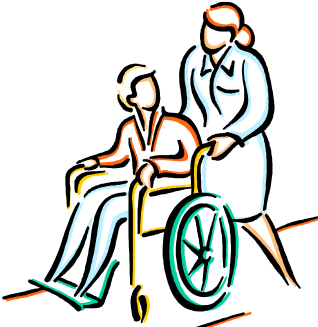
Wrong use
Improper use
Incorrect use



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.

Face

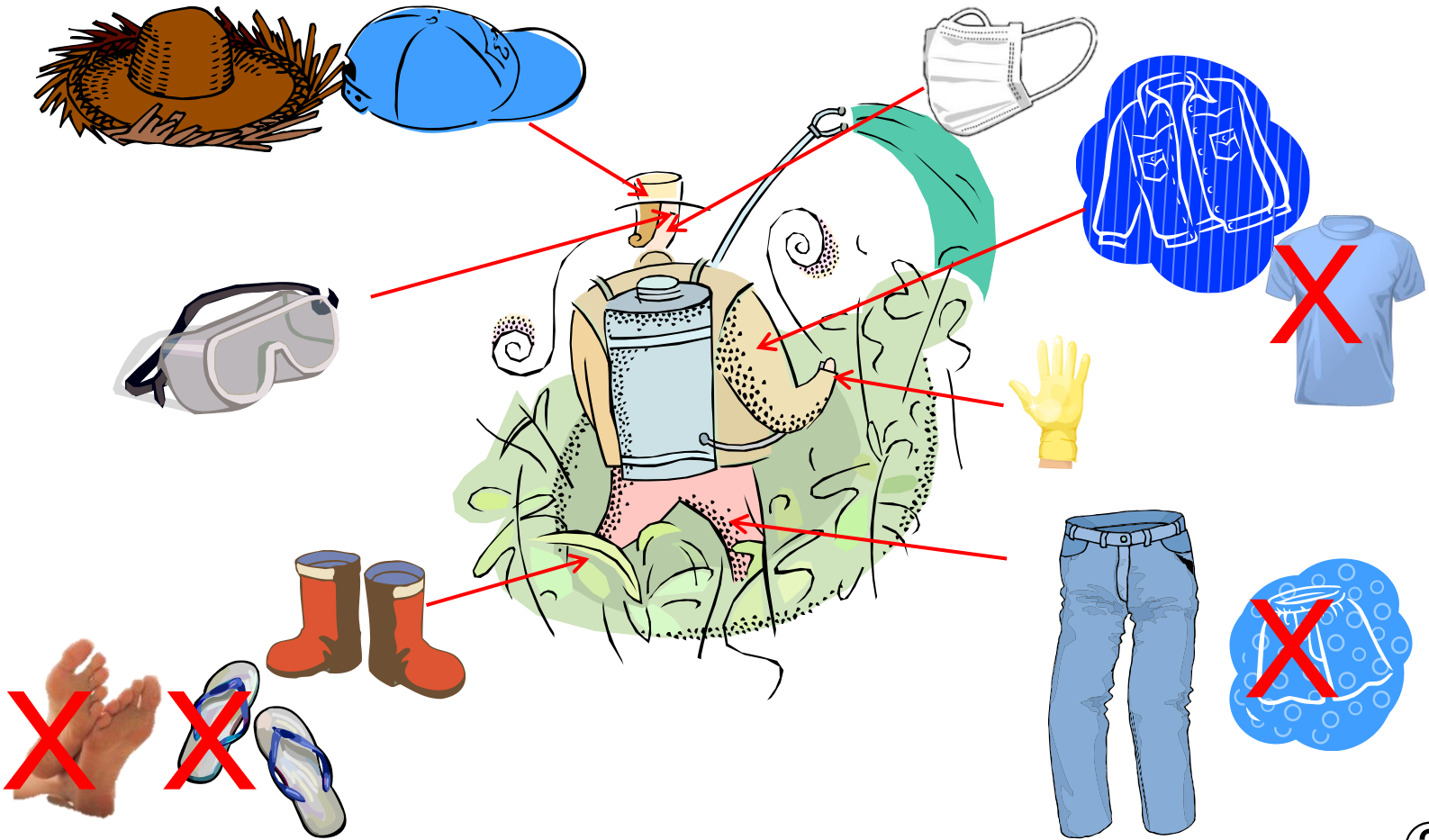
Operating precautions



②

- 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.

Face

Instructions and directions for use

Rest of diluted chemical

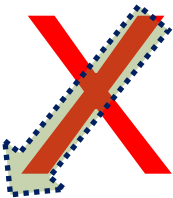
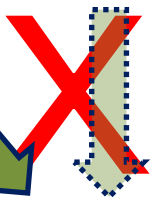
For RICE For VEGE For FRUIT

RICE

③

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

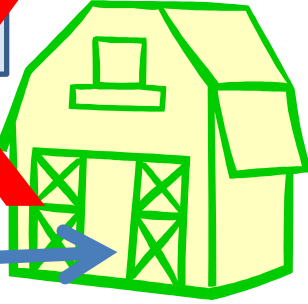
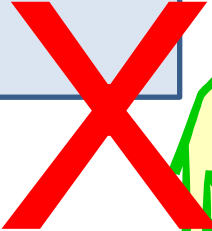
Instructions and directions for use



RICE

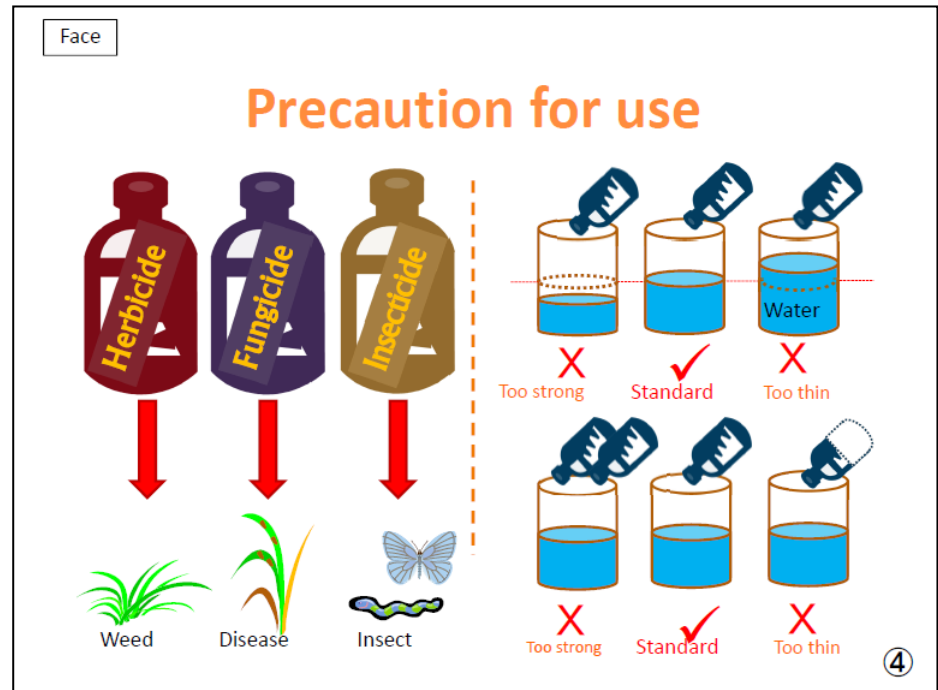


Rest of diluted chemical



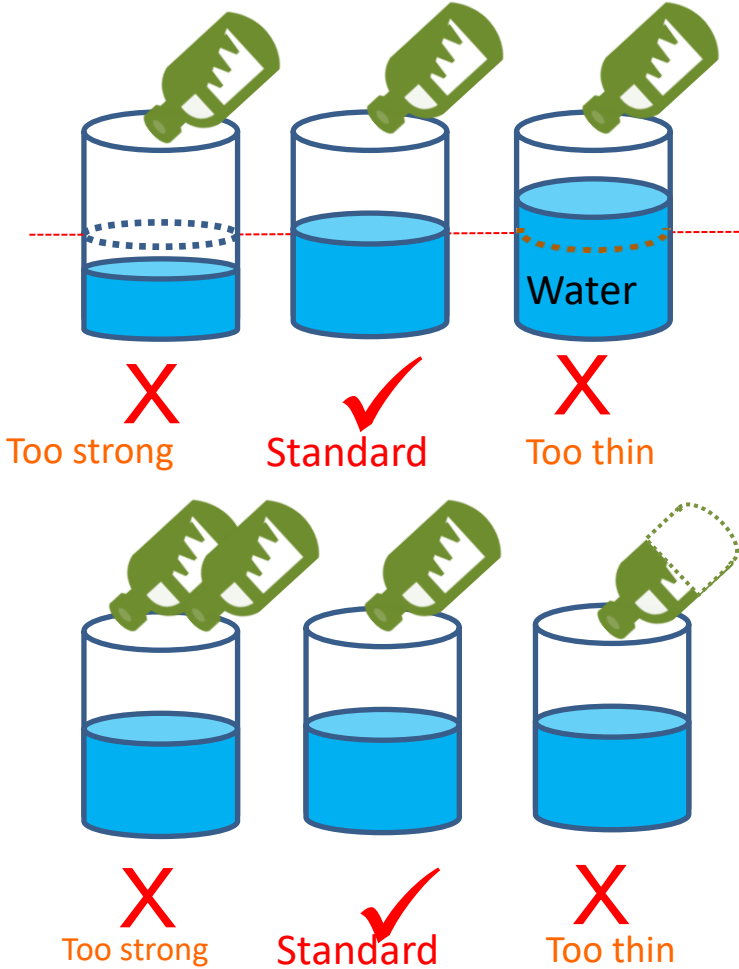
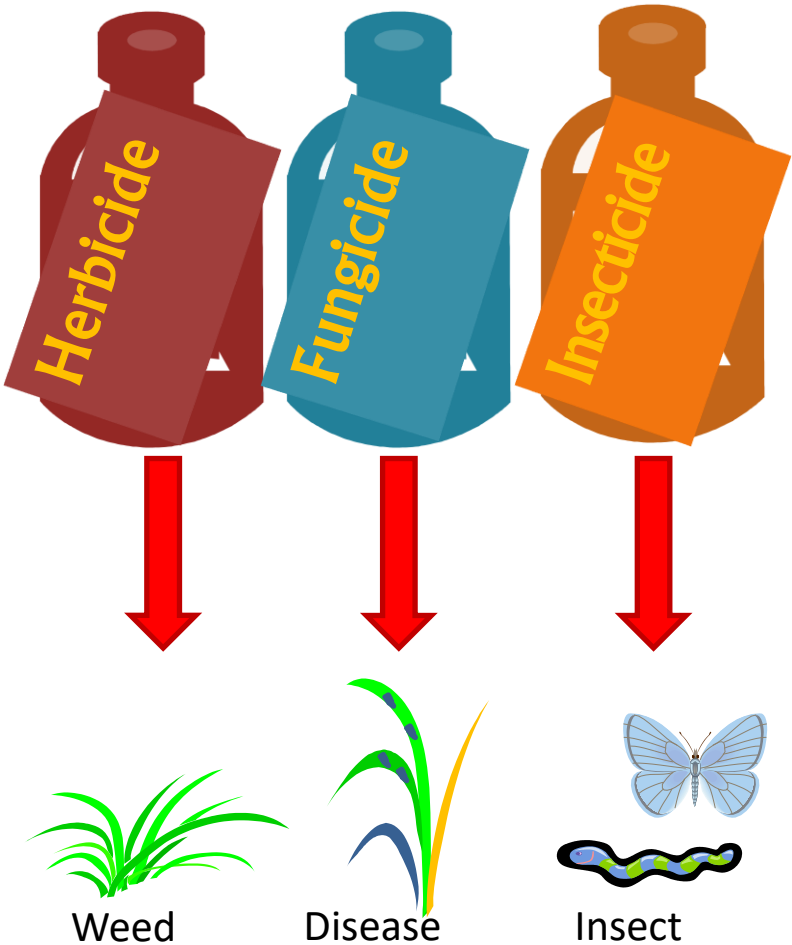
Back side

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



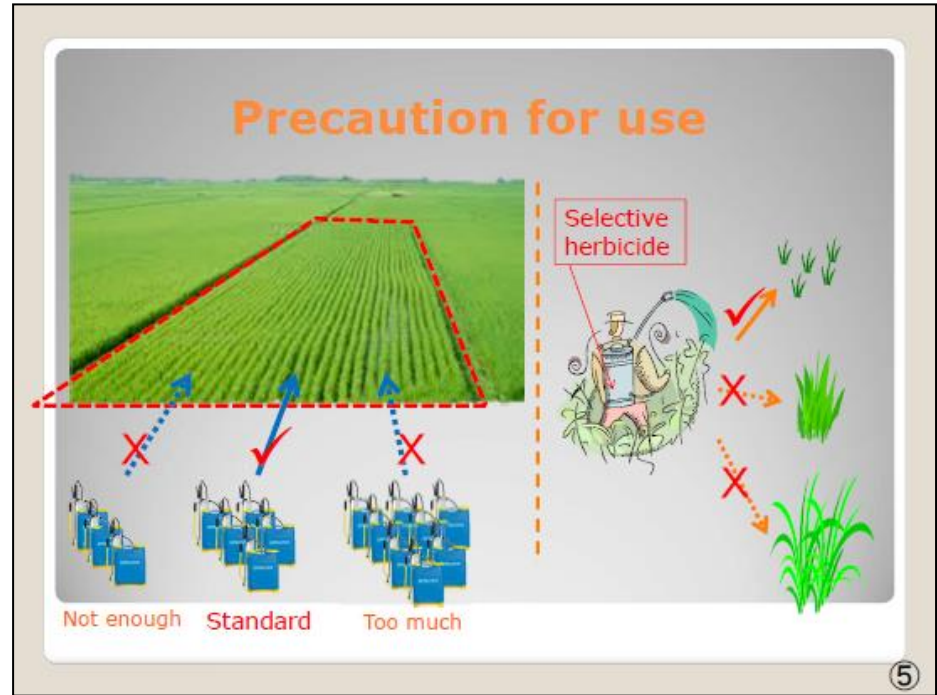
- Inadequate or inappropriate application of Agro Chemicals are ineffective in preventing and controlling diseases, pests and weeds.

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

✓



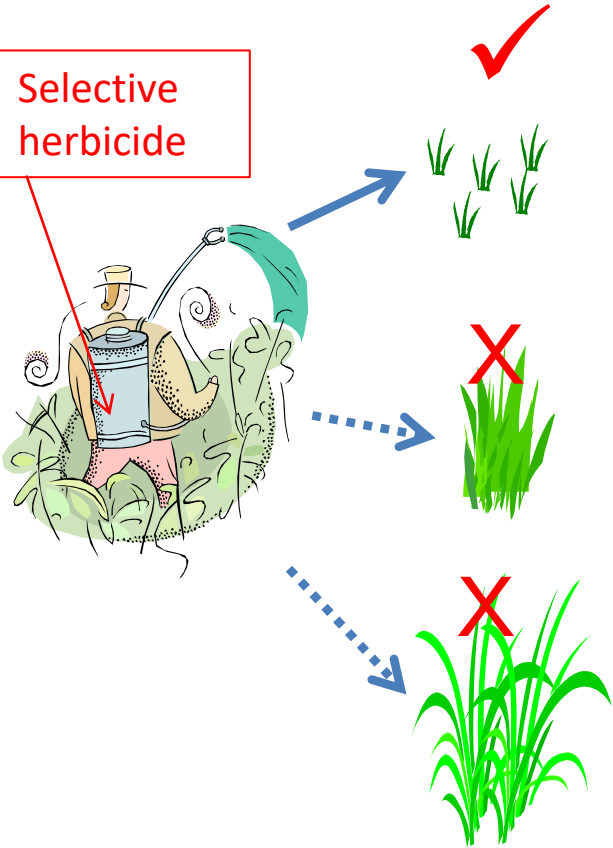
Standard

X

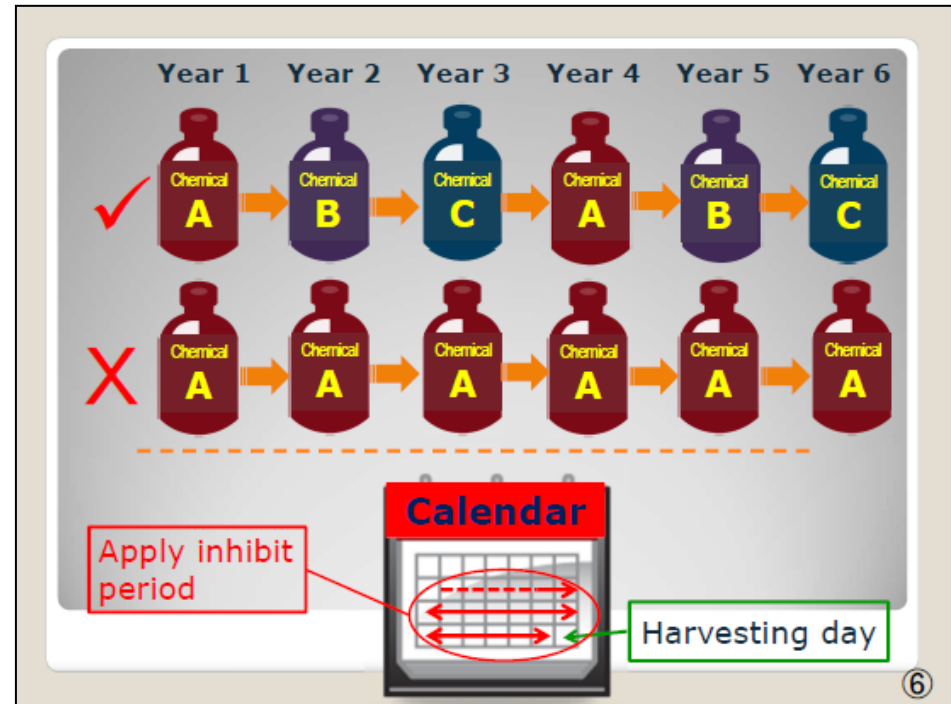


Too much

Selective herbicide

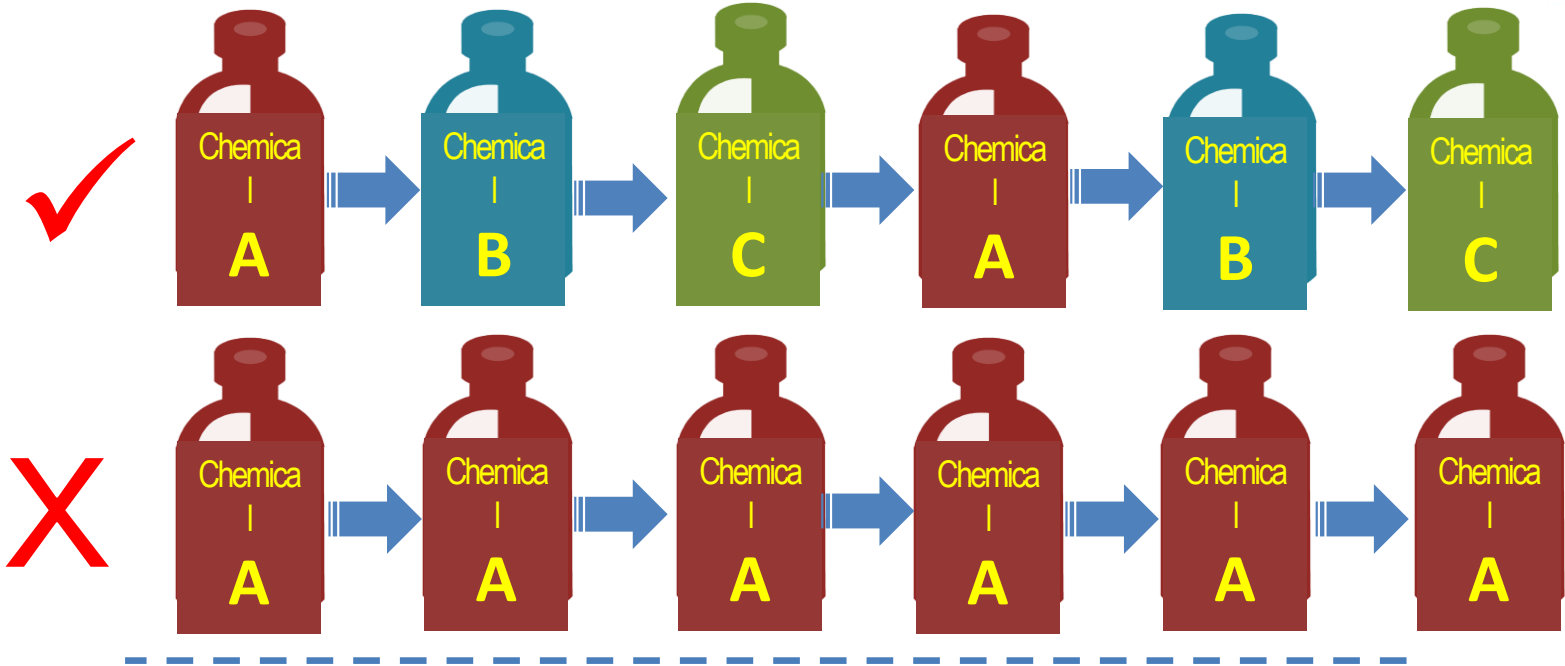


Back side

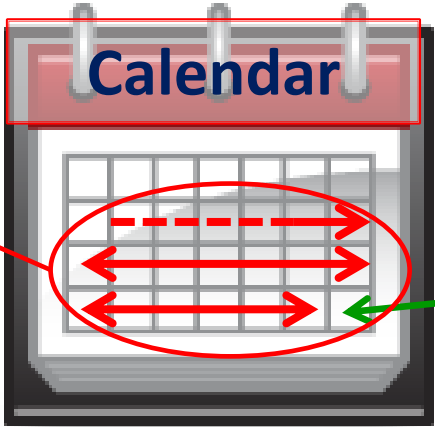


- If Agro-chemicals with same materials continue to be used over long periods, its efficiency will be reduced.
- Agro-chemicals must not be applied just before harvesting. (see label of each chemical for details)

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

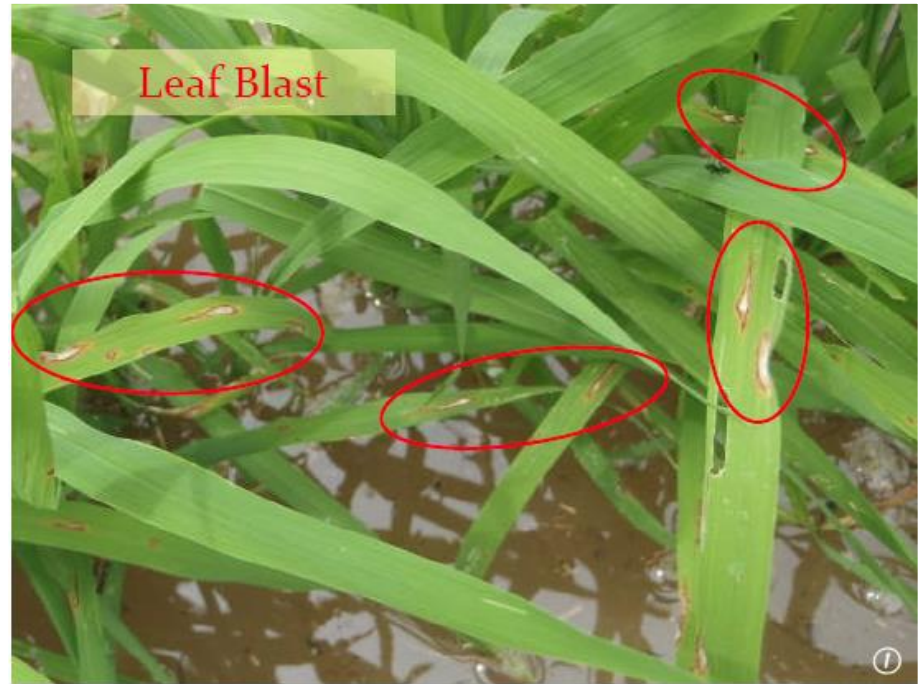


MOFA/JICA TENSUI RICE

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.

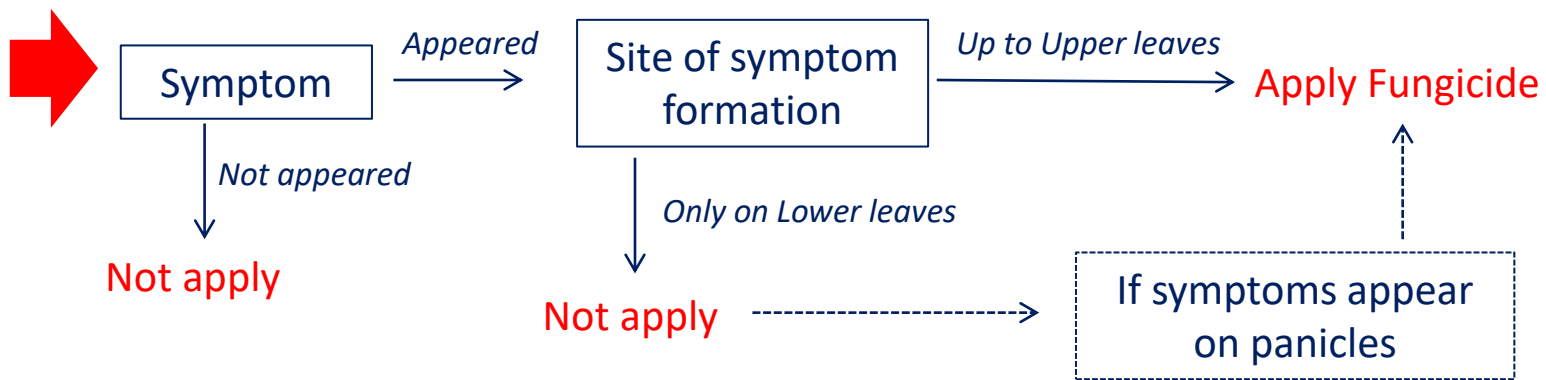


- If these symptoms appear, the fungicide that is effective in Blast should be sprayed immediately to prevent epidemic in whole field.

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

- It is important to apply fungicide before it is too late.
- When the fungicide is spray for Blast control, the chemical that is effective in Blast must be selected.



Blast spread in the field



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)

1st application :



Just before heading time

2nd 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)

1st application :



Just before heading time

2nd application:



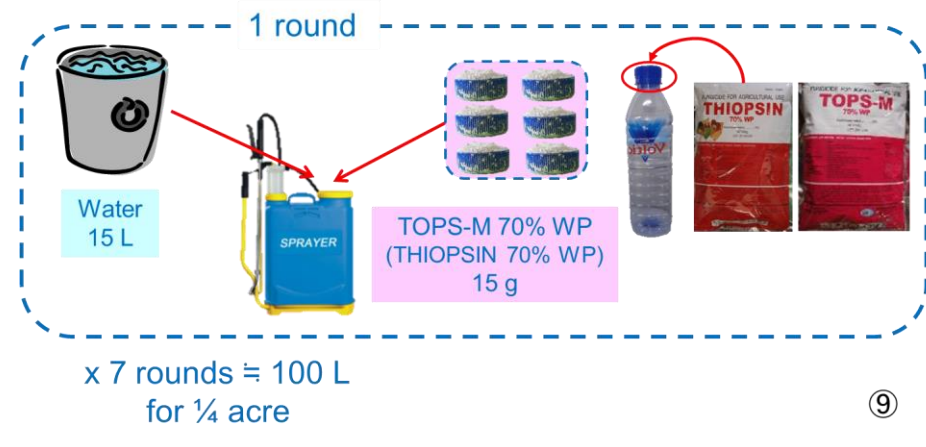
Full heading time
(As necessary)

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

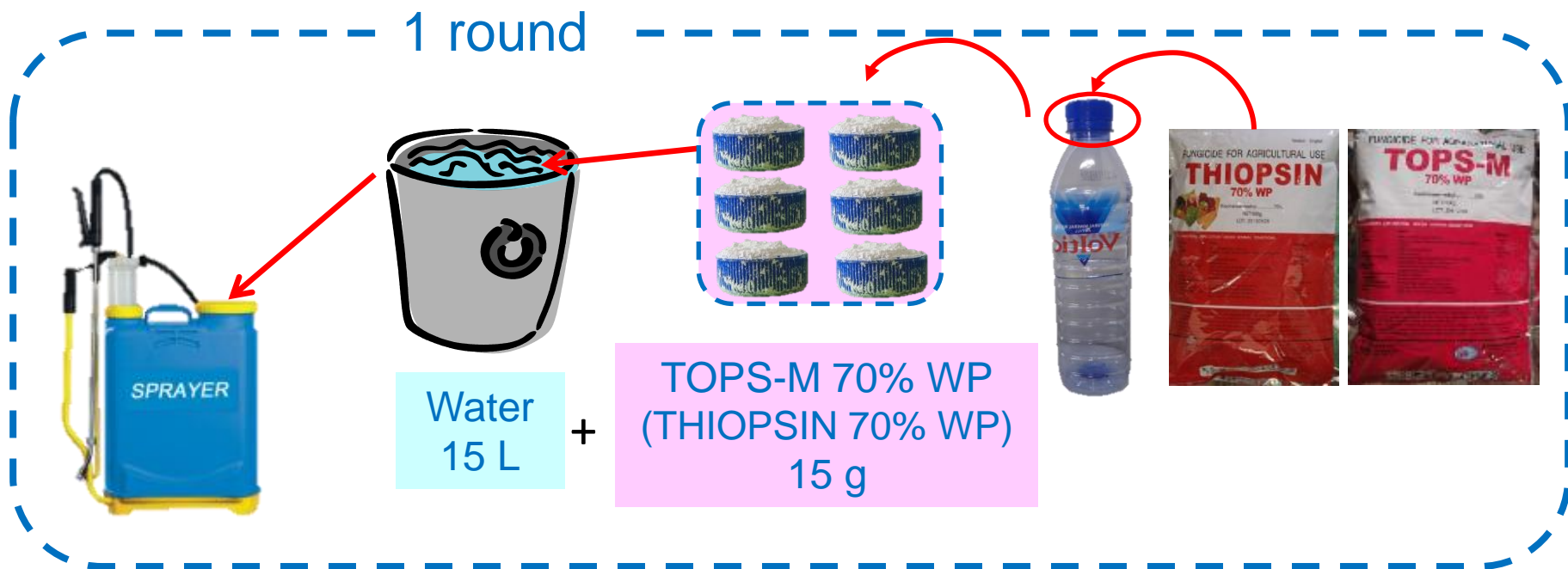


Total 105 grams of ***TOPS-M*** (or ***THIPOSIN***) and 105 litres of water which is equivalent of 7 rounds are required for ¼ acre.

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)

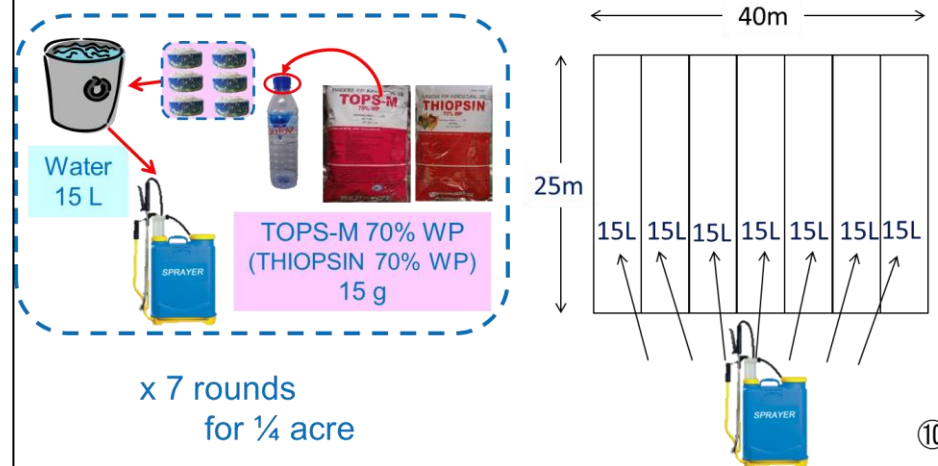
- First, mix 15 litres of water and 15 grams of TOPS-M (or THIPOSIN) and spray it to 1/7 of ¼ acre field.
- Then, mix same dilute solution and spray it to the next 1/7 of the field.
- Repeat it 5 more times.

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

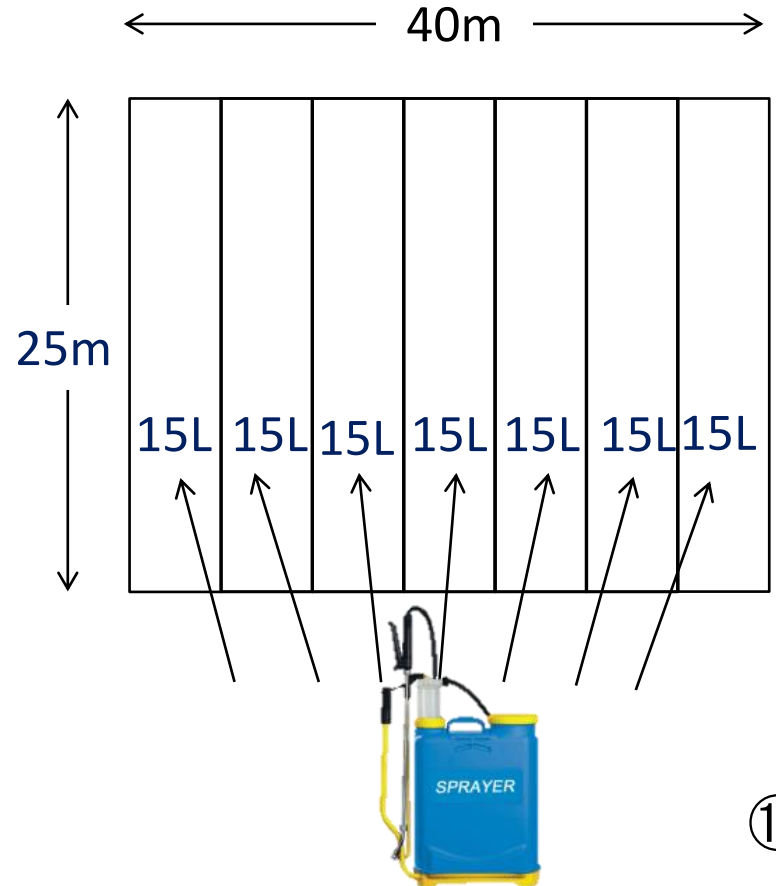


Chemical Control for Blast (Foliage application)

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



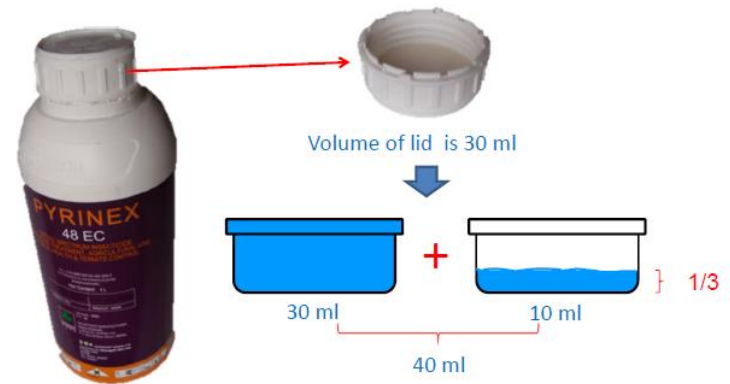
Back side

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

- Volume of lid is differ from product to product.

Face

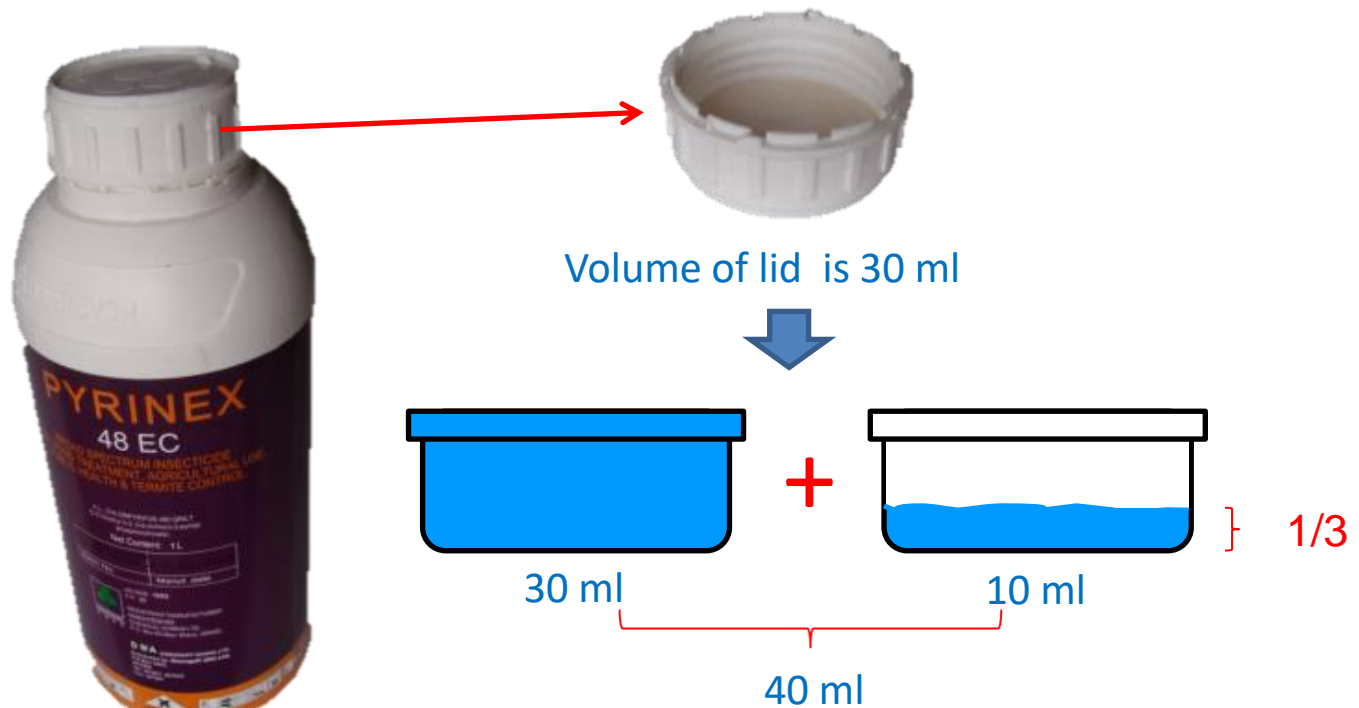
Method of measuring chemicals



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

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

Why quality seed ?



Many broken
grains are mixed

Discoloured grains
and coloured grains
are mixed

Good quality

①

What are the reasons declining quality of local rice?

- Foreign matters
- Broken grains
- Coloured or discoloured grains

Why quality seed ?

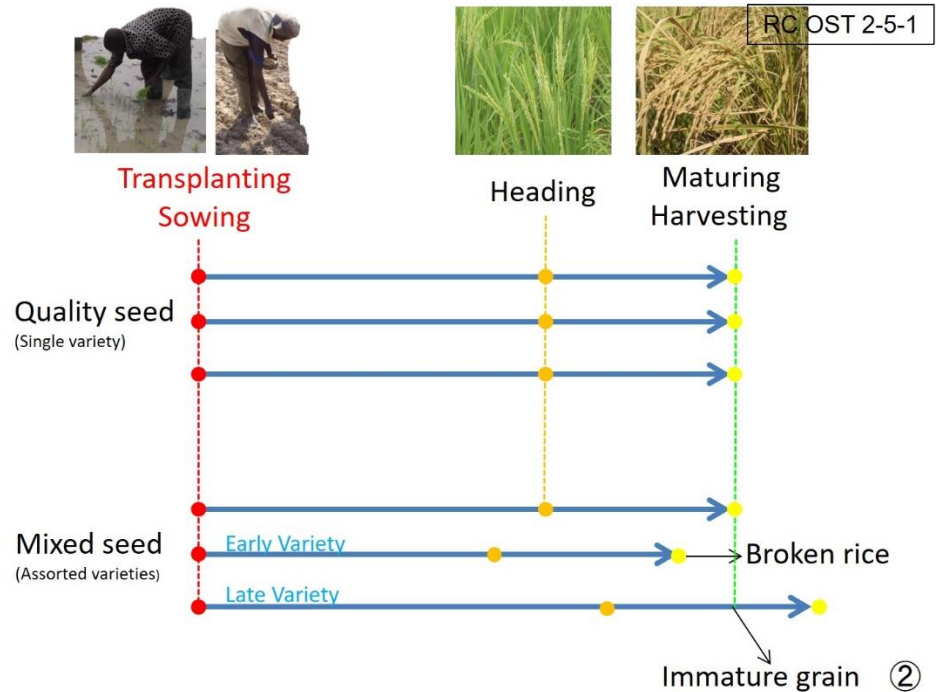


Many broken grains
are mixed

Discoloured grains
and coloured grains
are mixed

Good quality

- 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

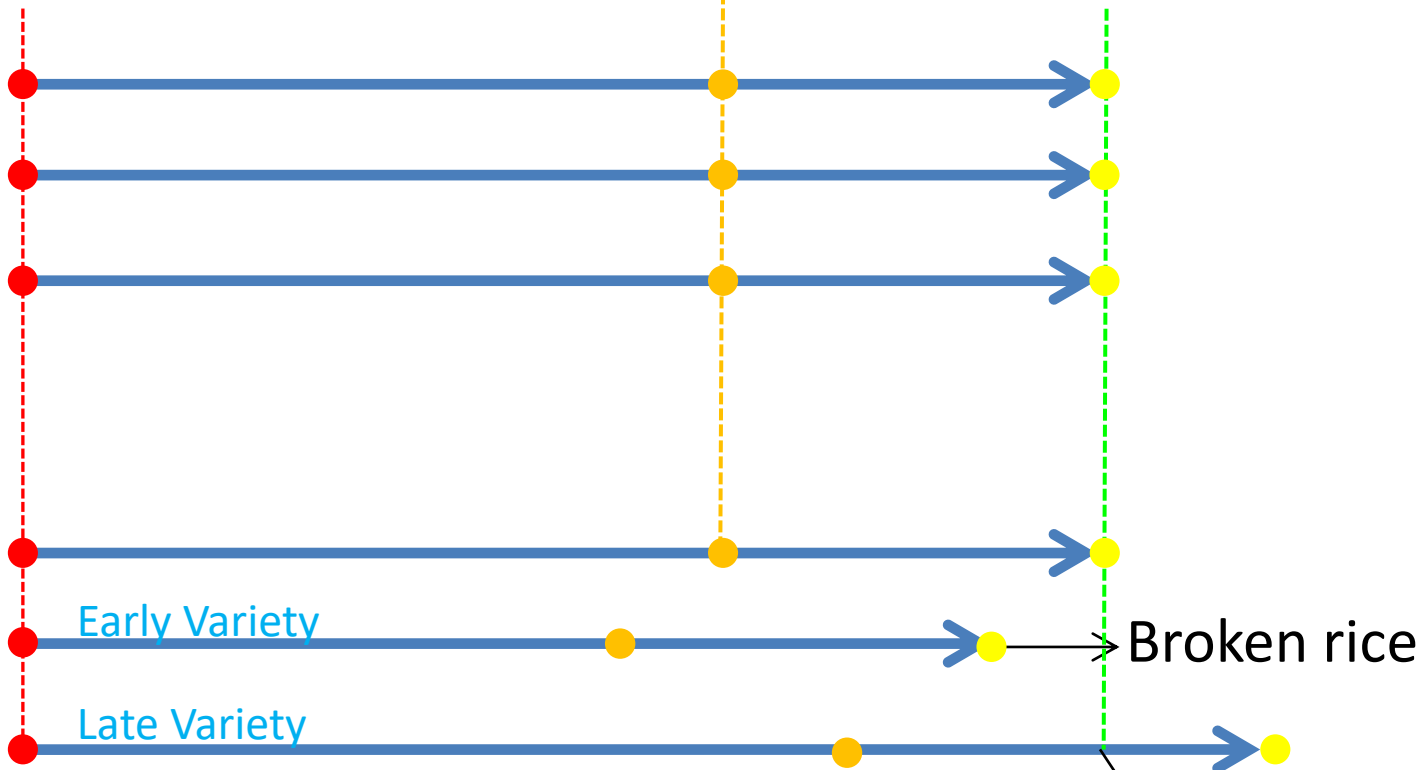
Transplanting
Sowing

Heading

Maturing
Harvesting

Quality seed
(Single variety)

Mixed seed
(Assorted varieties)



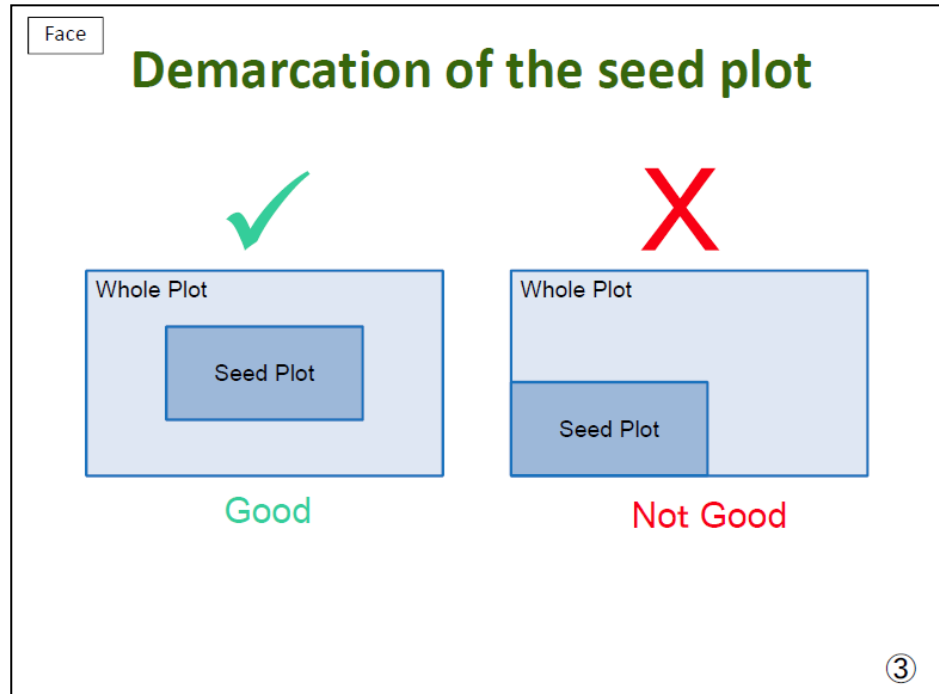
Immature grain ②

Back side

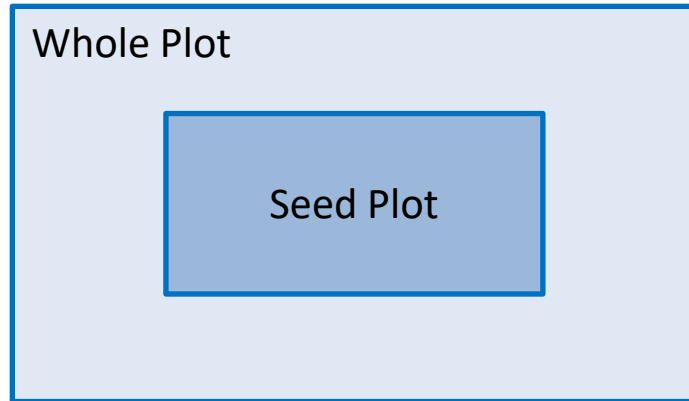
- Seed plot must be demarcated at the center, NOT on the corner or border of the field.

Why?

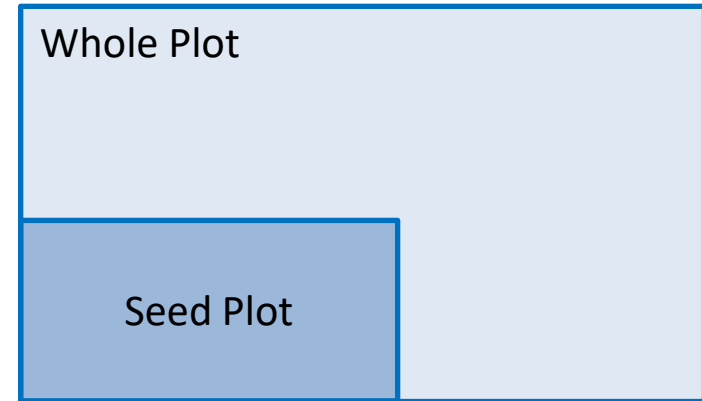
- Edge of field may be contaminated by diseases. Seed must be disease free.
- Prevent mixture of other varieties. Seed must be pure variety.



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.



Face

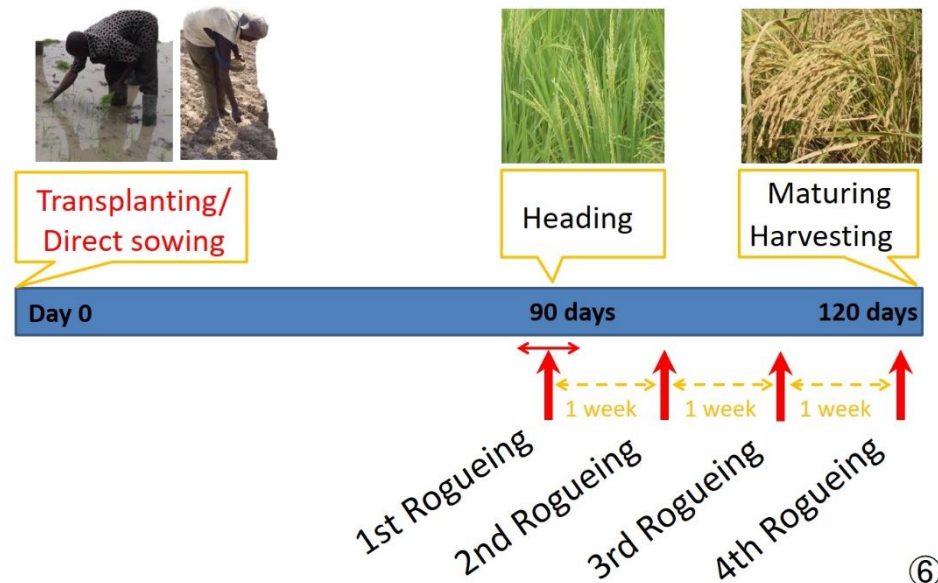
RC OST 2-5-1

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!



Value Chain of Local Rice

Good quality of Local Rice makes everybody happy!!
 For On-Site Training

- Rice
Utilization
- Farm
Management
- Land
Development
- Extension
- Other

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, parboilers, 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



Parboiler



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 parboilers, 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

Parboiler



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



Parboiler



Buy at higher price!



If not apply the technics...

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

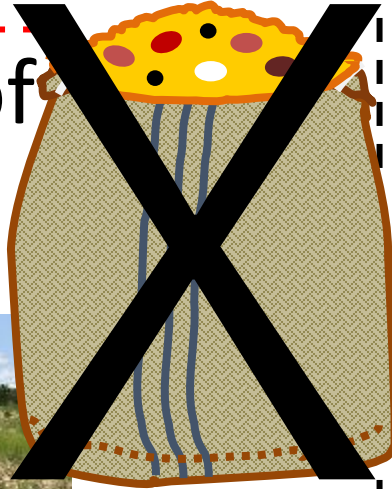
The quality of rice will become lower, price negotiation will be difficult and rice can not be sold at a higher price.

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



Parboiler



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”!!





MOFA/JICA TENSUI RICE PROJECT

Good Practices of Farm Management

Rice Cultivation

Farming Management

Land Development

Extension

Other

Case 1:

- Let's learn about a good practice of farmers in Gbung, East Gonja!

(shared in August 2014)

Case 1:

Shortening the Value Chain to
Increase Profit

-Gbung Farmers, East Gonja -



Case 1:

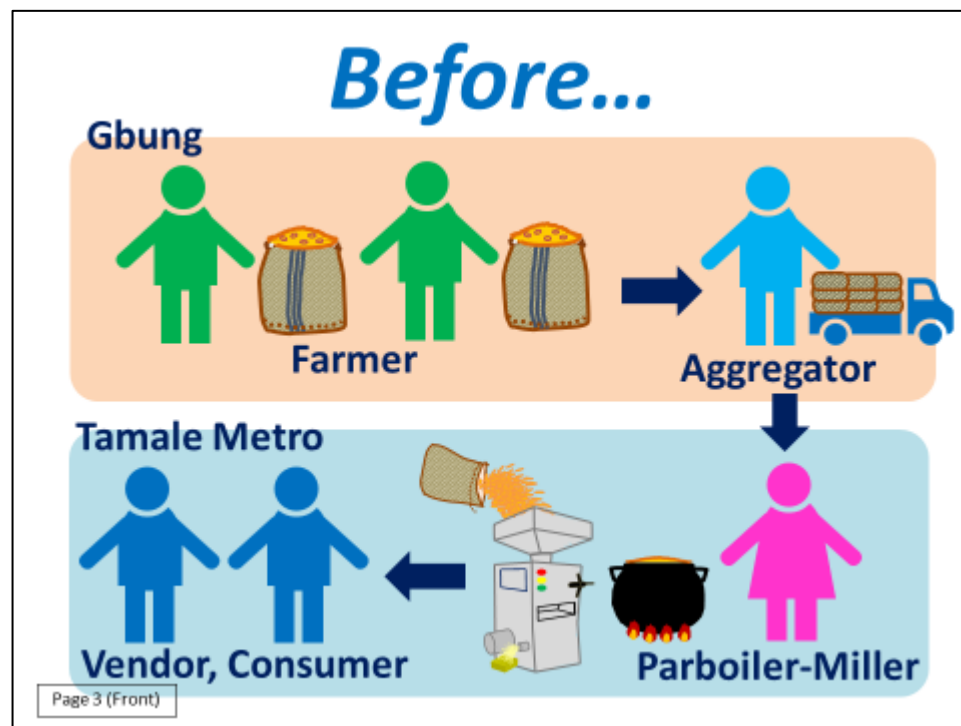
Shortening the Value Chain to Increase Profit

-Gbung Farmers, East Gonja -



Before...

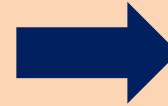
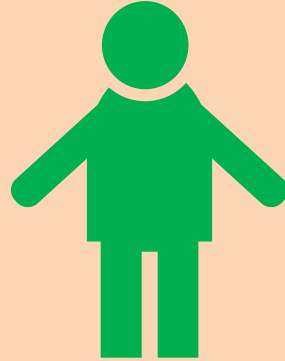
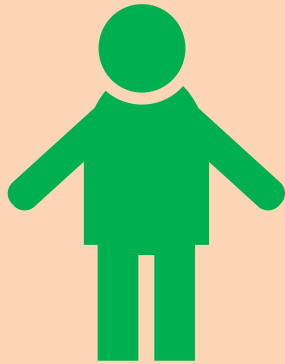
- The farmer and his colleagues used to sell high quality paddy to an aggregator visiting Gbung.
- After purchasing the paddy in Gbung, the aggregator sold it to parboiler-millers working on parboiling and milling in Tamale Metro. After processing, they sold the milled rice to vendors and/or consumers coming to the milling station.



Before...



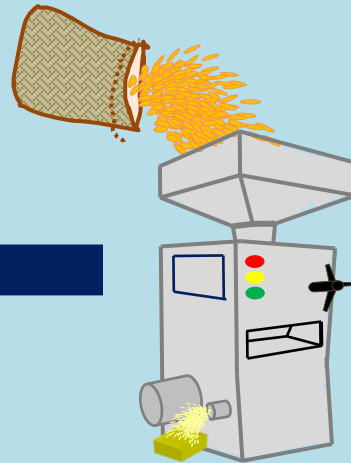
Gbung



Farmer

Aggregator

Tamale Metro

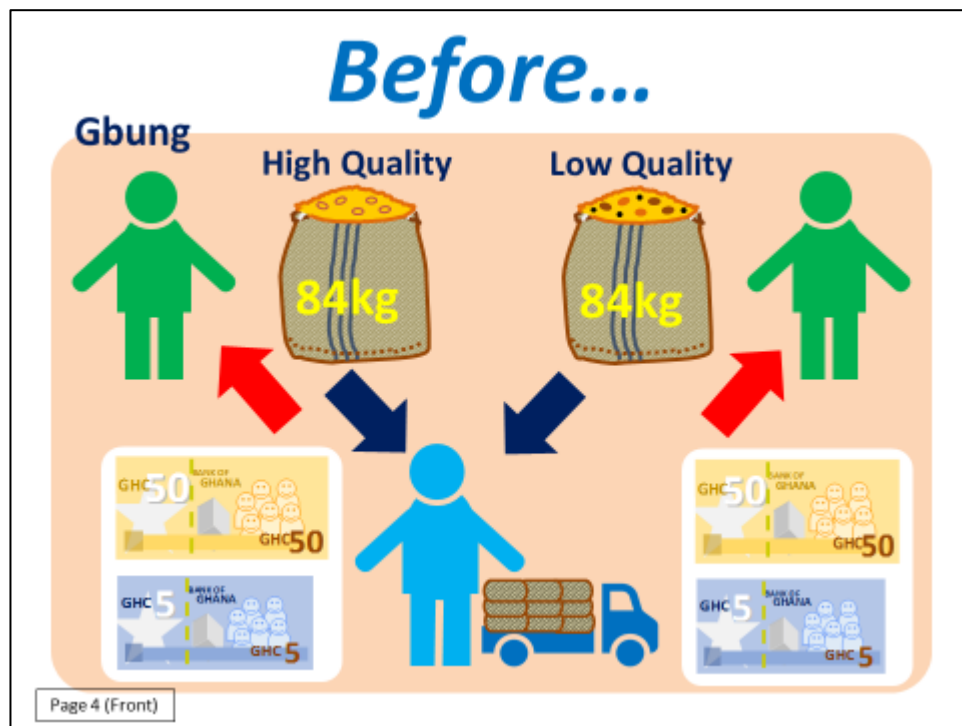


Vendor, Consumer

Parboiler-Miller

Before...

- In Gbung, he gained GHC55/84kg paddy for his high quality paddy, which was the same price as low quality paddy produced by other farmers.
- He had no other choice than selling at GHC55/84kg paddy as there was no market place in Gbung.
- **Ask farmers: How would you solve this kind of problem?**



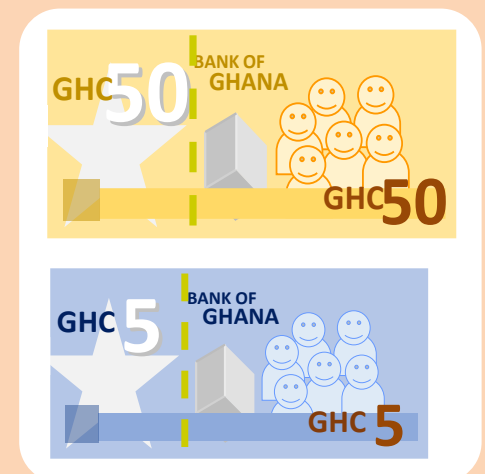
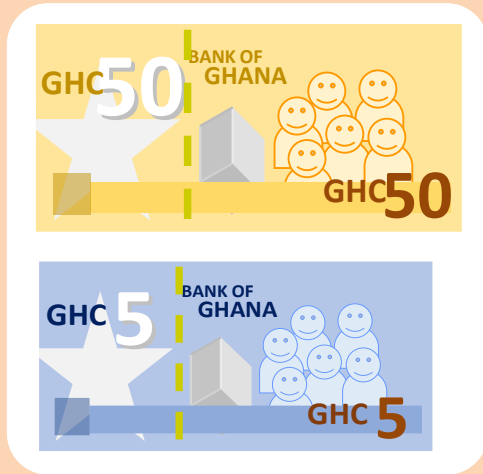
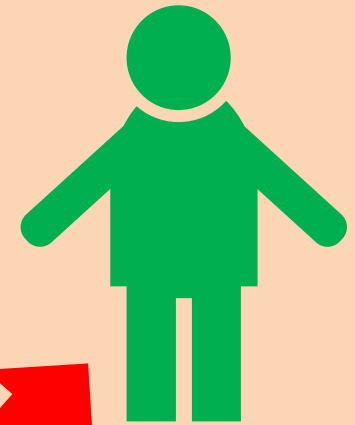
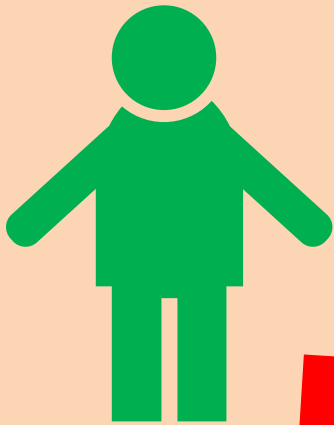
Before...



Gbung

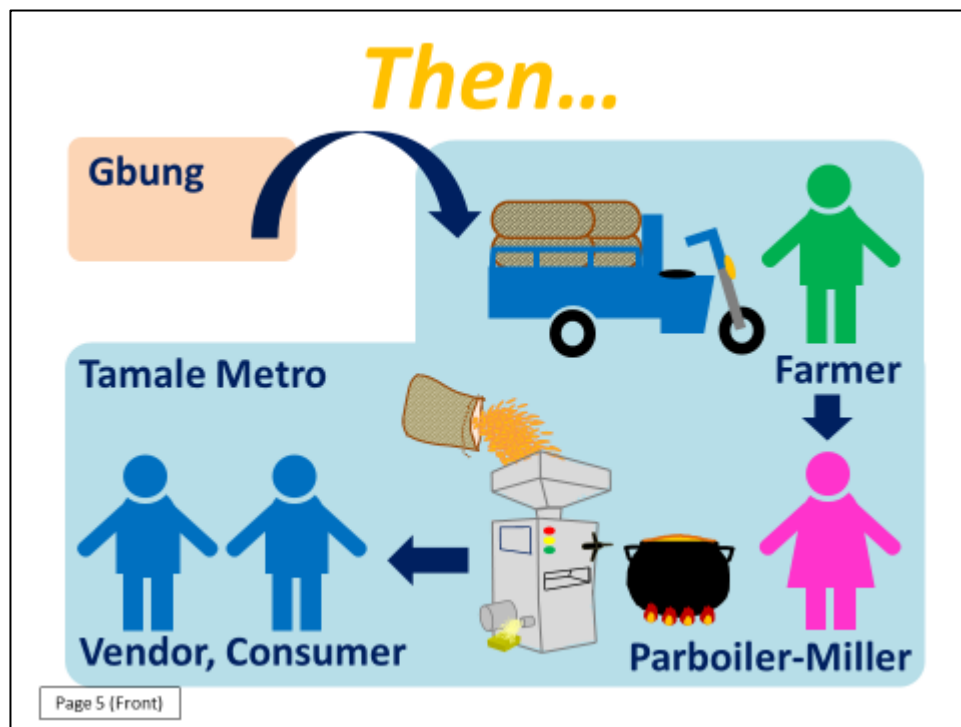
High Quality

Low Quality

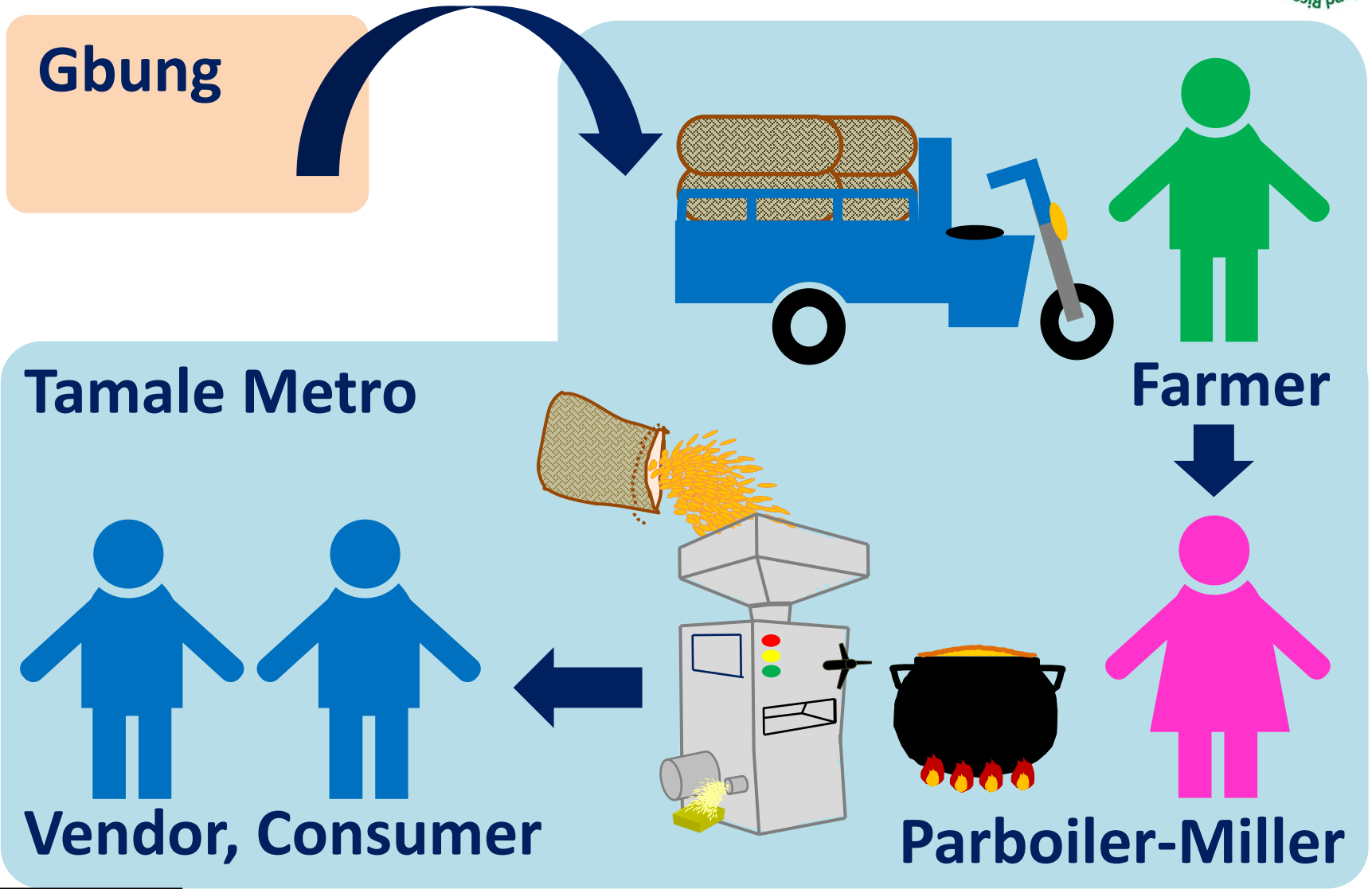


Then...

- He started to transport his high quality paddy to Tamale Metro by himself and directly sell to the parboiler-millers there. There was no intervention by the aggregator between them anymore.

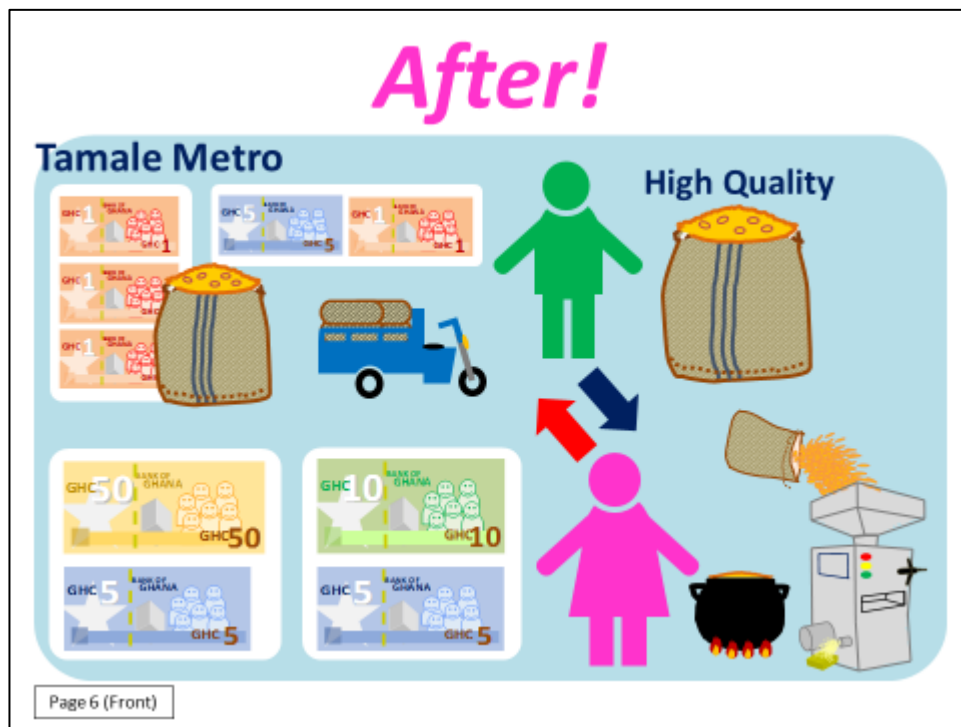


Then...



After!

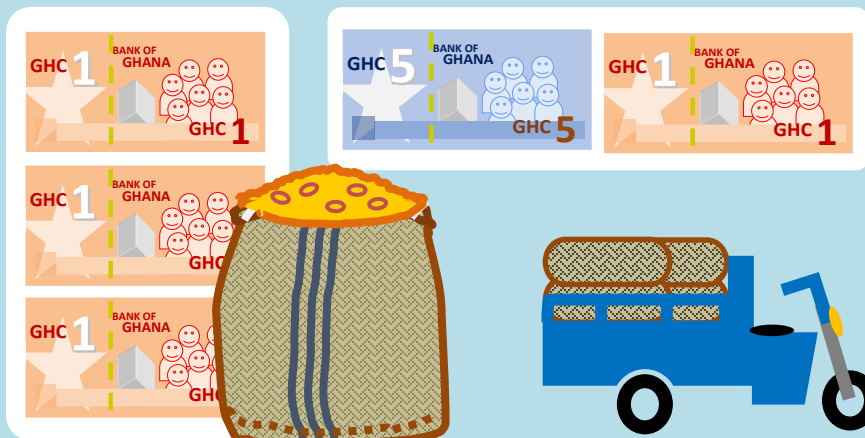
- Then, he gained GHC70/84 kg paddy from the parboiler-millers. This price is about GHC5-10/84kg paddy higher than that for low quality rice in Tamale Metro.
- Even after deducting transportation fee GHC3/84kg paddy bag and GHC6/person (driver), his profit increased by GHC6/84kg paddy.



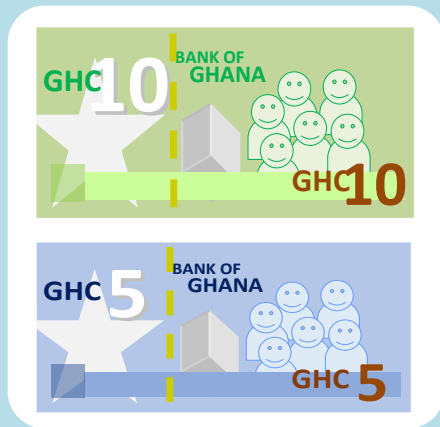
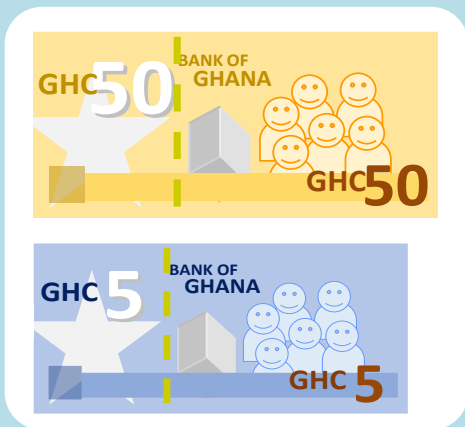
After!



Tamale Metro




High Quality



Case 2:

- Let's learn about a good practice of Mr. Adam of Vittin Community in Tamale Metro.

Case 2:
**Selecting Buyers Who Value
the Quality**
-Adam of Vittin, Tamale Metro-



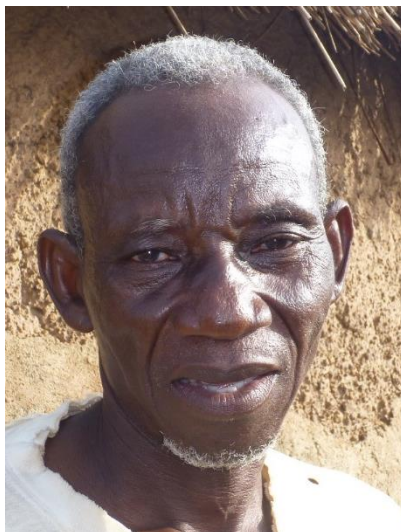
Page 7 (Front)



Case 2:

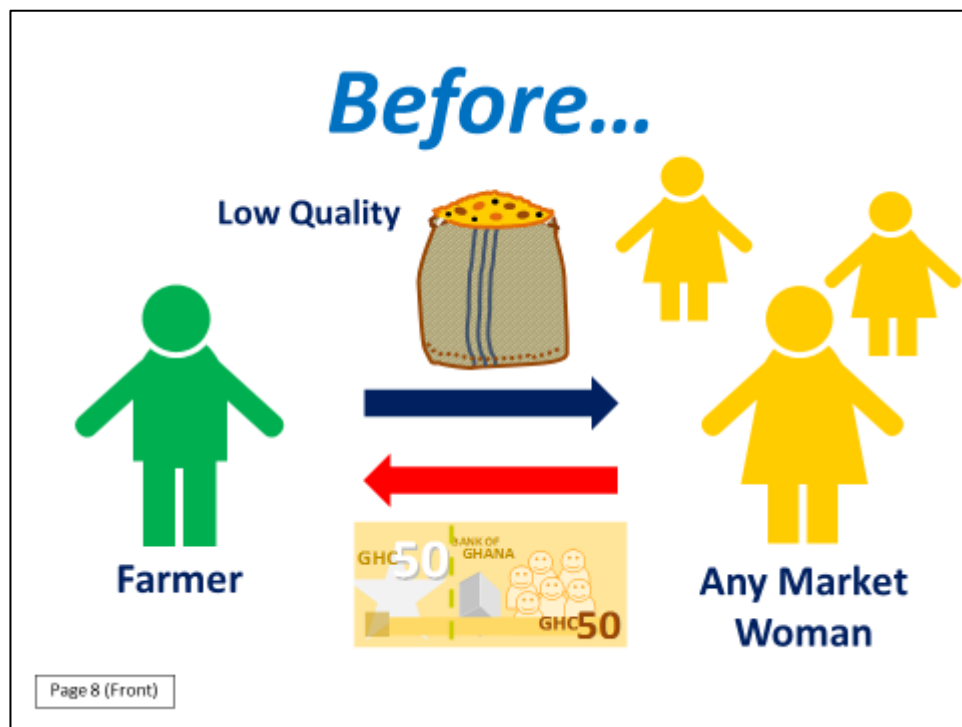
Selecting Buyers Who Value the Quality

-Adam of Vittin, Tamale Metro-



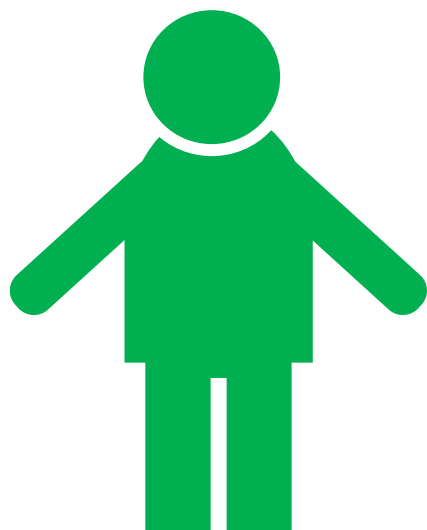
Before...

- Before he learnt to produce quality paddy at the TENSUI Project, Mr. Adam used to sell his paddy to any market woman visiting Vittin Community at GHC50/84kg paddy.

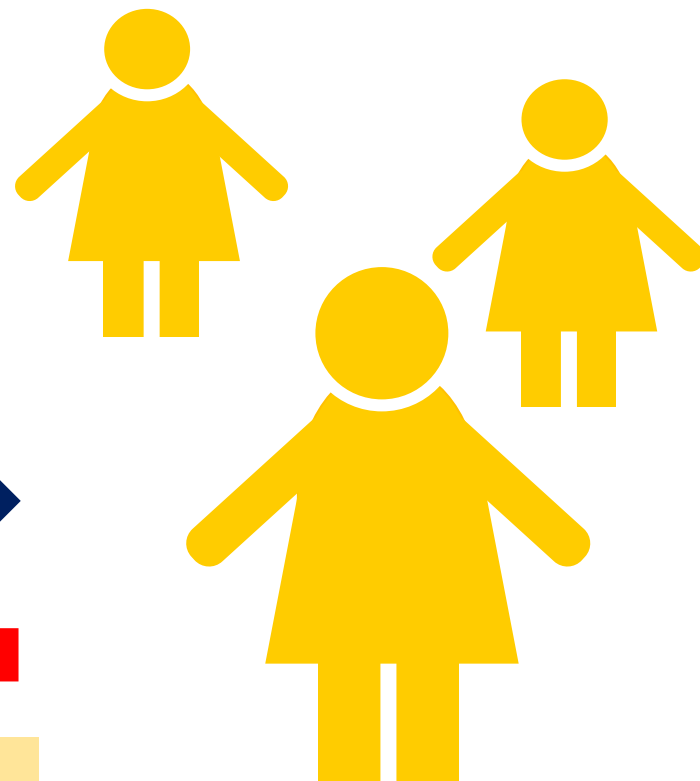


Before...

Low Quality



Farmer



Any Market Woman

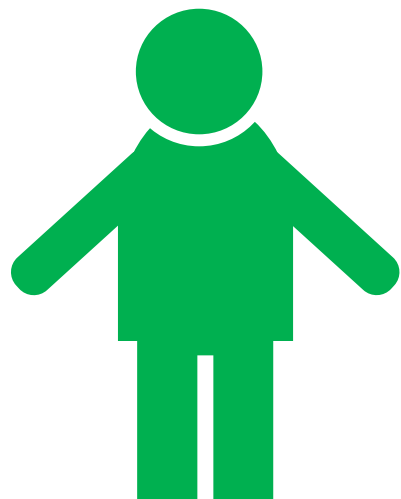


Then...

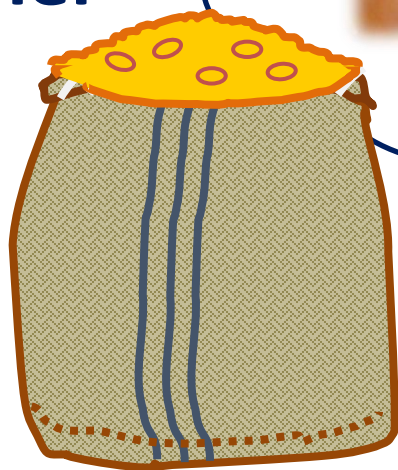
- After producing high quality paddy at the TENSUI Project, Mr. Adam actively worked on market women who do strict inspection to distinguish quality paddy.
- The market woman recognized that the quality of Mr. Adam's paddy is high enough to produce high quality milled rice for higher price.



Then...



Farmer



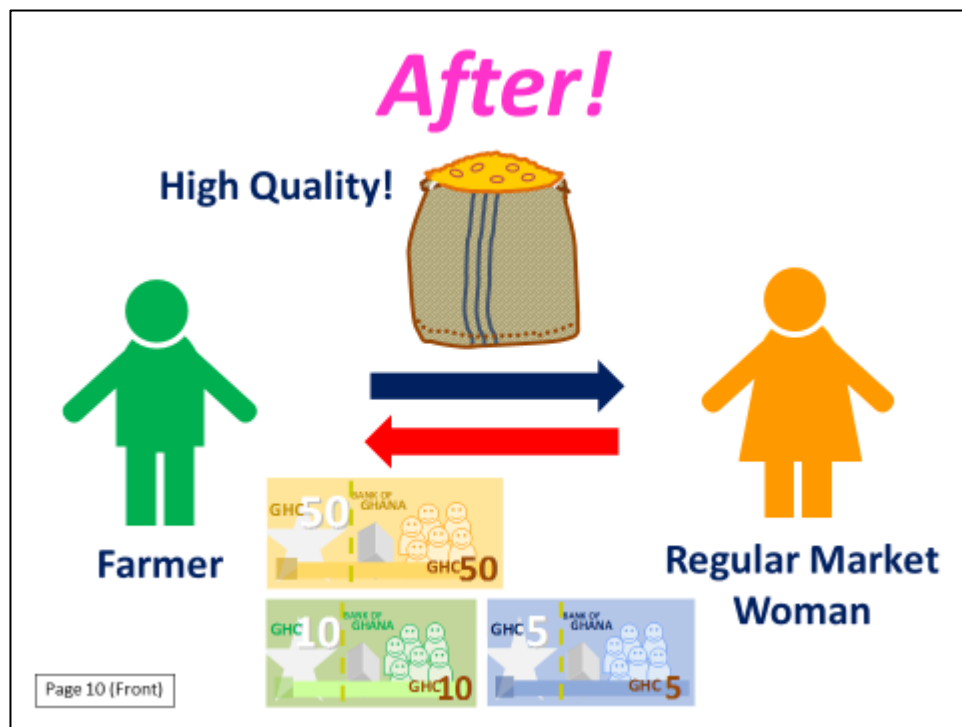
Quality Inspection



Market Woman

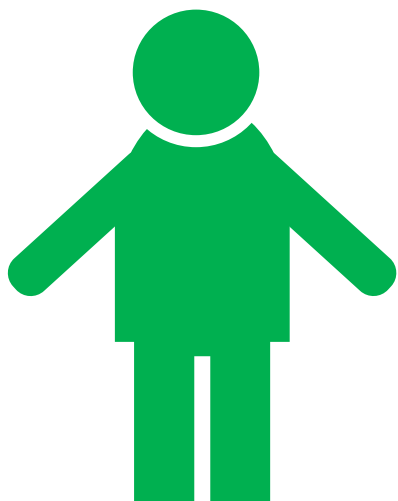
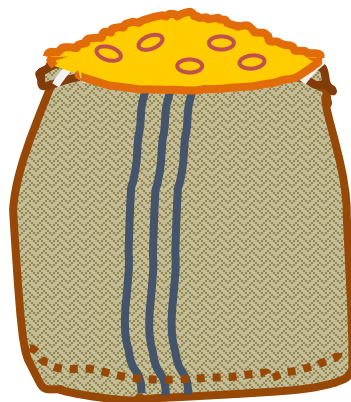
After!

- Eventually, he managed to establish a reliable relation with the market woman, who paid GHC65/84kg paddy to him.
- She became a regular market woman.



After!

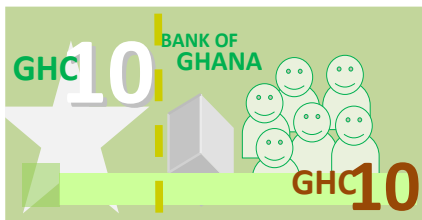
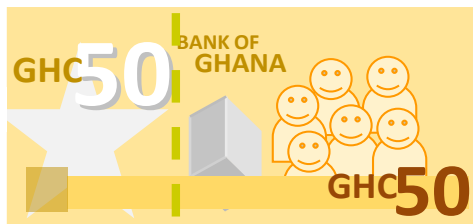
High Quality!



Farmer

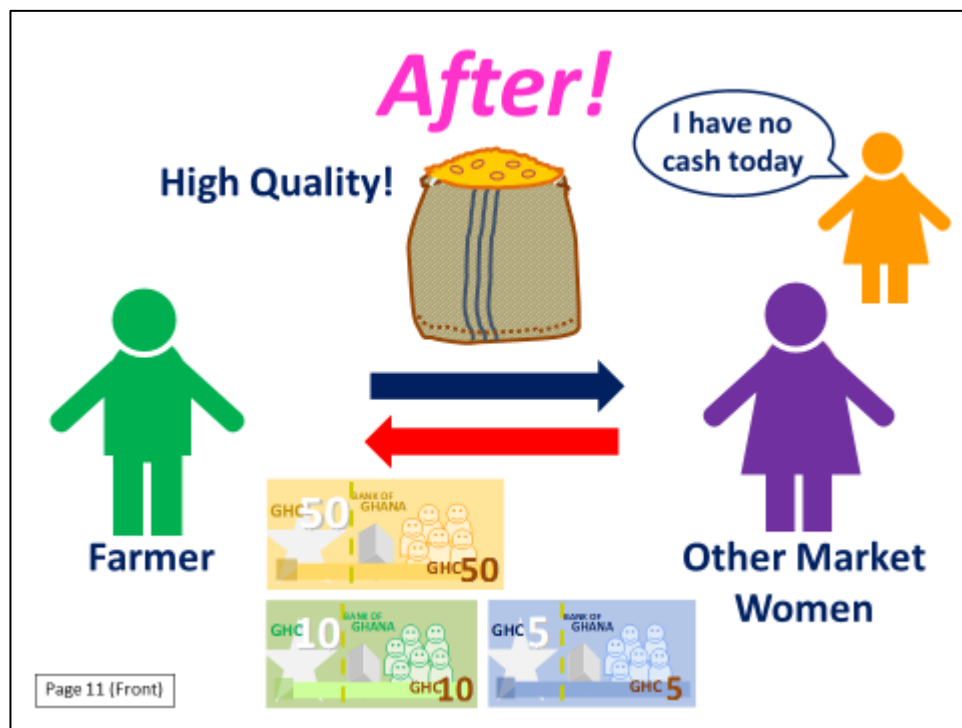


Regular Market
Woman



After!

- Even when the regular market woman has no cash, Mr. Adam could be connected with other market women who were able to buy his paddy still at GHC65/84kg paddy.
- Mr. Adam says, “I only stay in my community to sell the paddy to market women who visit me. When I don’t want to sell, I can keep the paddy in my storage till I am able to sell it at satisfactory price. Although I don’t sell my paddy when I don’t agree about the price which buyers present, they come back to me in the end to purchase the paddy at the price I present due to its quality.”

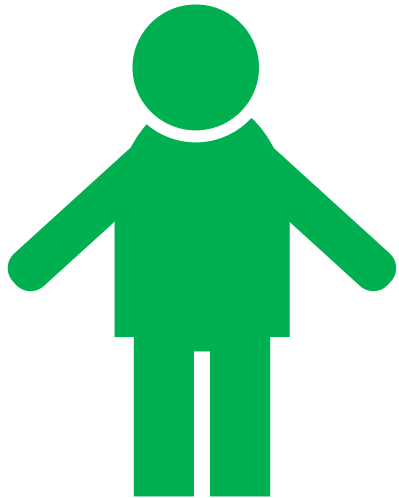
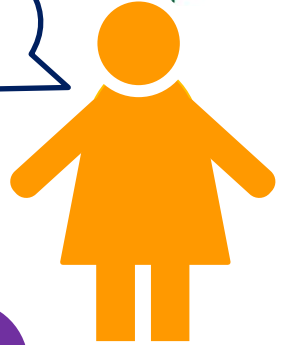


After!

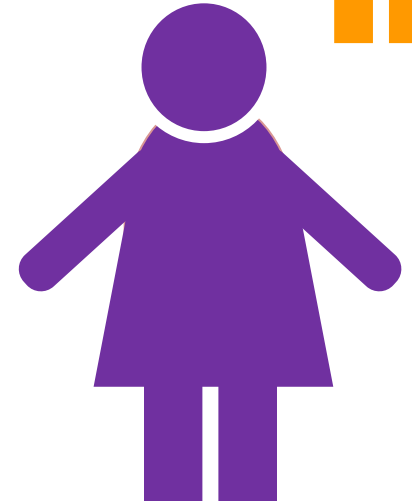
High Quality!



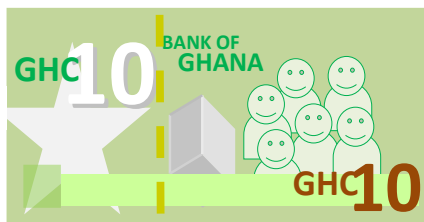
I have no cash today



Farmer



Other Market Women



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 today!

Case 3:

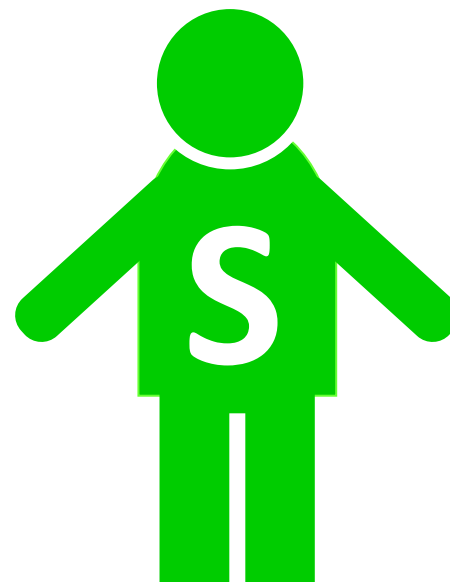
Let's Produce Seeds for Profit!



Page 12 (Front)

Case 3:

Let's Produce Seeds for Profit!

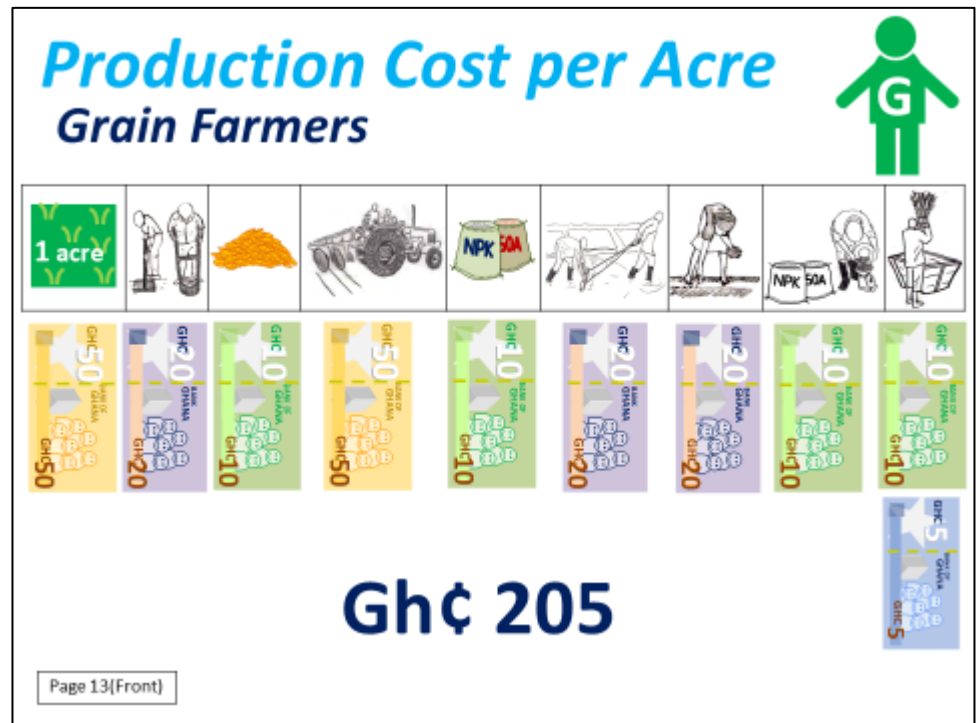


Production Cost per Acre

Grain Farmers

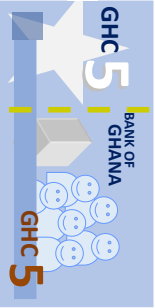
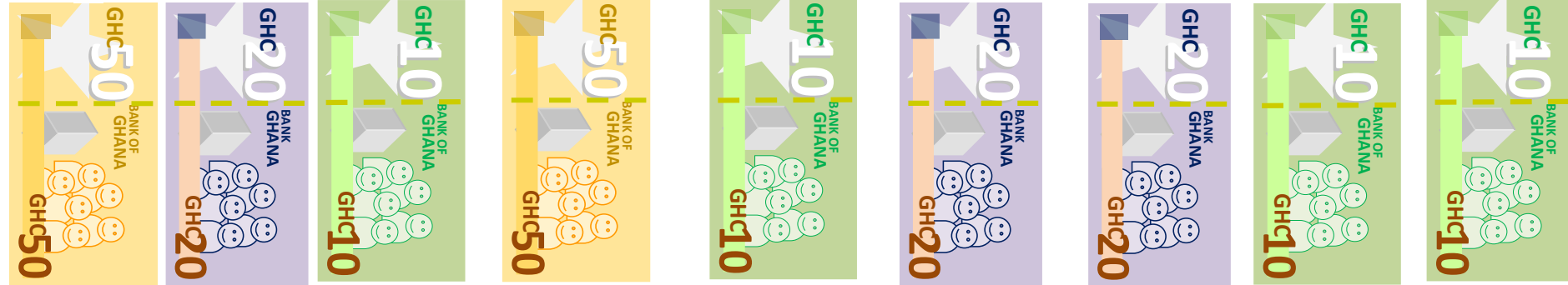
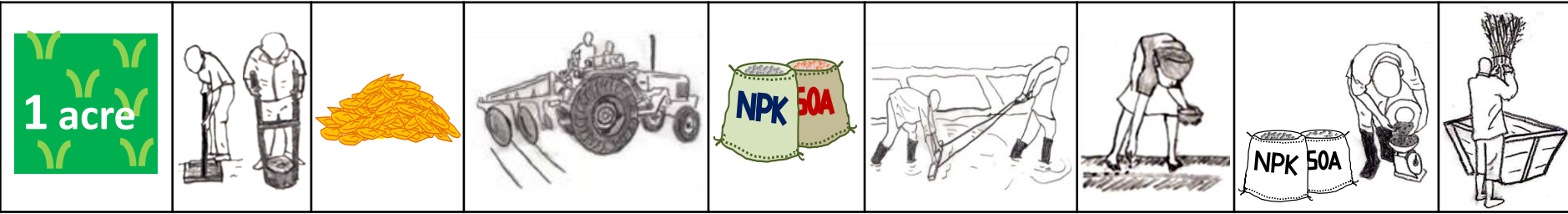


- Grain farmers need around GHC205 for grain production. For example, they spend money for land rent, land development, seed, tractor, fertilizer, etc.



Production Cost per Acre

Grain Farmers



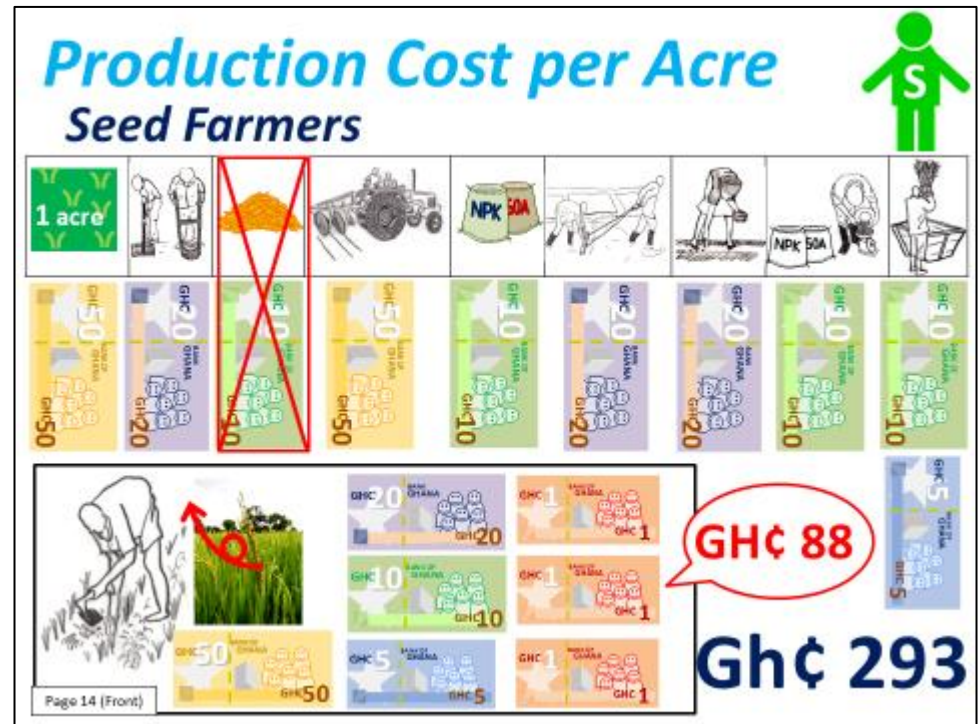
Gh¢ 205

Production Cost per Acre

Seed Farmers

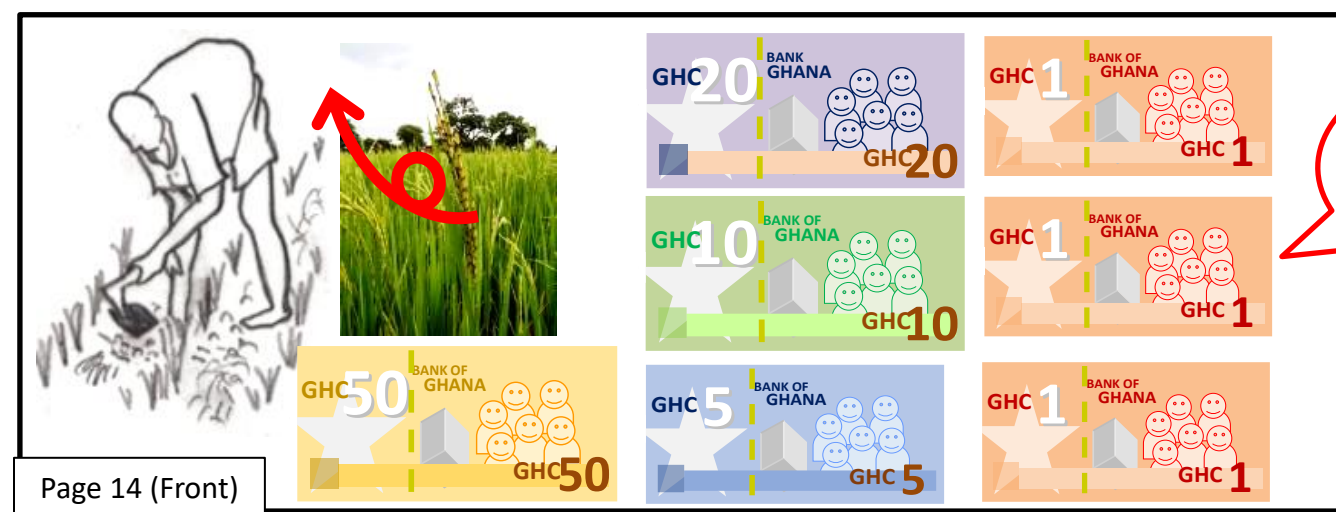
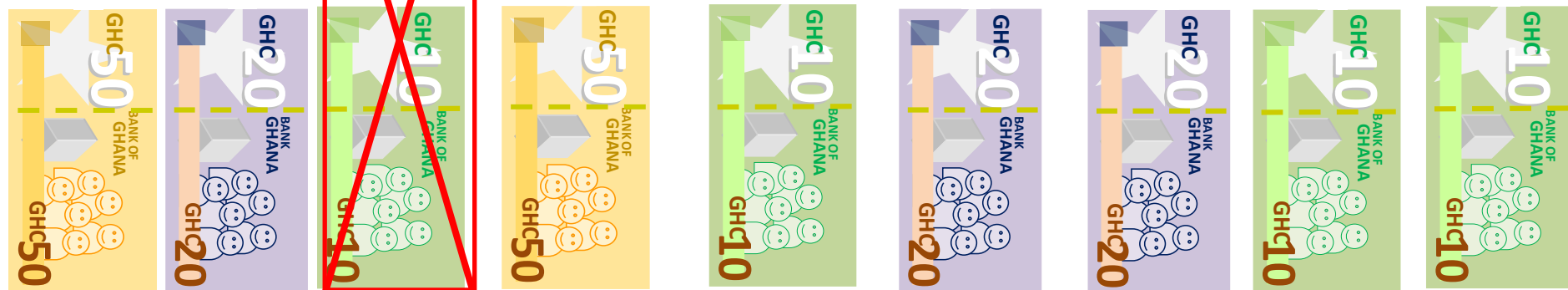
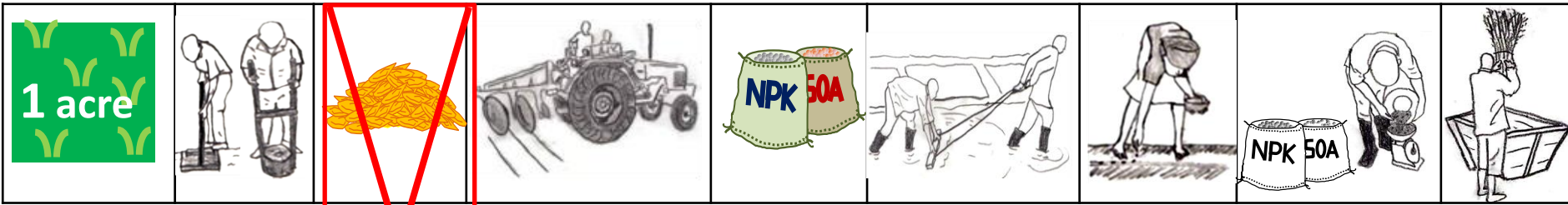


- Seed farmers need around GHC293 for seed production, which is around 1.5 times than grain producers' cost, excluding cost for grain seed.
- For example, they may spend extra money for weeding and off-type removal, which are important to keep purity of the product as seed.



Production Cost per Acre

Seed Farmers



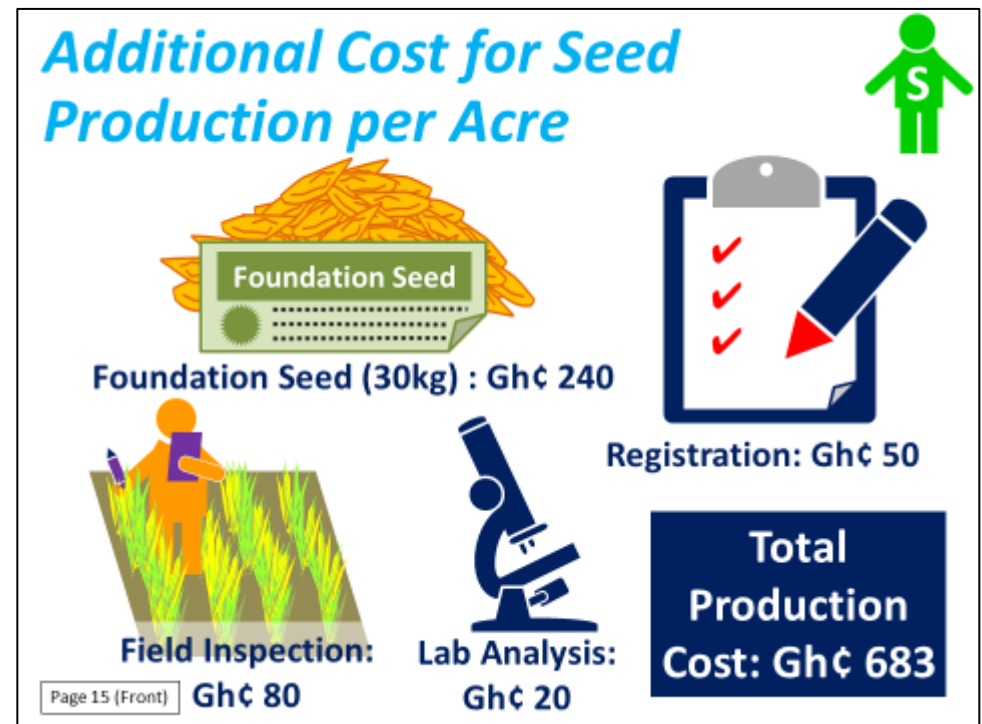
GH¢ 88

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**

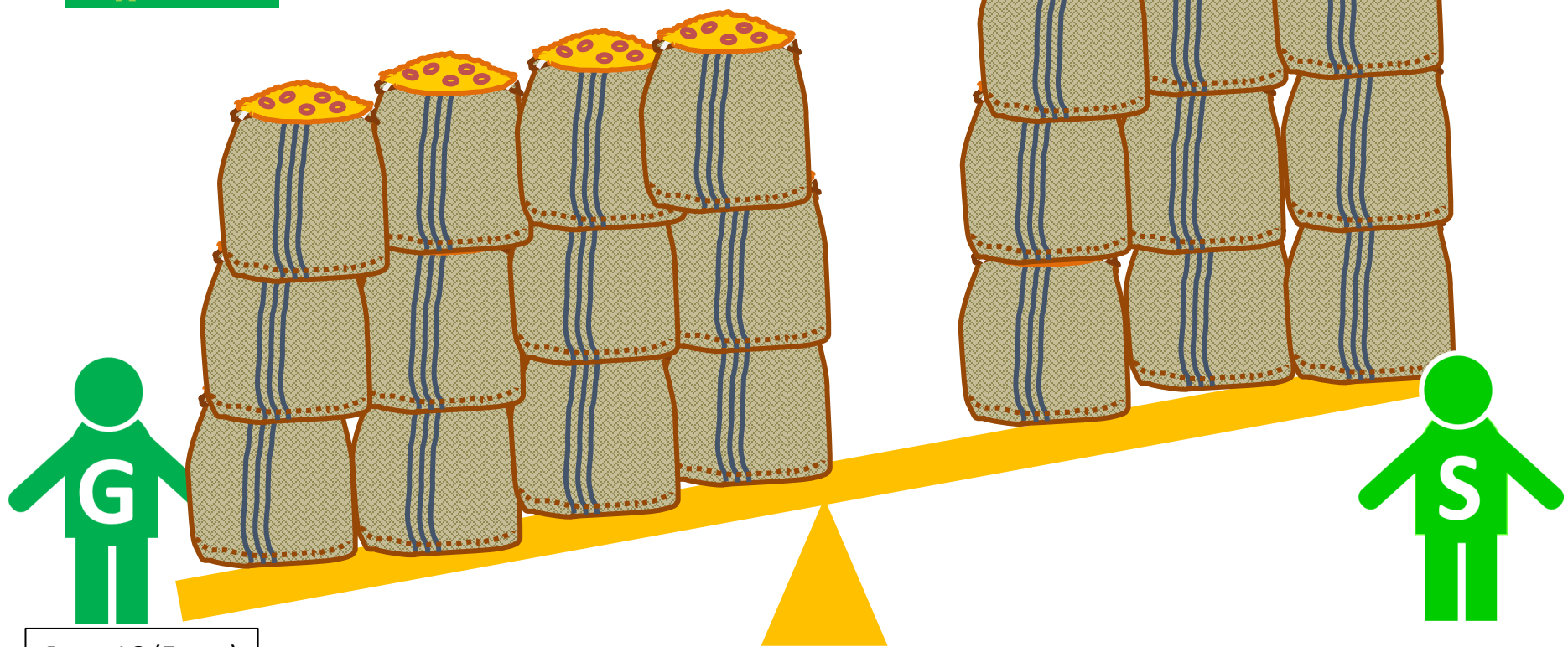
Production



- 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.

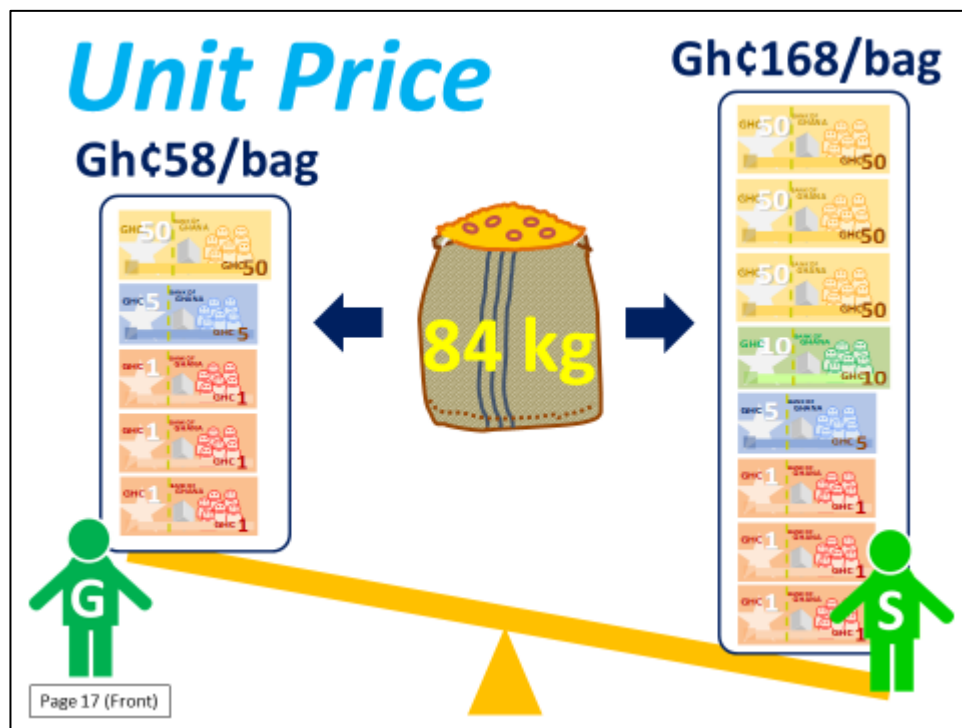


Production



Unit Price

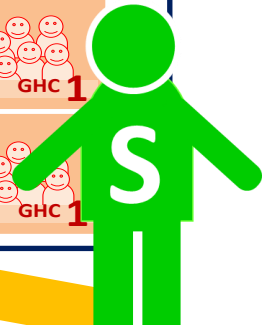
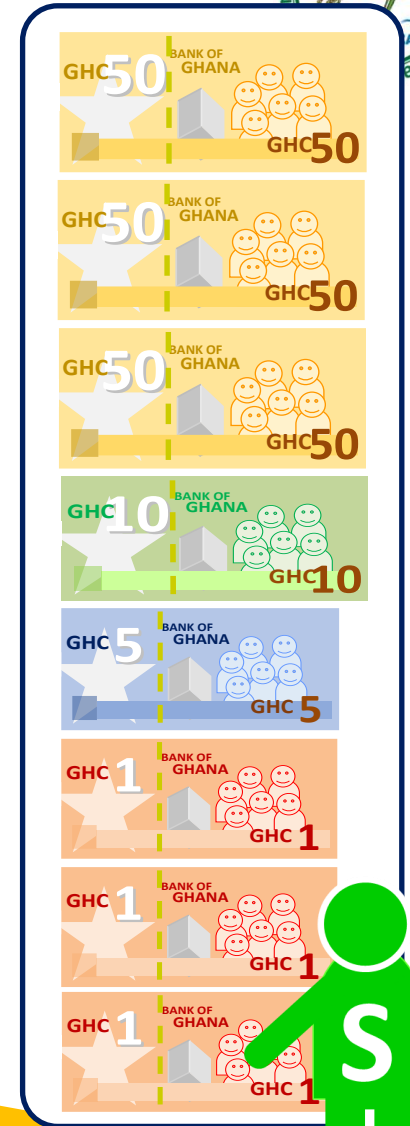
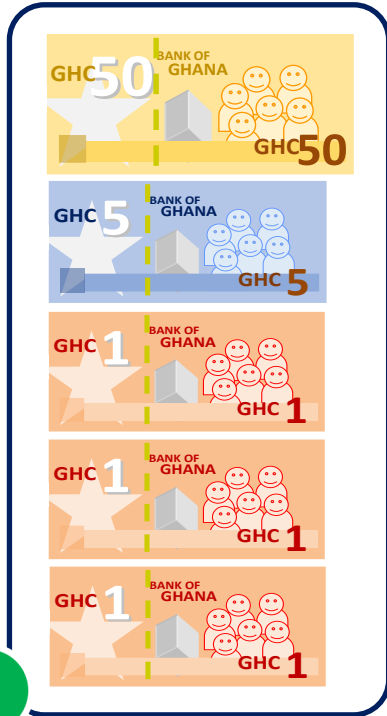
- Selling price of grain paddy was GHC58 per 84kg bag whereas selling price of seed paddy was..... GHC168 per 84kg bag!!



Unit Price

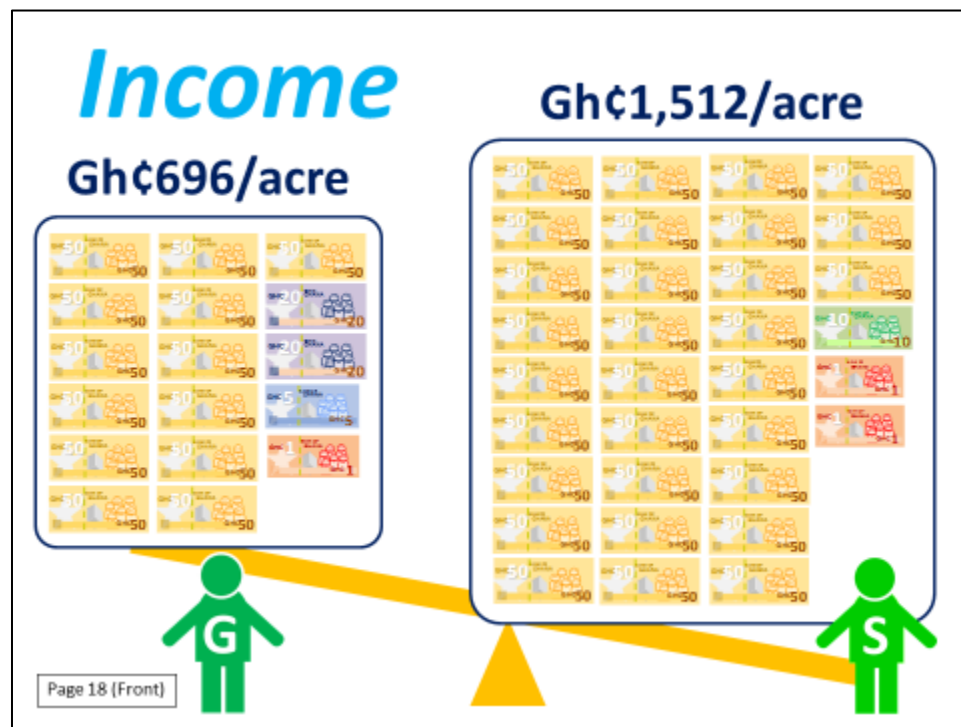
Gh¢168/bag

Gh¢58/bag



Income

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



Income

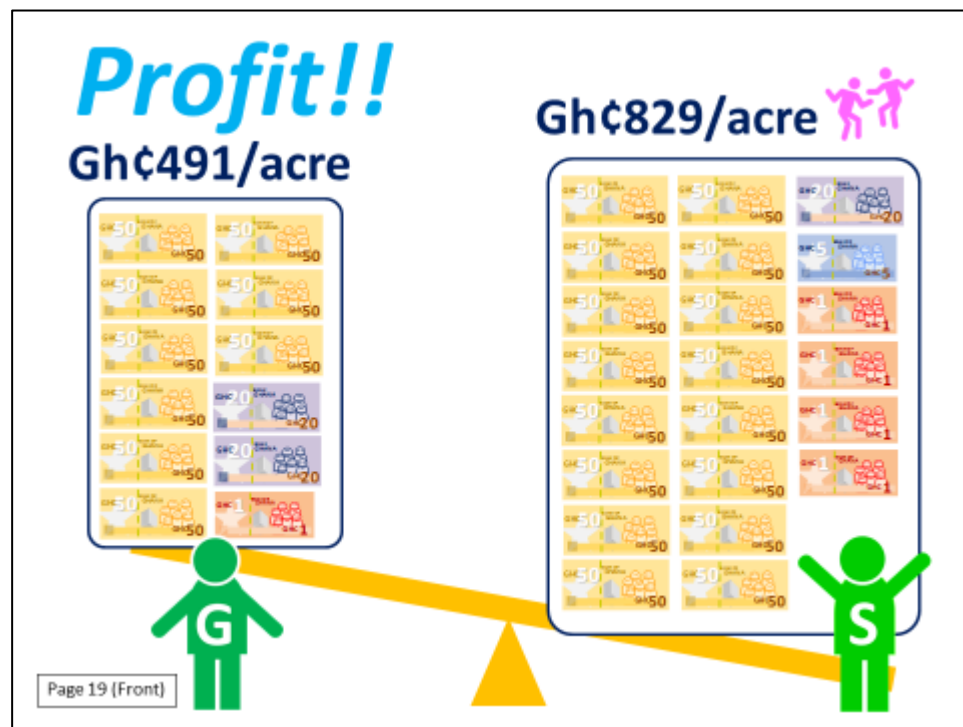
Gh¢696/acre

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



Case 4:

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

Case 4:

Saving Input Cost for Profit
-Cyprian of Konongo, Ashanti-



Case 4:


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



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 21 (Front)

In 2012...



GHC 31/50kg bag



GHC 32/50kg bag

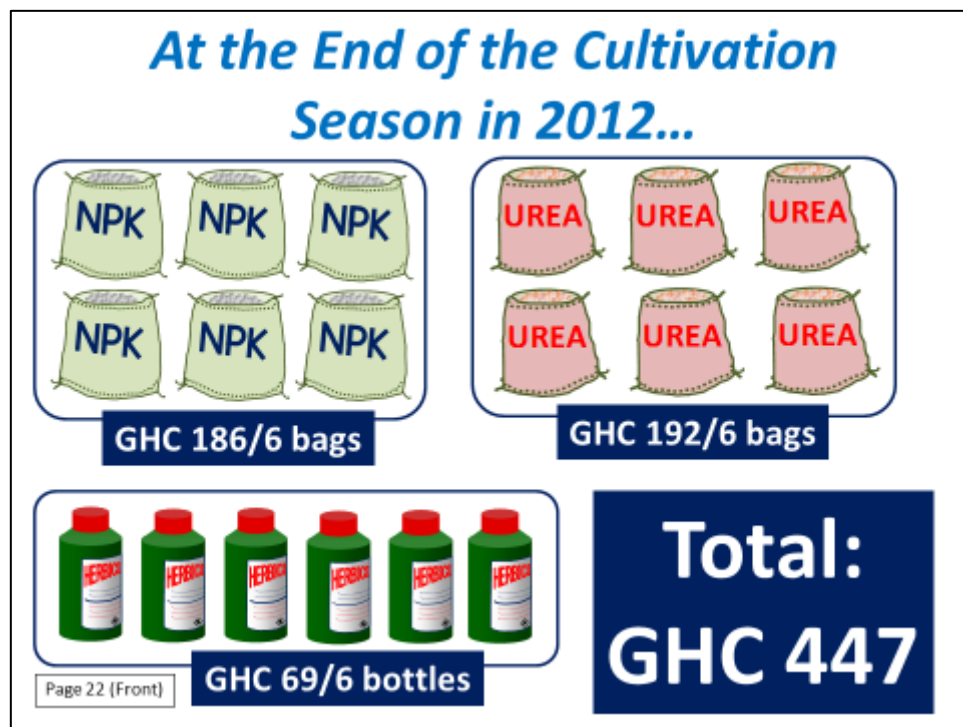


GHC 11.5/1 L bottle

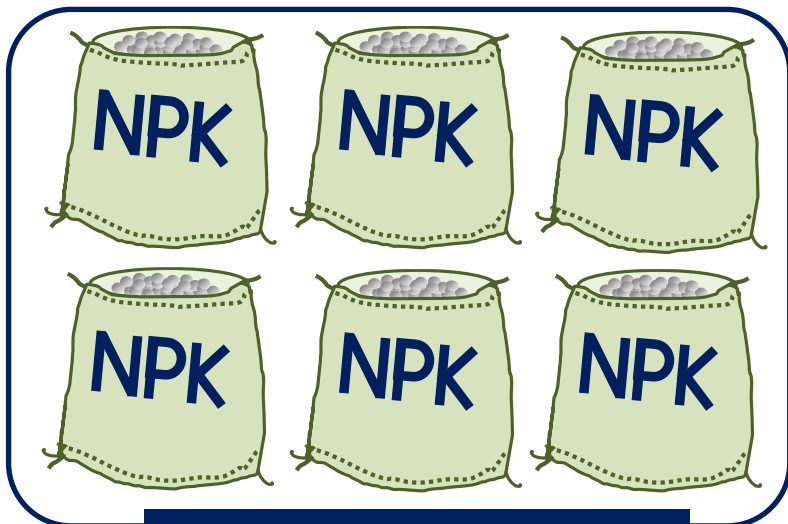
At the End of the Cultivation Season in 2012...



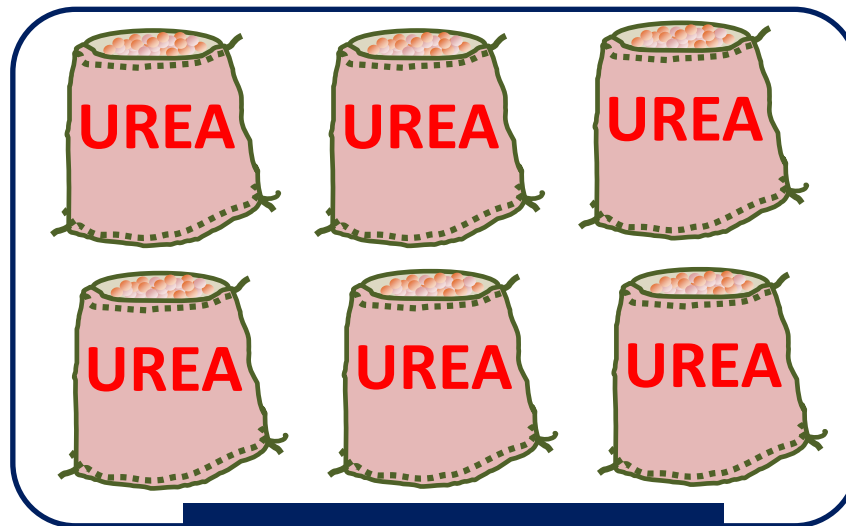
- At the end of cultivation season in 2012, Mr. Cyprian decided to buy 6 bags of NPK at the cost GHc 186. He also spent GHc 192 on 6 bags Urea. Again he purchased 6 litres of herbicide at cost of GHc 69.
- In total, he spent GHc 447 on the three inputs.



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...



NPK
GHc 51/50kg bag

UREA
GHc 55/50kg bag

HERBICIDE
GHc 14/1 L bottle

Page 23 (Front)

In 2013...



GHC 51/50kg bag



GHC 55/50kg bag



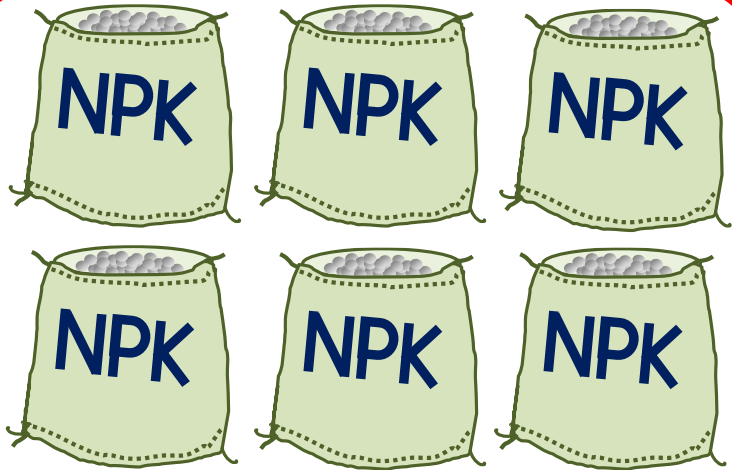
GHC 14/1 L bottle

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

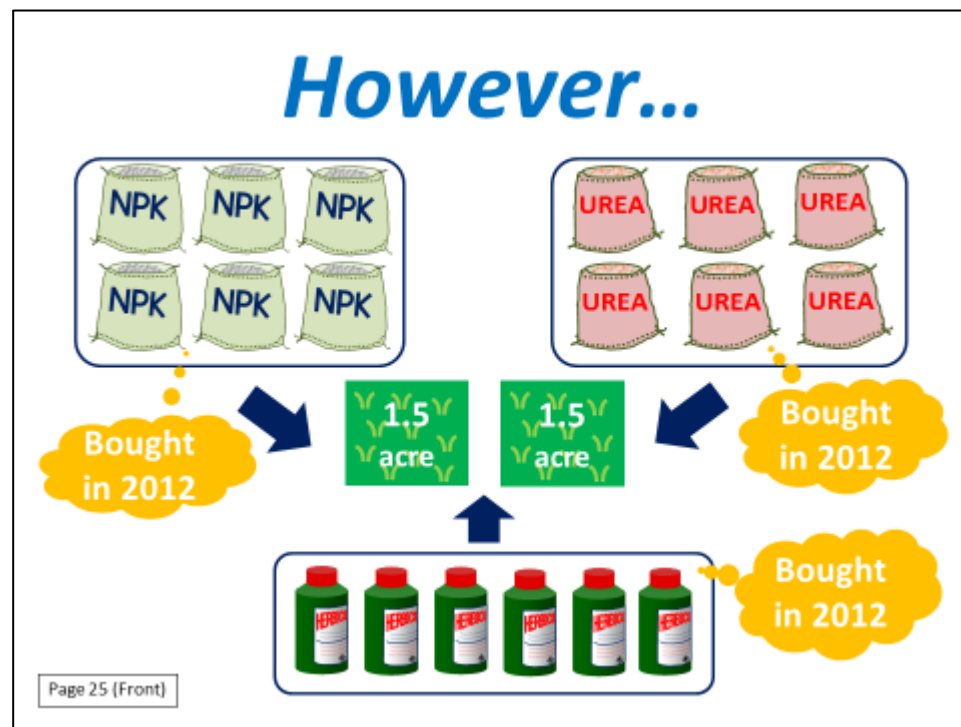


GHC 84/6 bottles

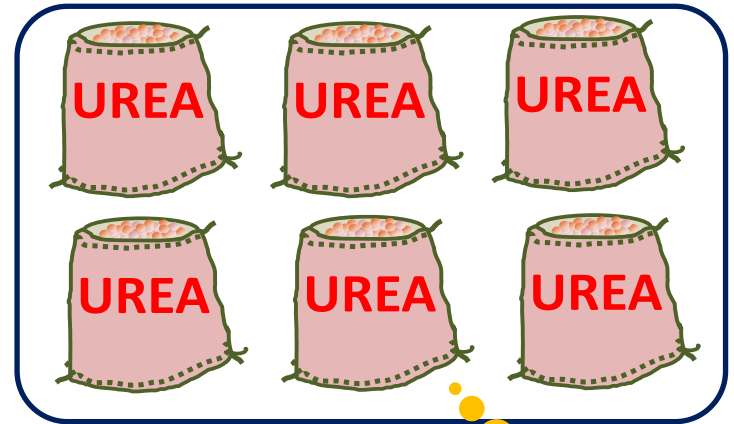
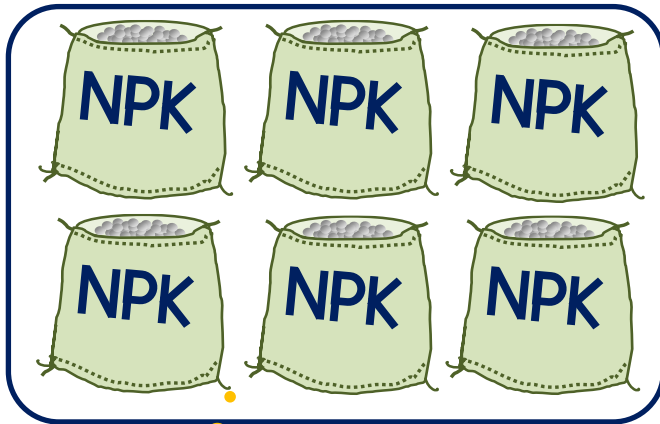
**Total:
GHC 720**

However...

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



However...



Bought
in 2012



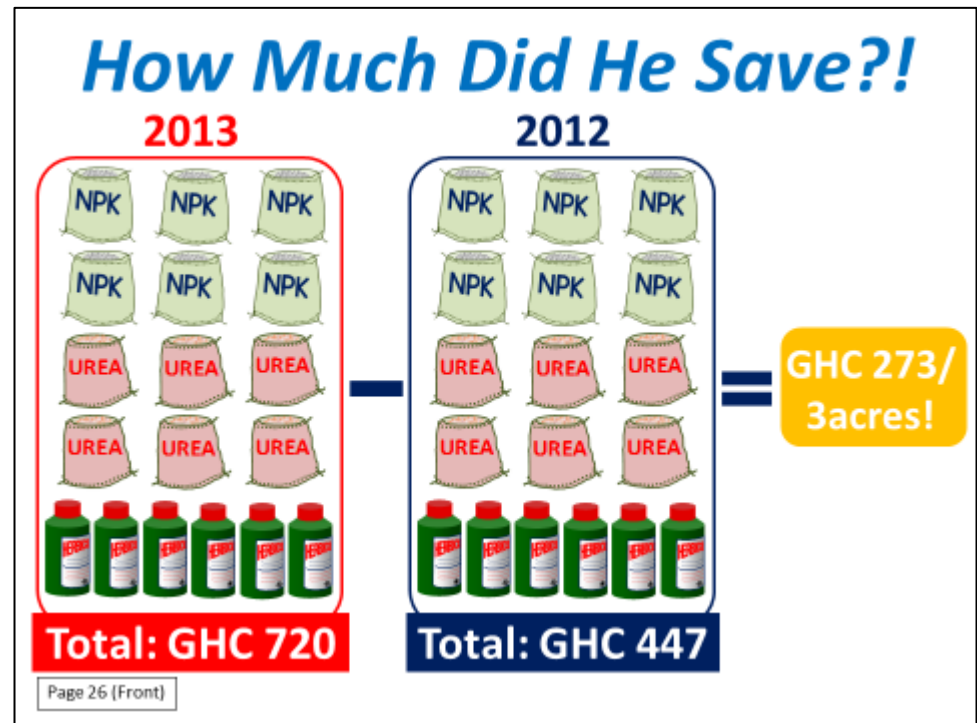
Bought
in 2012



Bought
in 2012

How Much Did He Save?!

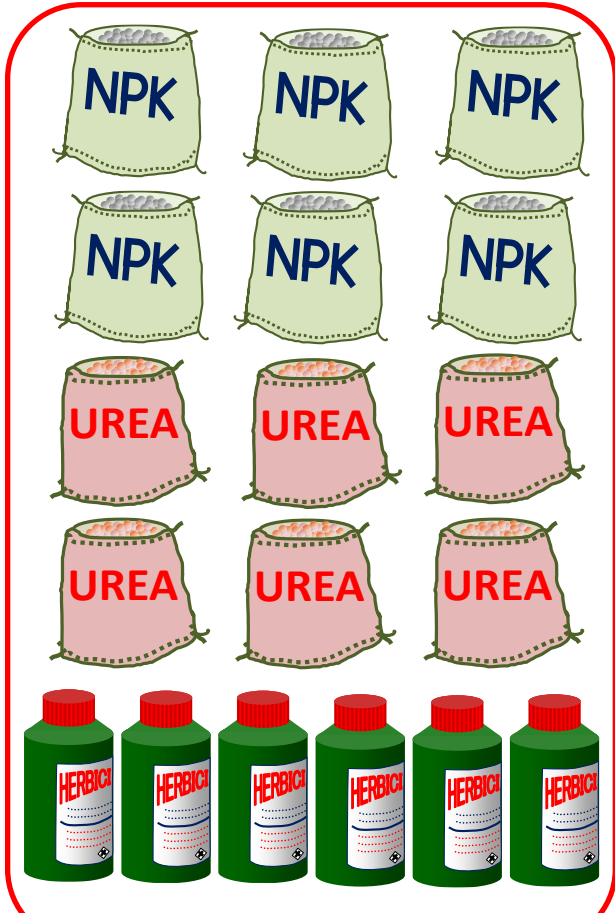
- How much did he save when he purchased Inputs in advance?
- In 2013 the inputs cost GHc 720. Meanwhile, he spent GHc 447 on same quantity of inputs in 2012.
- Since he bought in advance, he made saved GHc 273 on 3 acres!!!



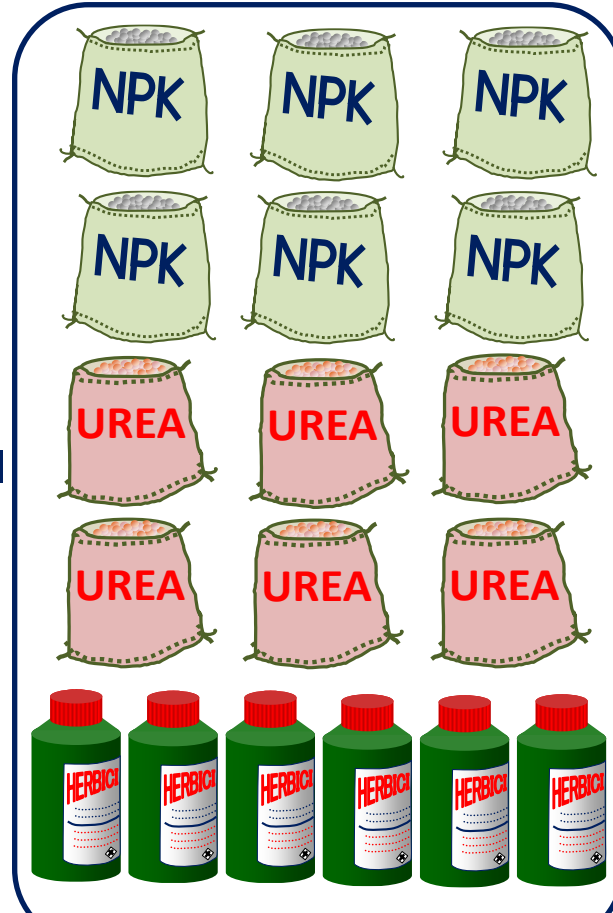
How Much Did He Save?!

2013

2012



Total: GHC 720



Total: GHC 447

GHC 273/
3acres!

- 2nd onsite training to be carried out during main crop season.
- 2nd 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. Value chain of local rice
 7. Good practices of farm management



2nd Onsite Training

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





MOFA/JICA TENSUI RICE

Rice
Cultivation

3rd 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)



Windmill



Balloon

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



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



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



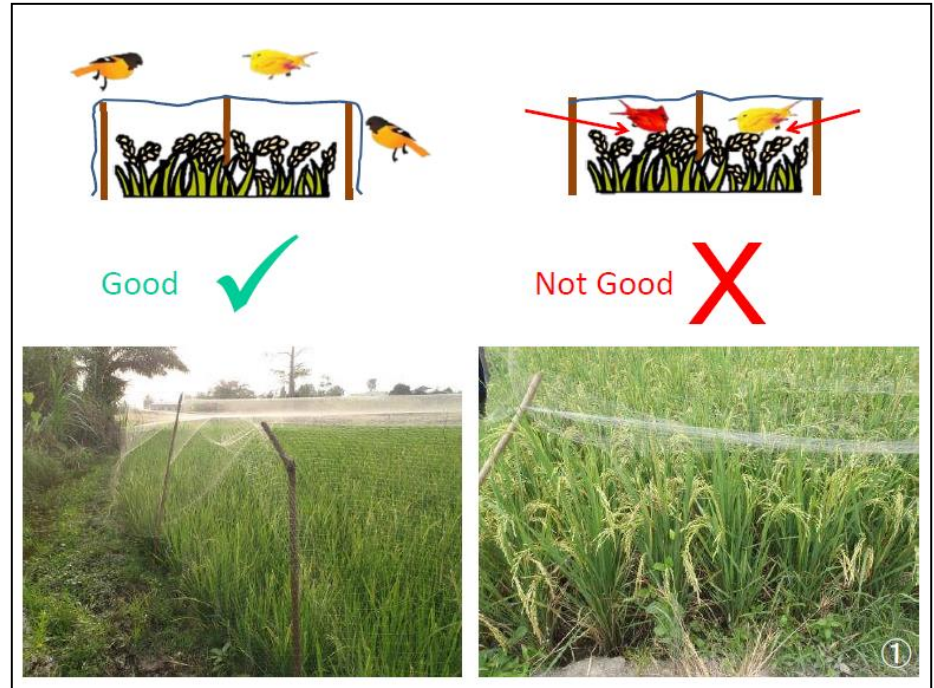
Bird Netting

(2) bird netting over rice field



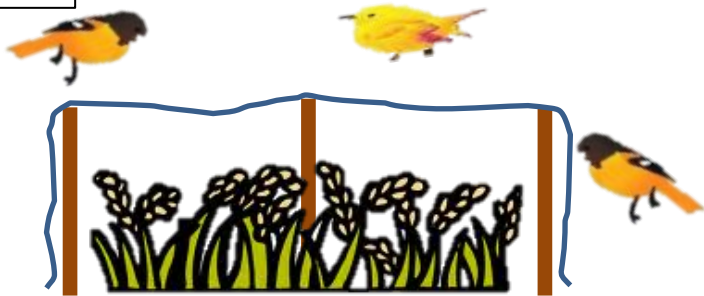
Back side

- 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 3-2-2



Good

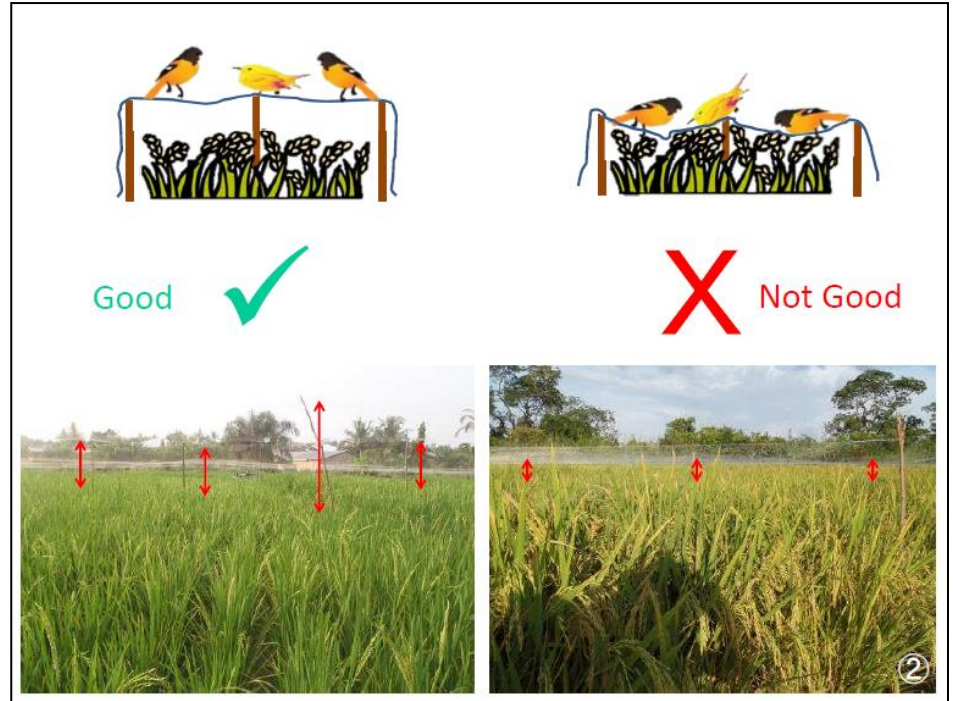


Not Good



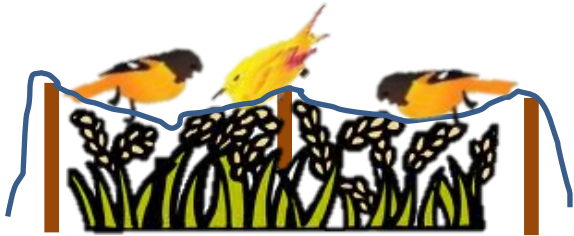
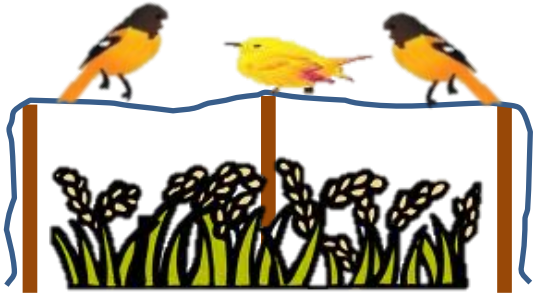
Back side

- 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 3-2-2



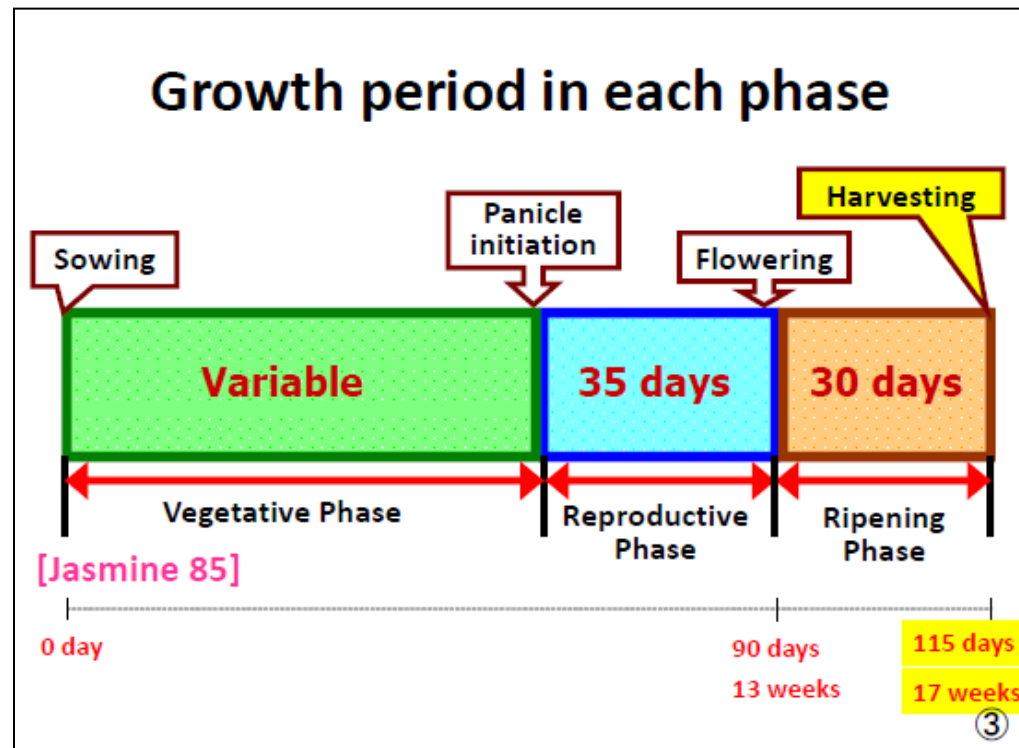
Good



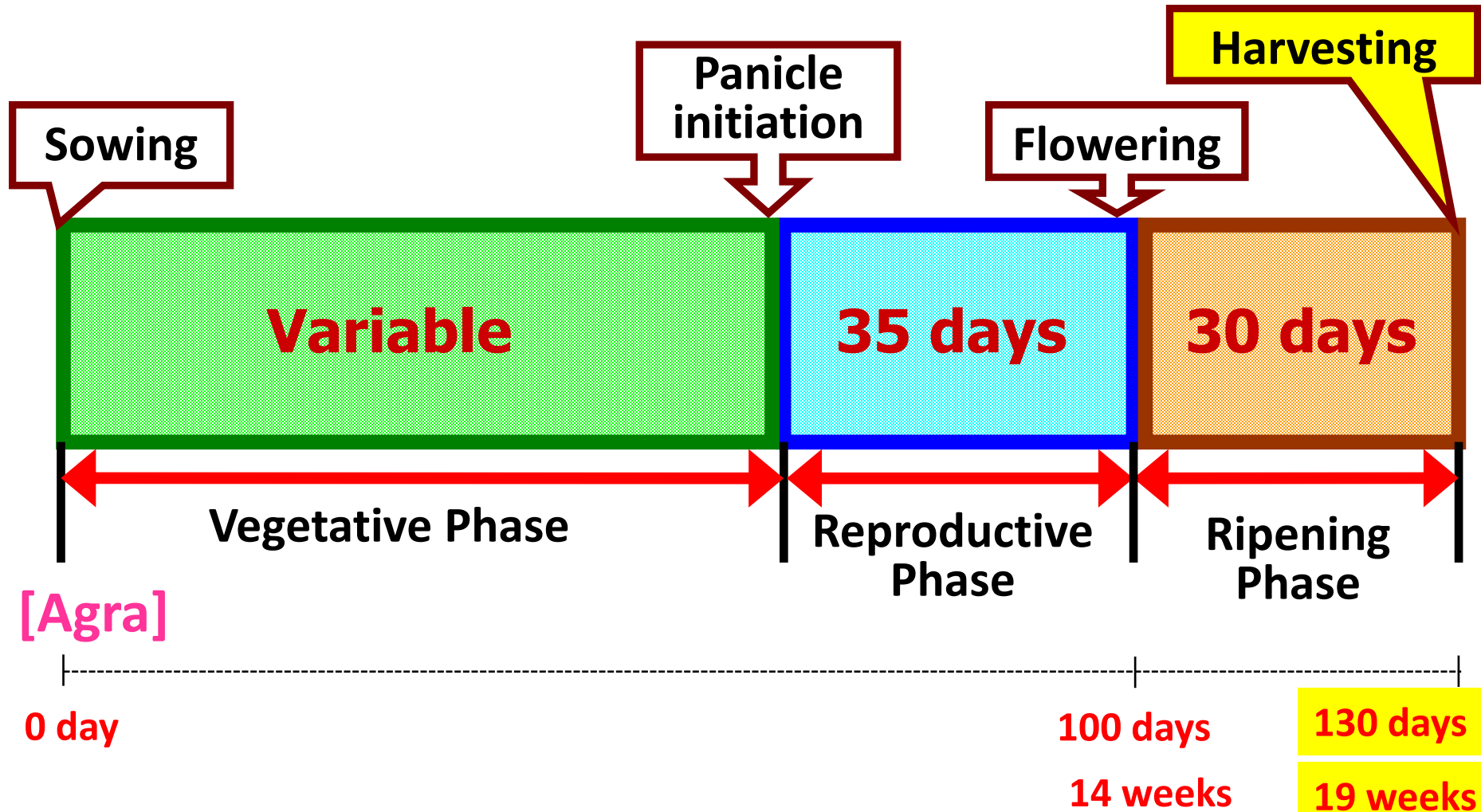
Not Good



- From the 15th week (105 days) after sowing, observe the degree of maturing.
- Calculated maturing time of “Jasmine 85” is 115 days after sowing.



Growth period in each phase



[Agra]

0 day

100 days

130 days

14 weeks

19 weeks

Back side

Watch colour of straw

- 80 – 85 % of spikelets turn out yellow

(Optional)

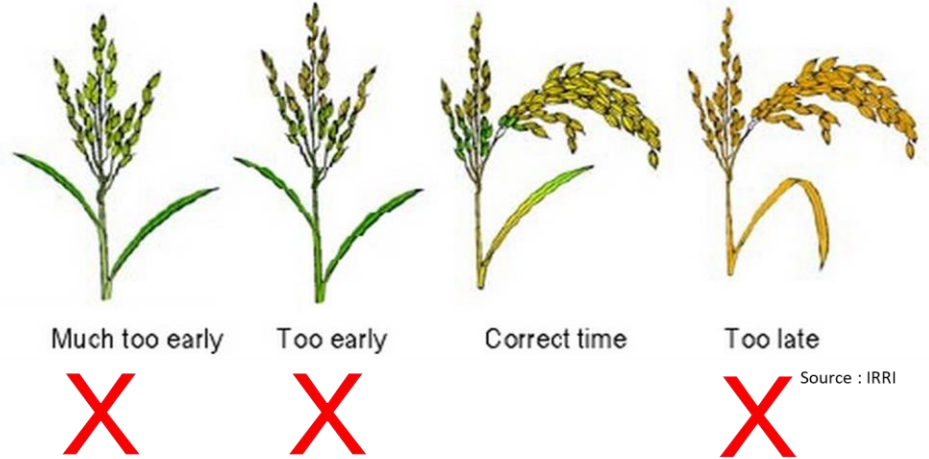
Check moisture contents every 2 - 3 days

- Optimum moisture contents : 25 - 20 %

Face

RC OST 3-2-1

How to Judge Harvesting Time by Panicle Observation



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.



Face



RC OST 3-2-2



5

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



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

Face

Cleaning

Clean



Dirty



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

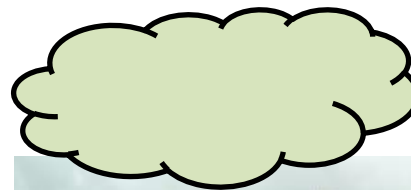
9

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

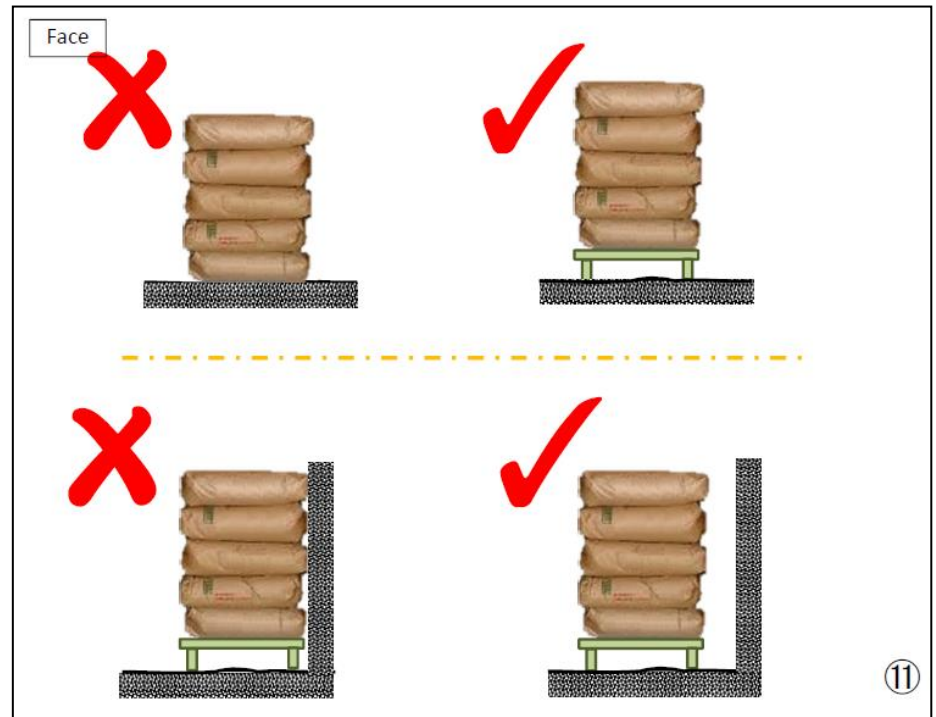
Some storage structures



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 Northern 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 Northern Region.

MOFA/JICA TENSUI RICE PROJECT

A Tale of Two Farmers

Project Farmer Non-Project Farmer

-Northern Region-

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

Farm Management



A Tale of Two Farmers



Project Farmer



Non-Project Farmer

-Northern 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!



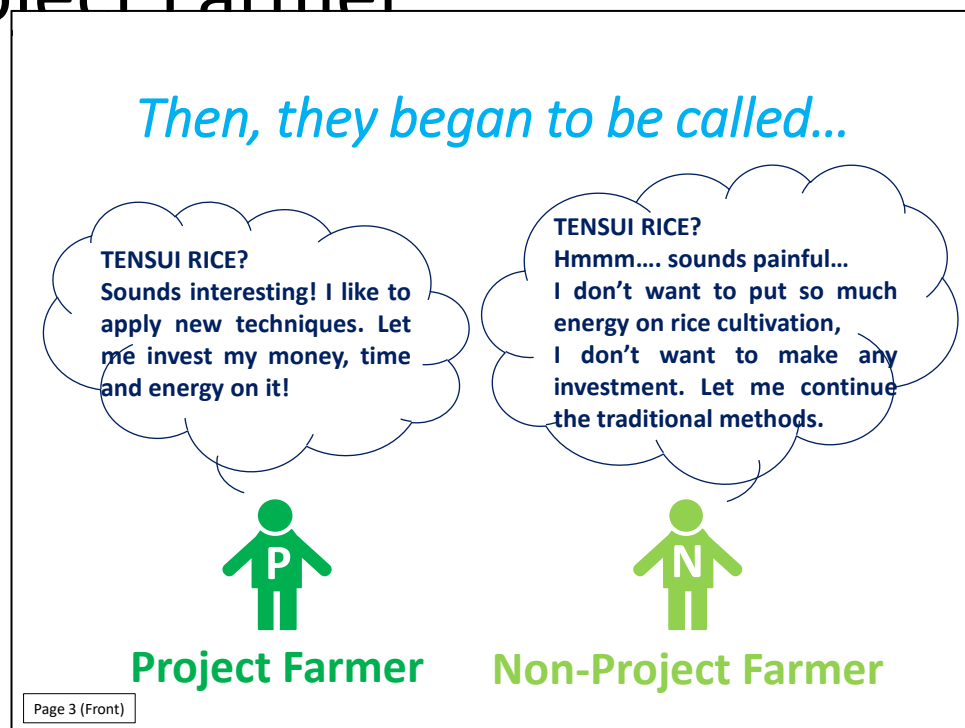
TENSUI RICE?

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?

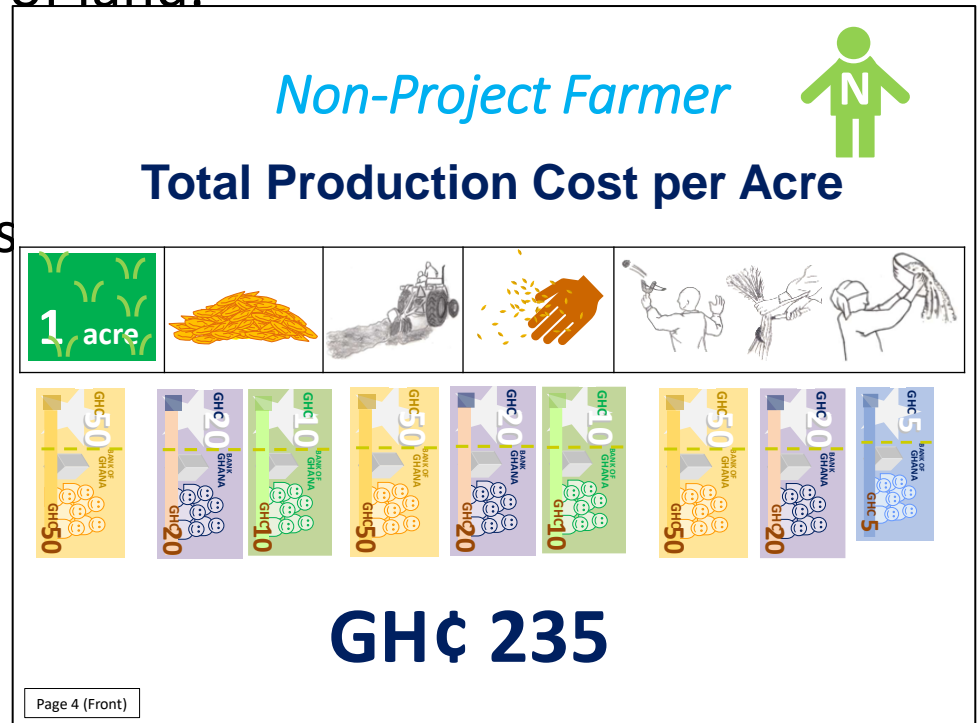
Hmmm.... sounds painful... I don't want to put so much energy on rice cultivation, I don't want to make any investment. Let me continue the traditional methods.



Non-Project Farmer

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

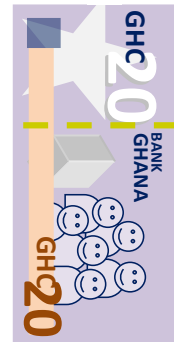
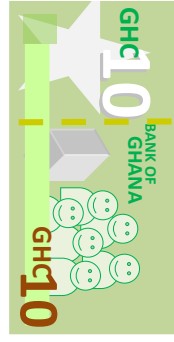
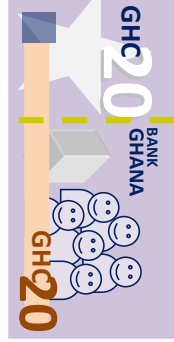
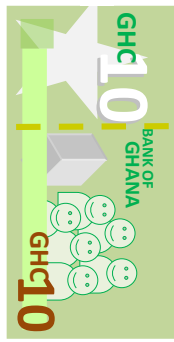
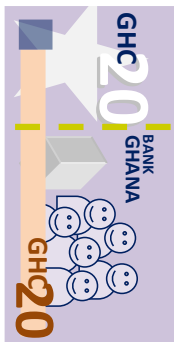
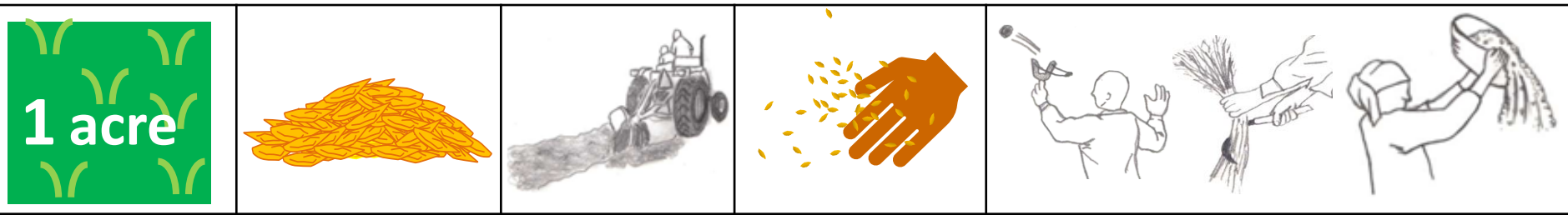
- He spent some money for renting a land and buying seeds.
- He applied the traditional production methods including tractor ploughing, broadcasting, bird scaring, harvesting and winnowing in an acre of land.
- He didn't apply fertilizers as he didn't buy them.
- In total, his production cost was GHC 235.
- Ask farmers: How much have you spent? More than him or less than him?



Non-Project Farmer



Total Production Cost per Acre

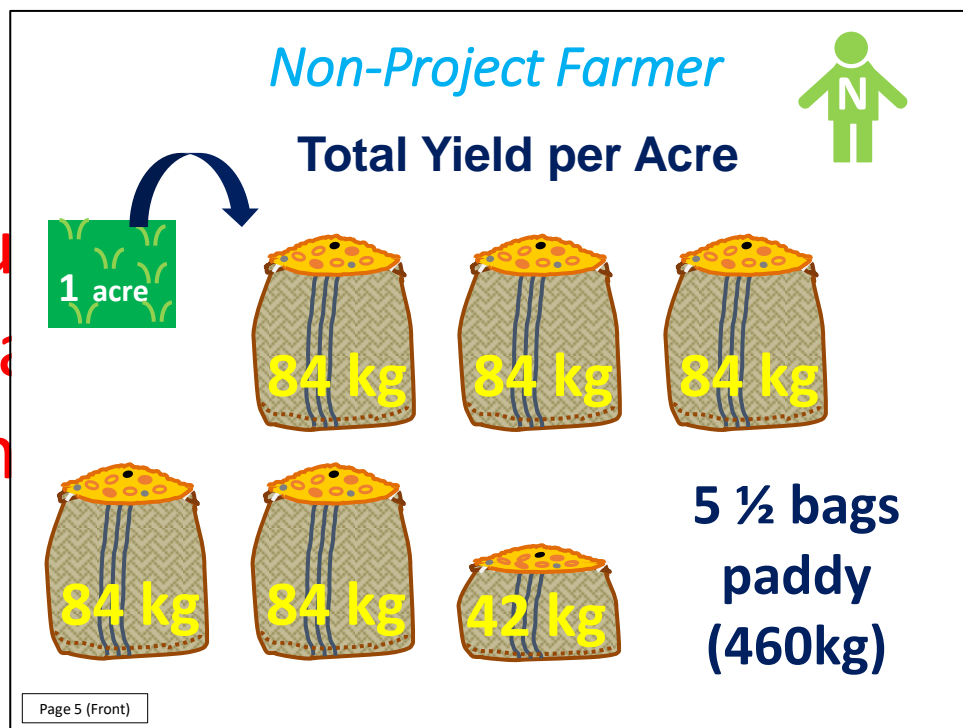


GH¢ 235

Total Yield per Acre

- In the harvest season, the Non-Project Farmer harvested 5 ½ bags of paddy (around 460kg) from 1 acre.

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



Non-Project Farmer



Total Yield per Acre



5 ½ bags
paddy
(460kg)

Producer Price per Bag (84kg Paddy)

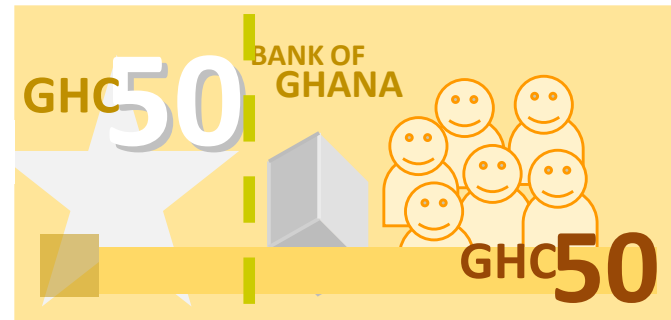
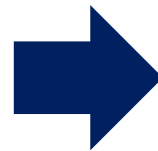
- Quality of the Non-Project Farmer's paddy was not so high. The paddy included lots of foreign matter such as stones and different varieties.
- A parboiler agreed to buy the paddy at GHC 50 per 84kg bag.
- **Ask farmers:**
How is the quality of your paddy? What is price of your paddy?



Non-Project Farmer



Producer Price per Bag 84kg Paddy

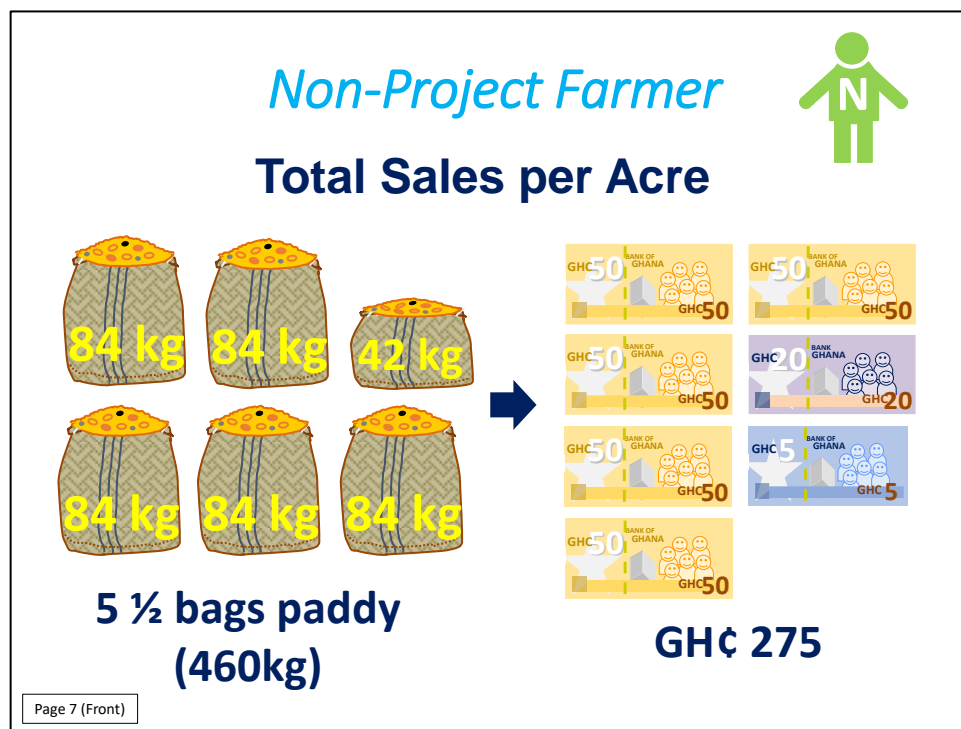


Low Quality Paddy

GH¢ 50

Total Sales per Acre

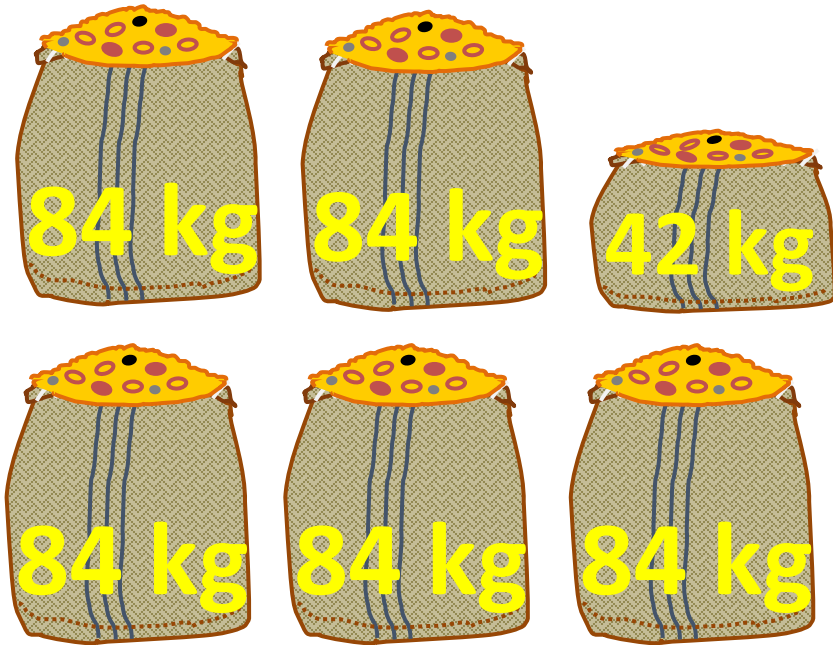
- In total, the Non-Project Farmer gained GHC 275 from 5 ½ bags of paddy.
- Ask farmers:
Is his income big or small??



Non-Project Farmer



Total Sales per Acre



5 ½ bags paddy
(460kg)

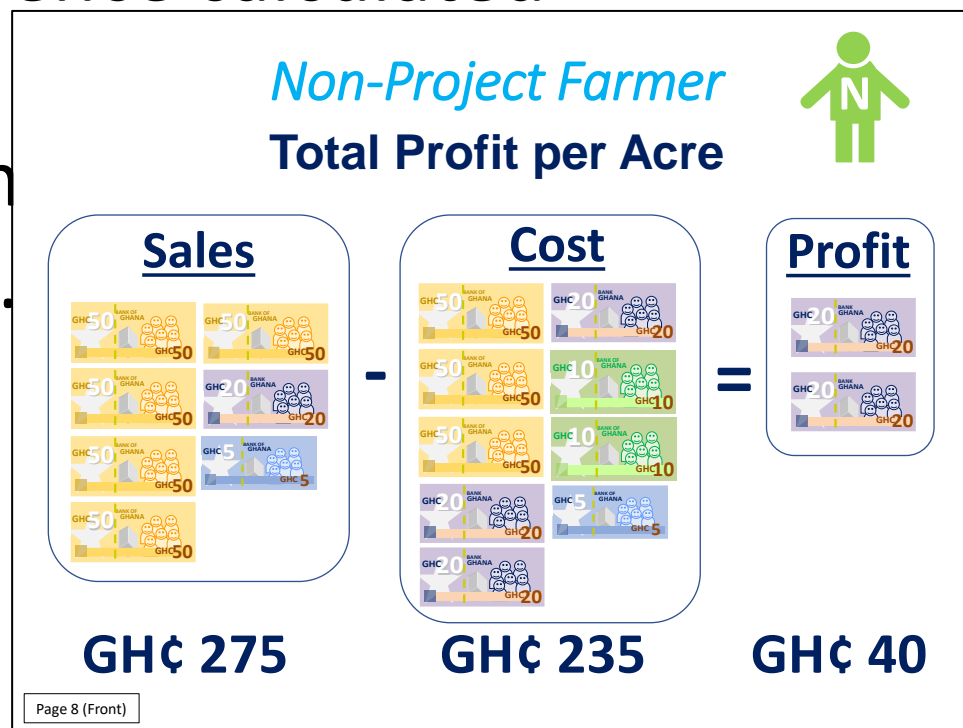


GH¢ 275

Total Profit per Acre

- Eventually, the Non-Project Farmer got GHC 40 as a profit from rice production in an acre. The profit is a difference calculated by subtracting the cost (GHC 235) from the sales (GHC 275).

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



Non-Project Farmer

Total Profit per Acre

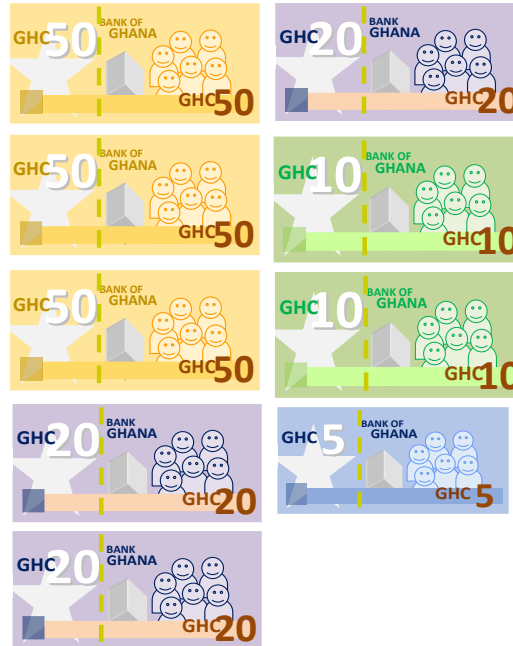


Sales



GH¢ 275

Cost



GH¢ 235

Profit



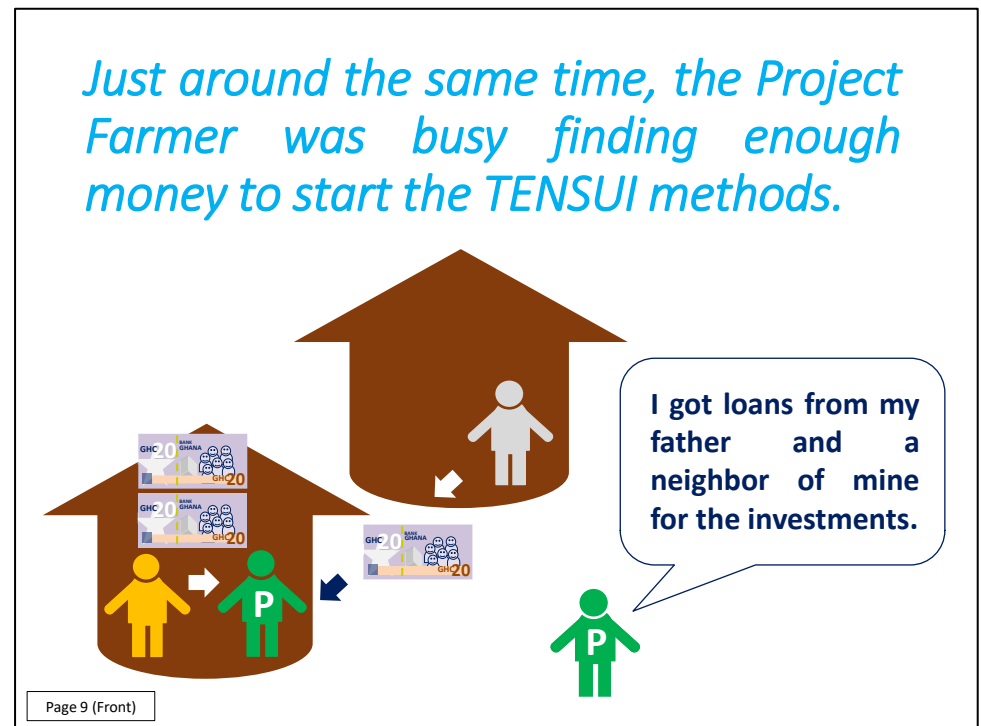
GH¢ 40

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 an acre, he borrowed GHC 40 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?



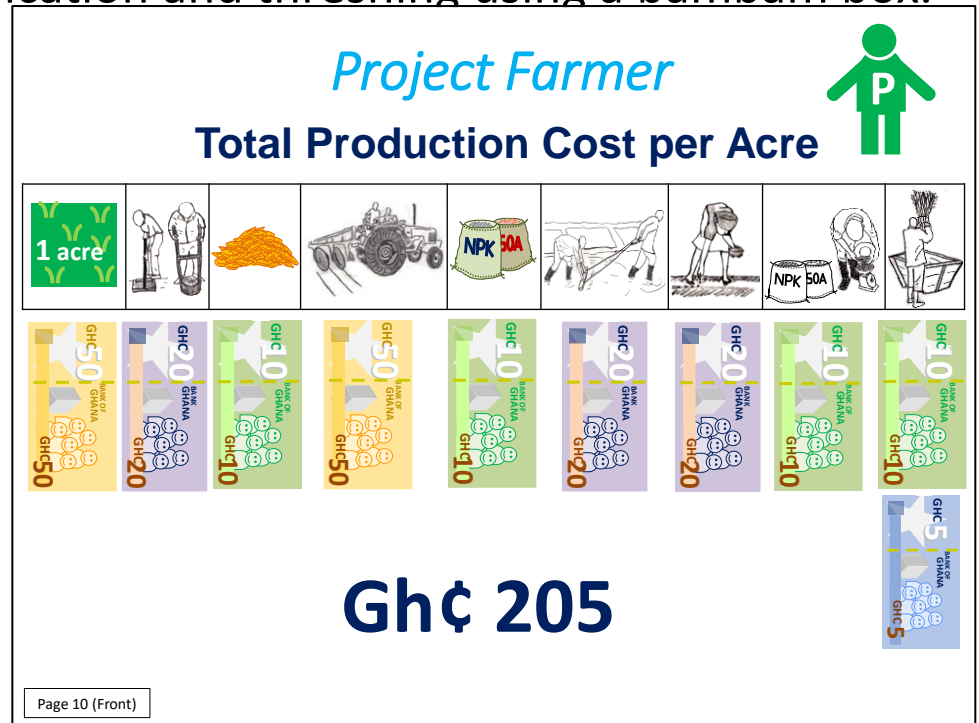
Just around the same time, the Project Farmer was busy finding enough money to start the TENSUI methods.



Then, let's see how the Project Farmer worked



- He spent some money for renting a land and buying seeds and fertilizers. As he used seeds harvested in the previous season, he was able to save some cost for seed procurement.
- He applied the TENSUI methods including tractor ploughing and harrowing, leveling, line sowing, fertilizer application and threshing using a bambam box.
- His total production cost was GHC 205.
- **Ask farmers: Is his production cost too much or reasonable?**

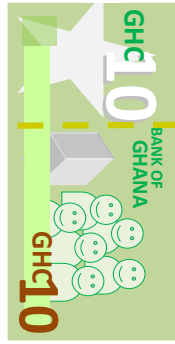
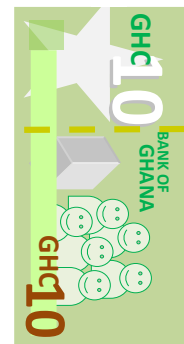
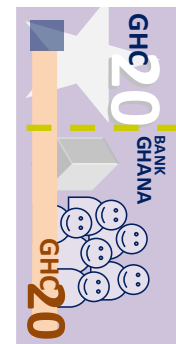
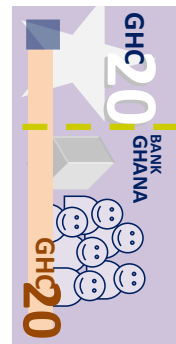
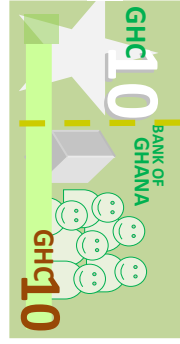
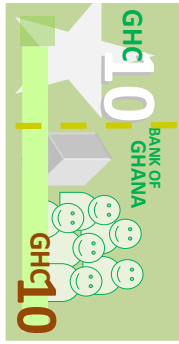
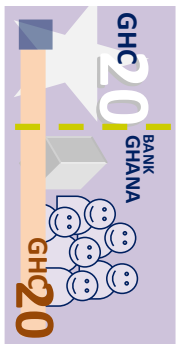
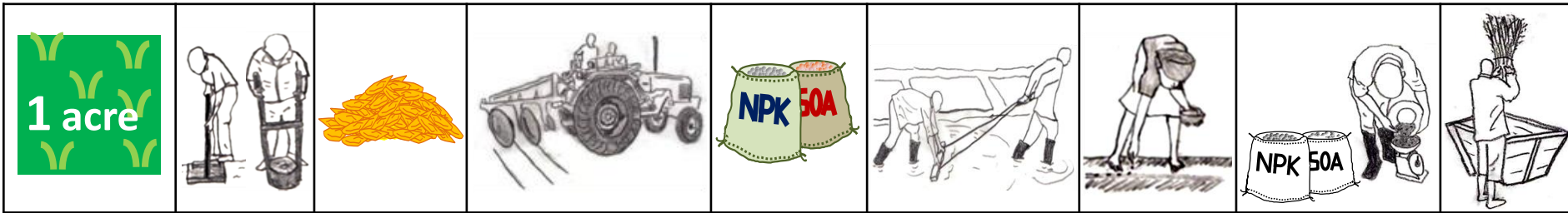


Remark for AEAs: In the Impact Survey 2013, higher production cost was expected for Project Farmers while their production cost was actually lower than Non-Project Farmers for reasons unknown. Although the actual figure is used in this material, its ultimate message is "Project Farmers can gain higher return than Non-Project Farmers".

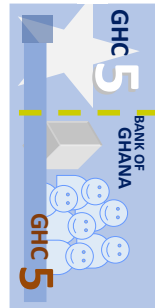
Project Farmer



Total Production Cost per Acre

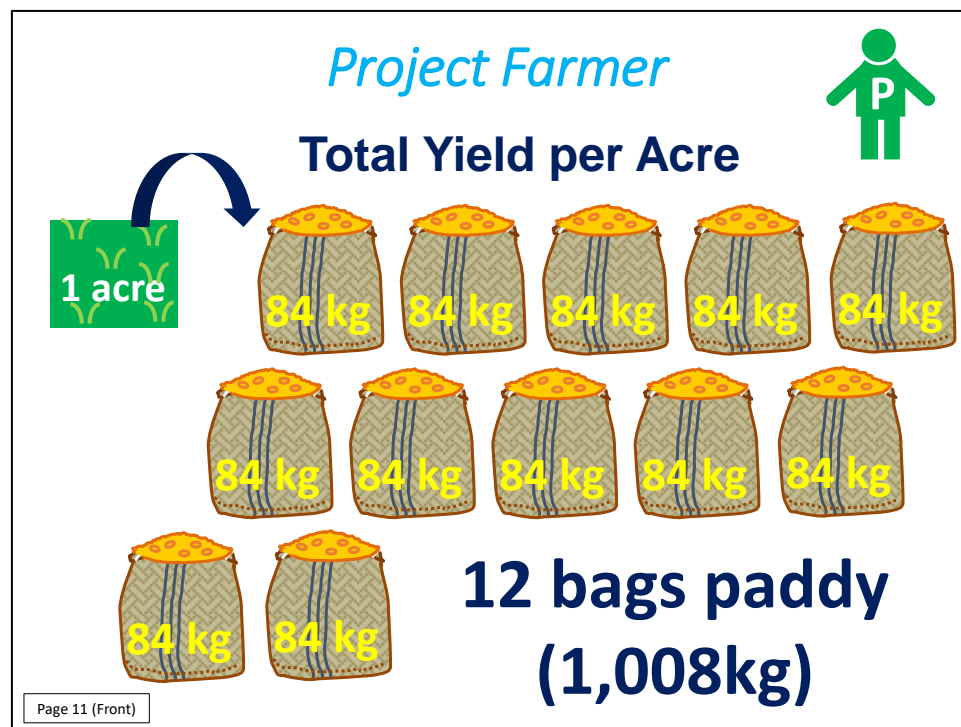


Gh¢ 205



Total Yield per Acre

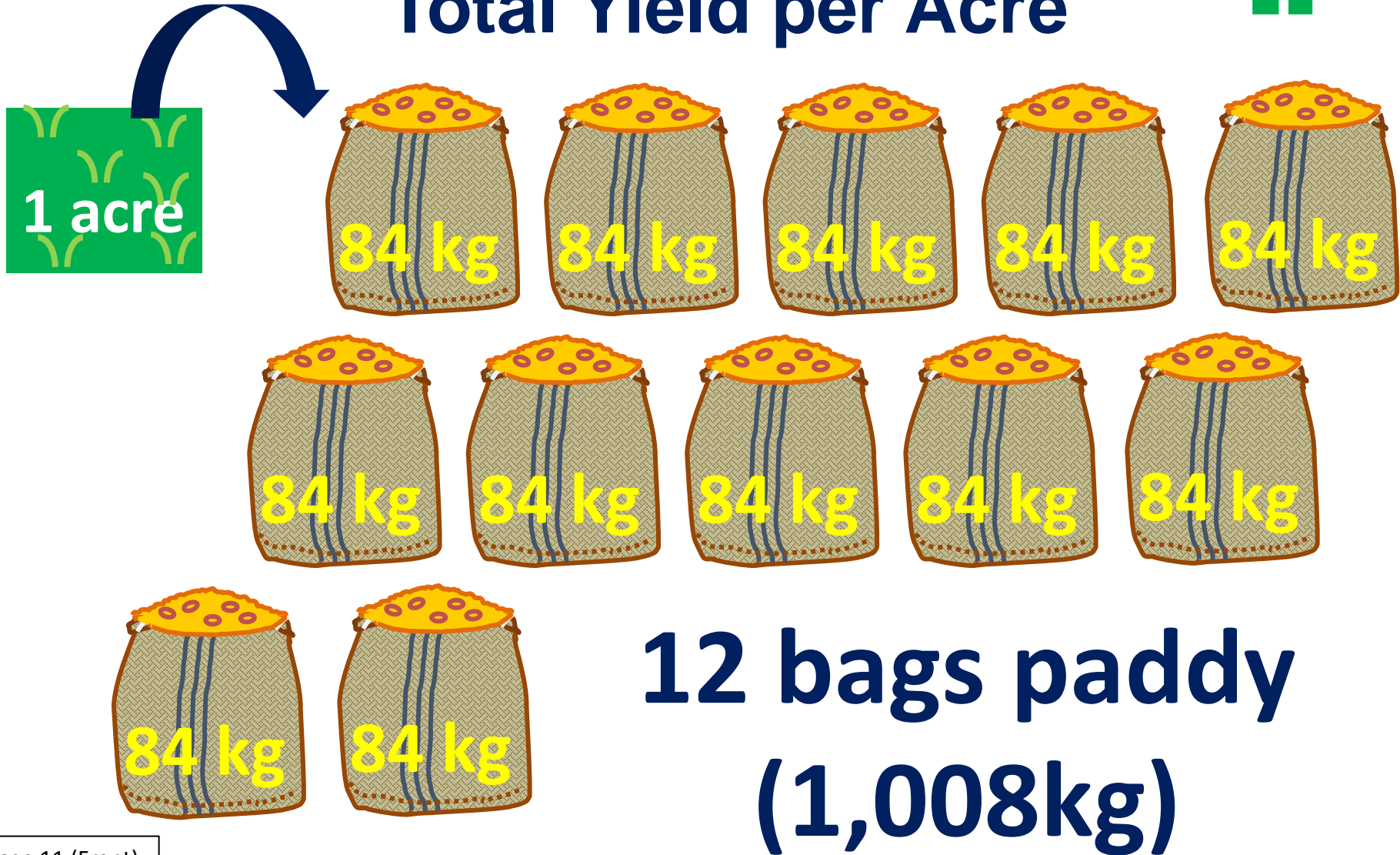
- The Project Farmer harvested 12 bags of paddy (1,008 kg) from 1 acre.
- Ask farmers:
Is his harvest big or small?



Project Farmer

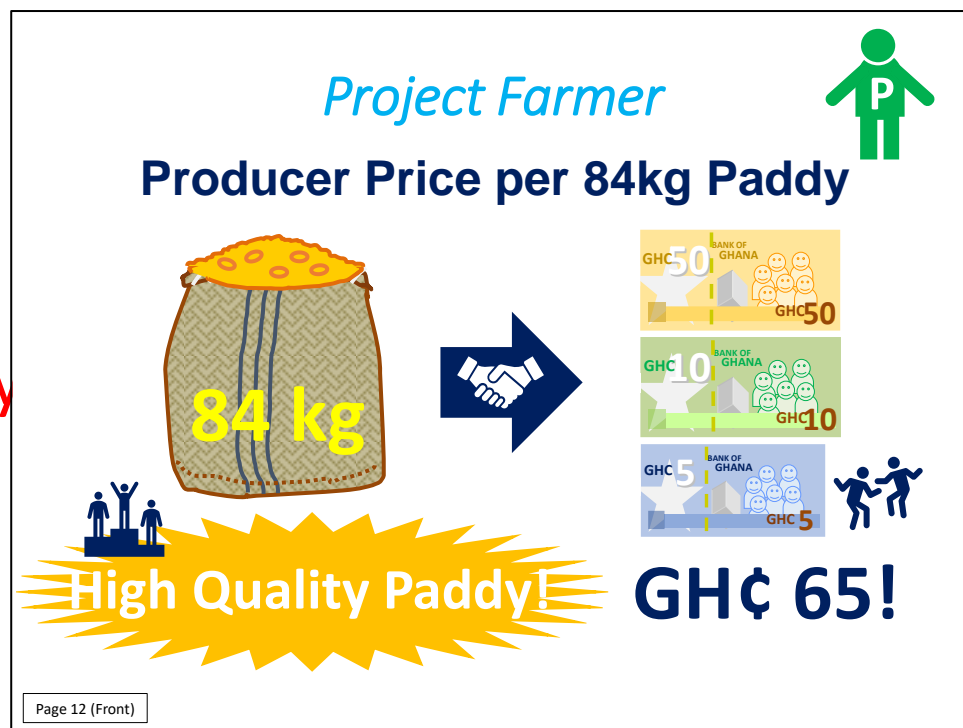


Total Yield per Acre



Producer Price per 84kg Paddy

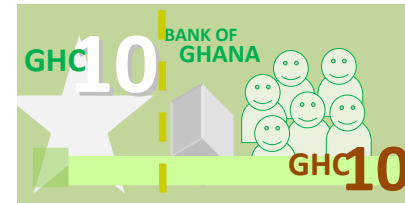
- Quality of the Project Farmer's paddy was very high. The paddy was pure without foreign matters such as stones, husks and different varieties.
- A parboiler agreed to buy the paddy at GHC 65 per 84kg bag.
- **Ask farmers: What is the price difference between the low quality and the high quality paddy?**



Project Farmer



Producer Price per 84kg Paddy

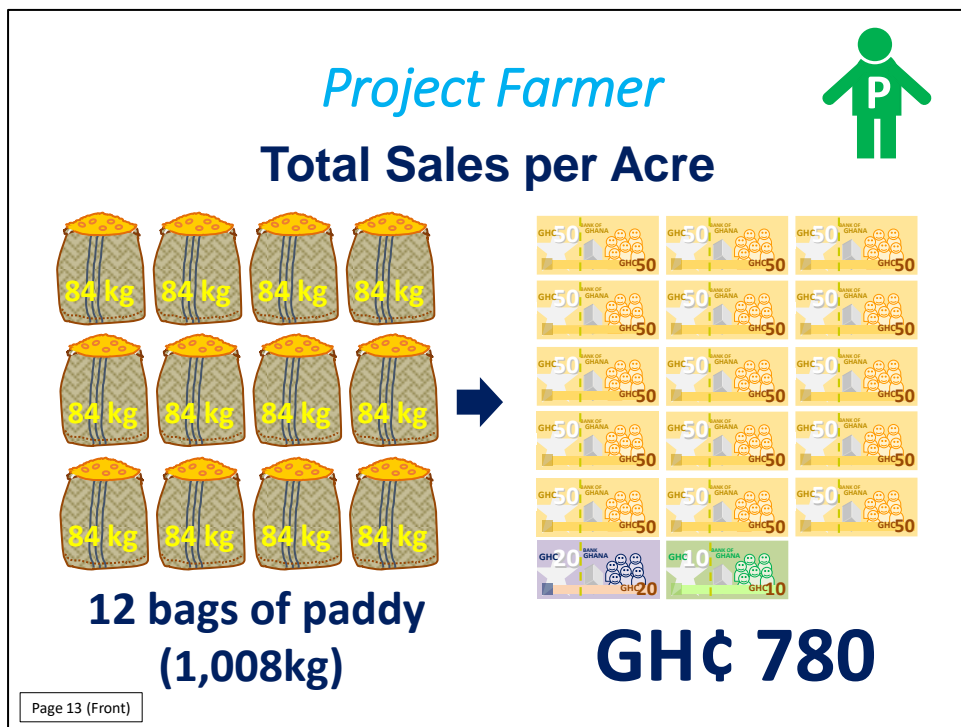


High Quality Paddy!

GH¢ 65!

Total Sales per Acre

- In total, the Project Farmer gained GHC 780 from 12 bags of paddy.
- Ask farmers:
Is his income big or small??



Project Farmer



Total Sales per Acre

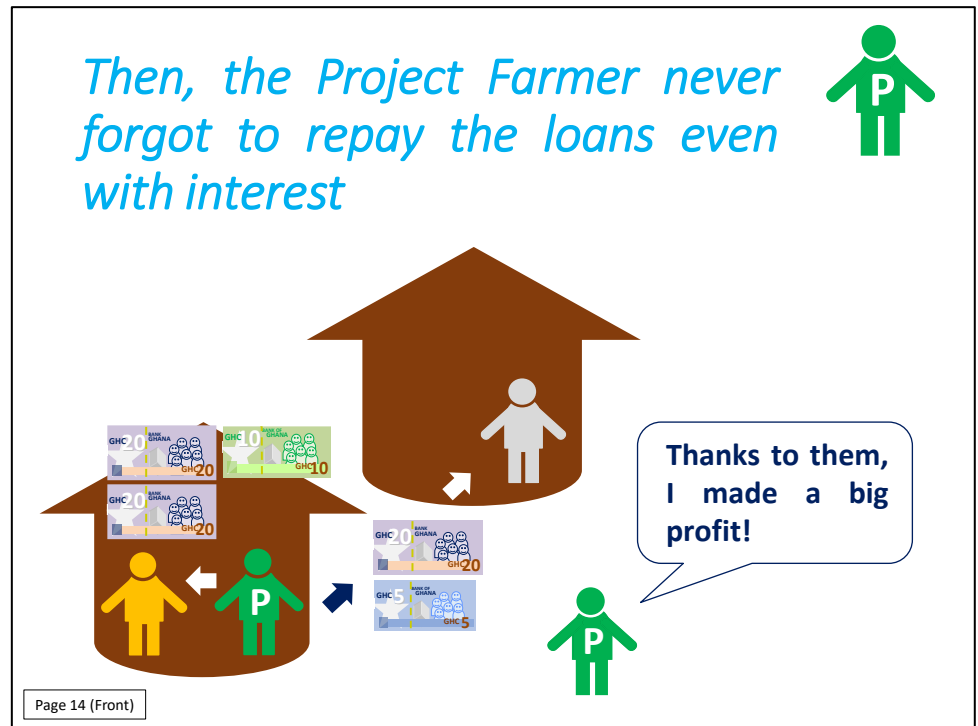


**12 bags of paddy
(1,008kg)**

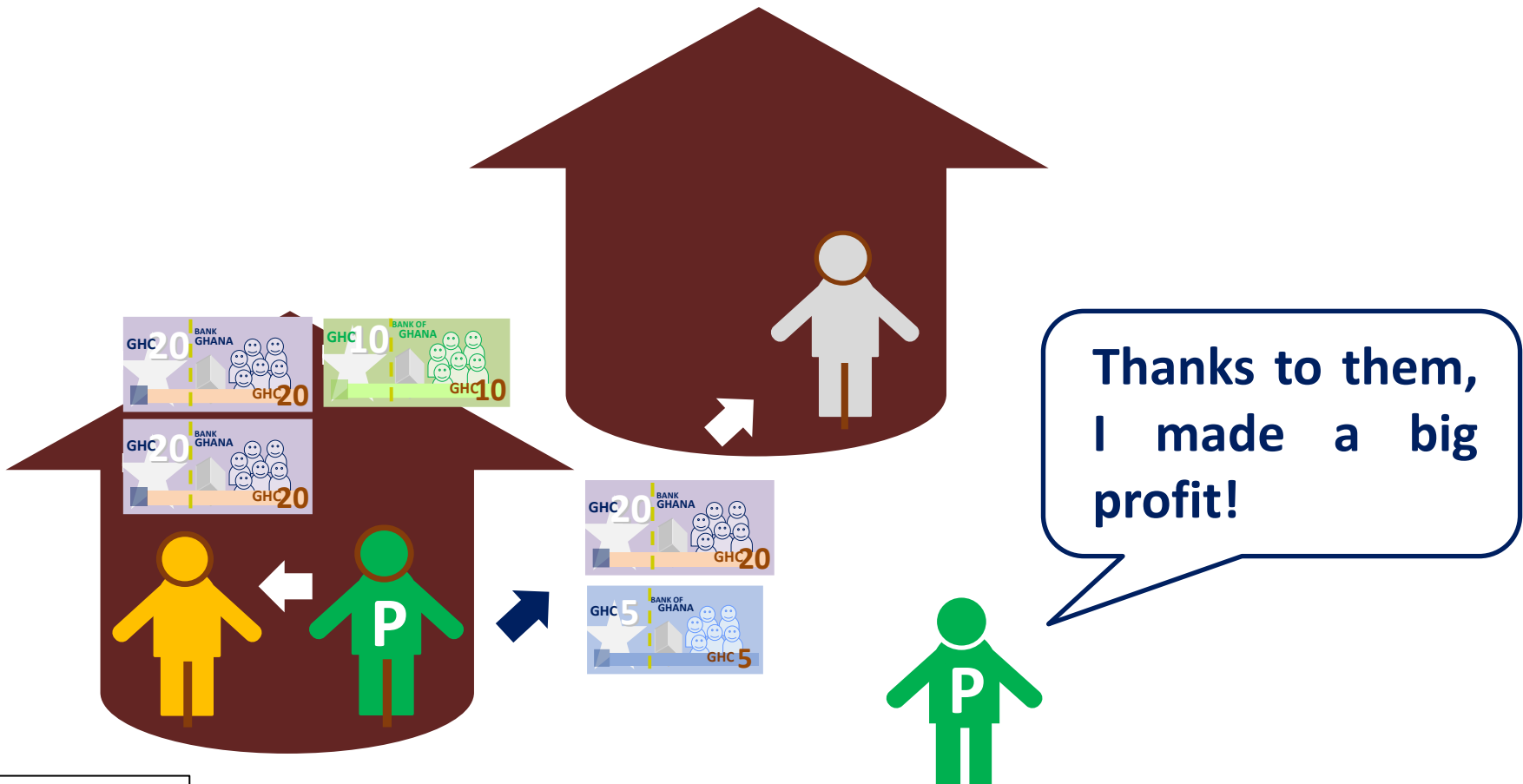
GH¢ 780

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

- He returned GHC 40 to his father with interest (GHC 10) and GHC 20 to his neighbor with interest (GHC 5). The total interest cost was GHC 15.

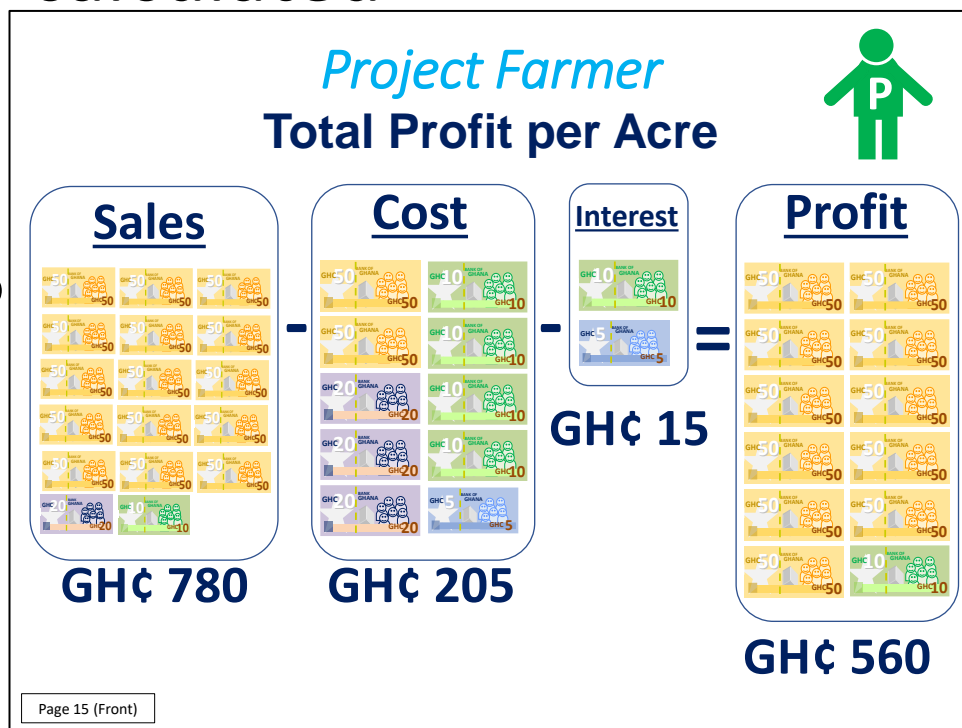


Then, the Project Farmer never forgot to repay the loans even with interest



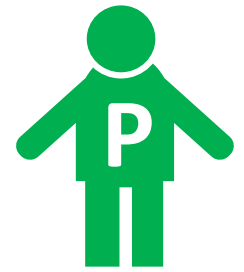
Total Profit per Acre

- Eventually, the Project Farmer got GHC 560 as a profit from rice production in an acre. The profit is a difference calculated by subtracting the cost (GHC 205) and the interest (GHC 15 from the sales (GHC 780).



Project Farmer

Total Profit per Acre



Sales



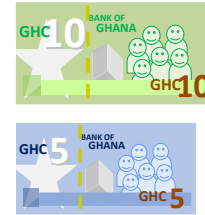
GH¢ 780

Cost



GH¢ 205

Interest



GH¢ 15

Profit



GH¢ 560

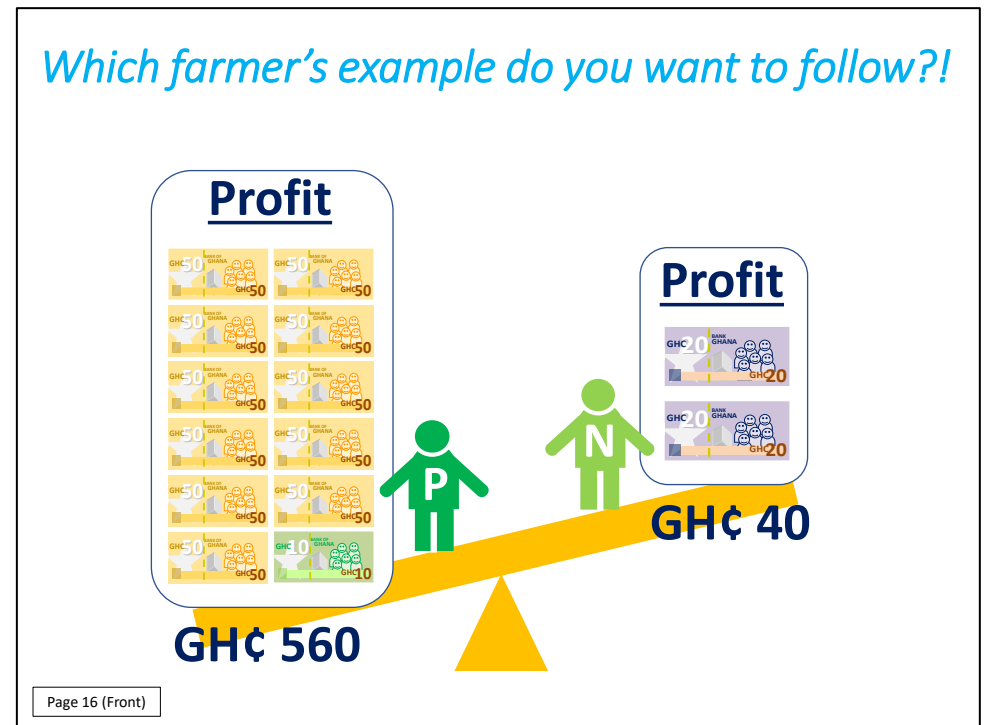
Which farmer's example do you want to follow?!



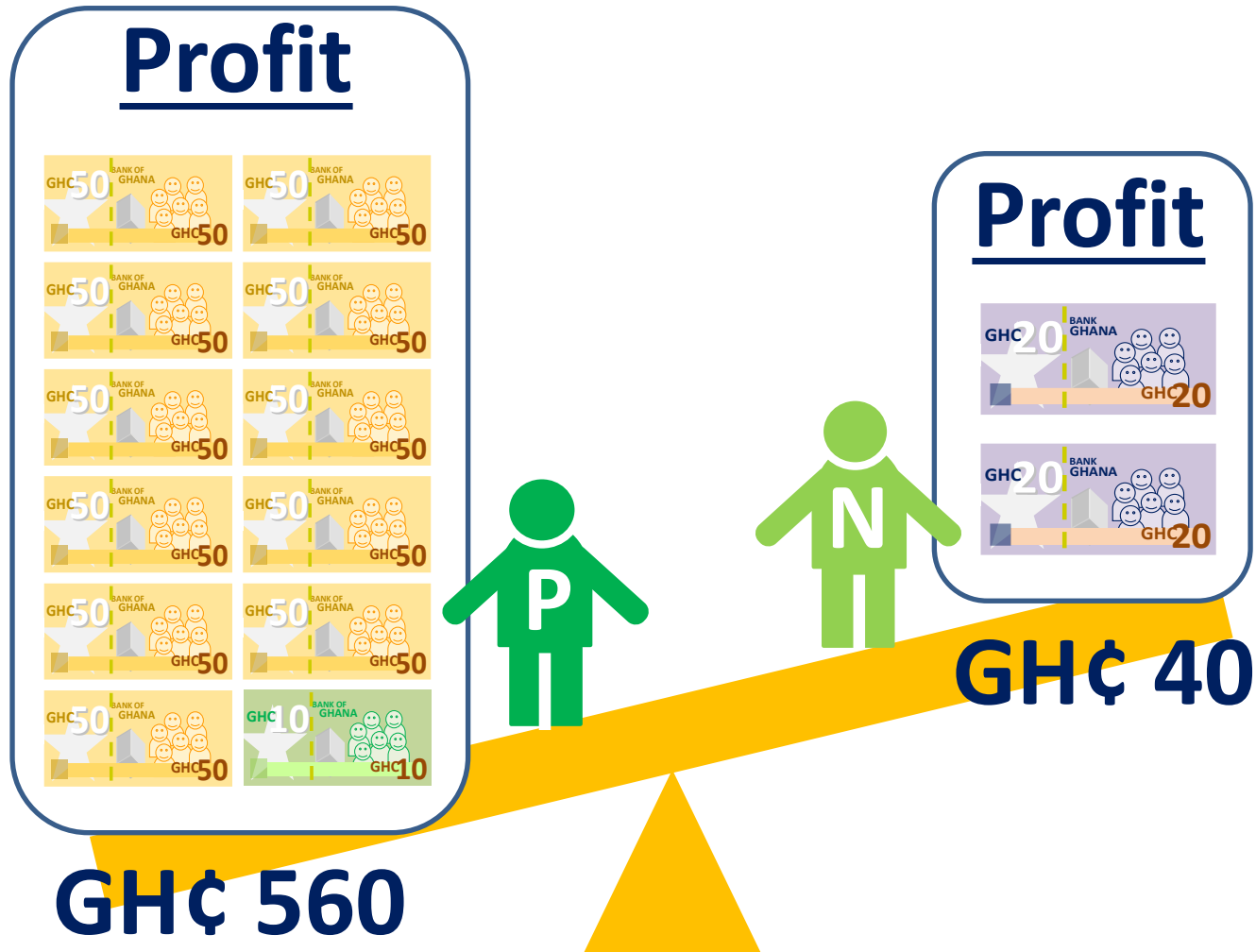
The profit from the Project Farmer's field was higher than that for the Non-Project Farmer!

Ask farmers:

- What is the difference between their profit?



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



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



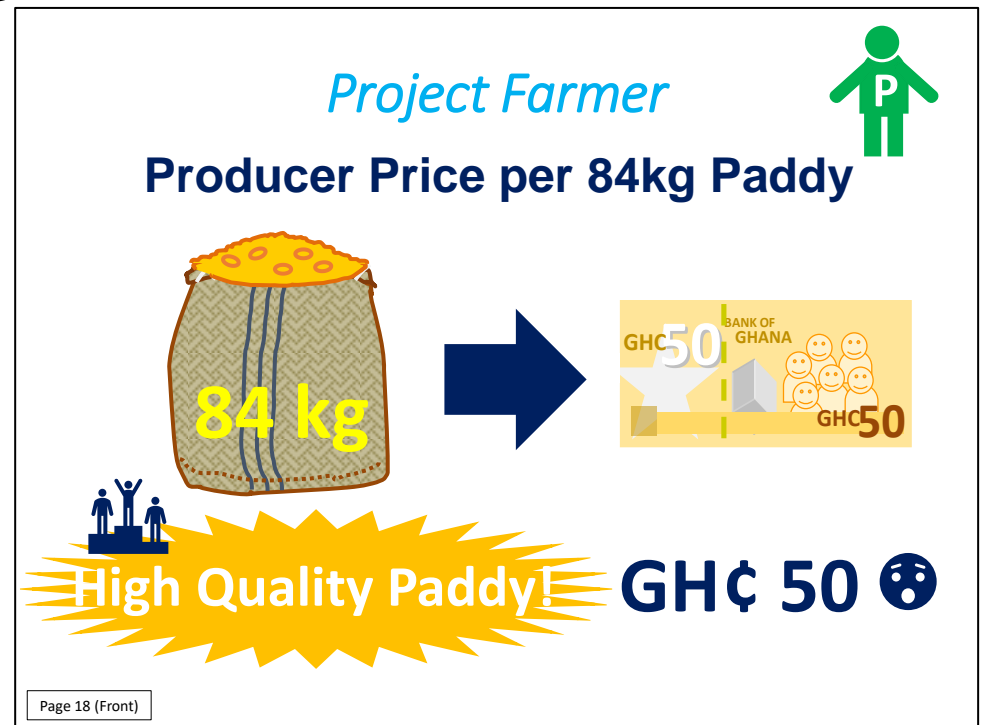
But sometimes, quality was not reflected to producer price... 🤔

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



Producer Price per 25kg Milled Rice

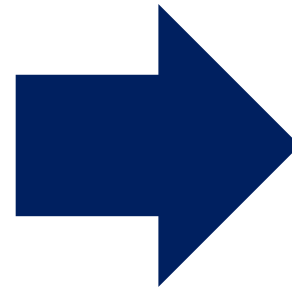
- Quality of the Project Farmer's paddy was very high. But a parboiler agreed to buy the paddy at GHC 50 per bag. This is the same price as the producer price of the low quality rice.
- Ask farmers: How is your experience?



Project Farmer



Producer Price per 84kg Paddy

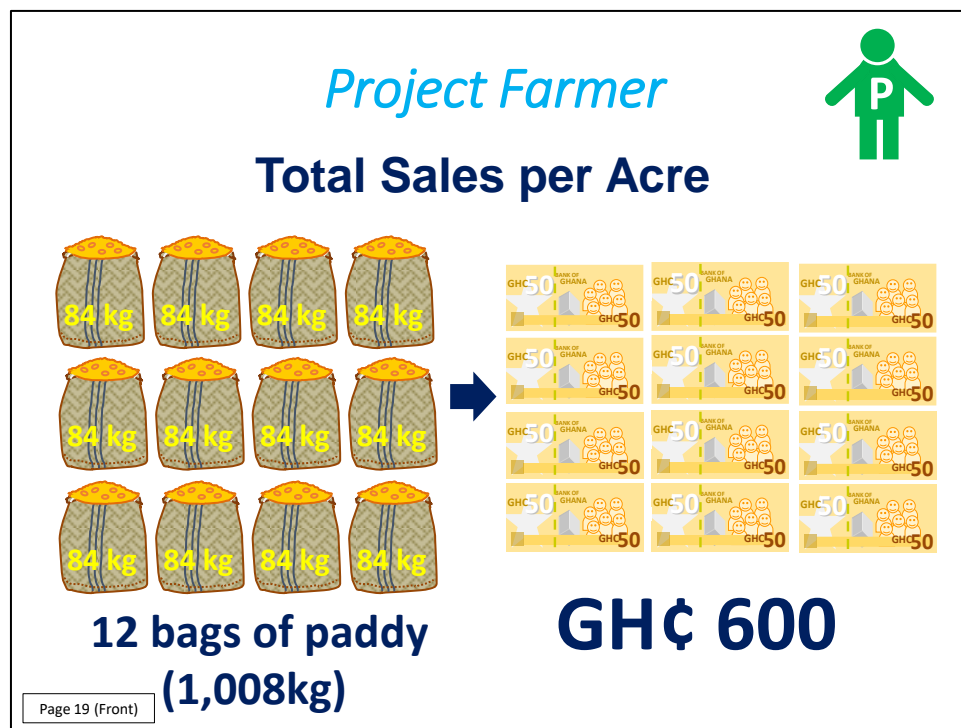


High Quality Paddy!

GH¢ 50 😬

Total Sales per Acre

- In total, the Project Farmer gained GHC 600 from 12 bags of paddy.
- Ask farmers:
Is his income big or small??



Project Farmer



Total Sales per Acre

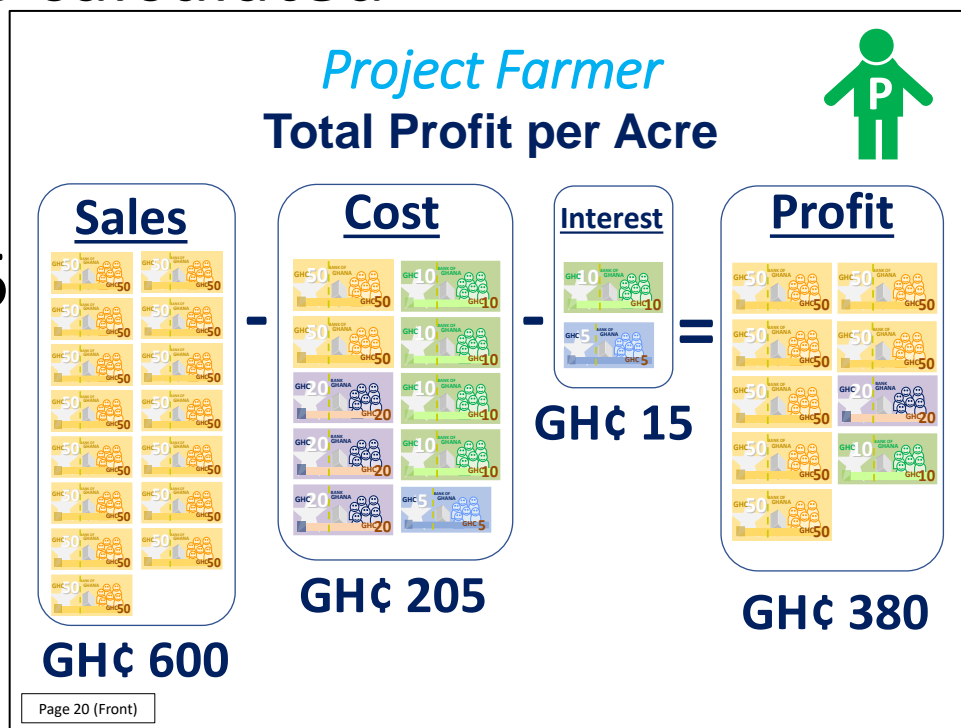


**12 bags of paddy
(1,008kg)**

GH¢ 600

Total Profit per Acre

- Eventually, the Project Farmer got GHC 380 as a profit from rice production in an acre. The profit is a difference calculated by subtracting the cost (GHC 205) and the interest (GHC 15) from the sales (GHC 600).



Project Farmer

Total Profit per Acre

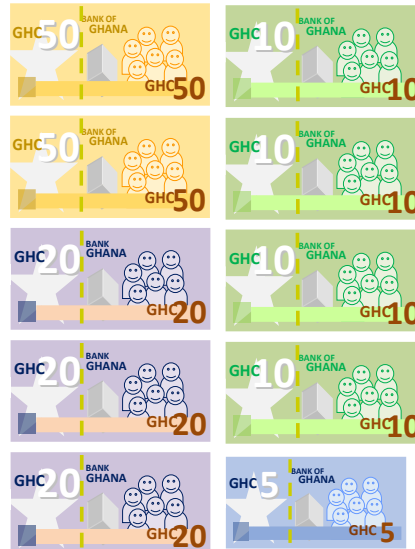


Sales



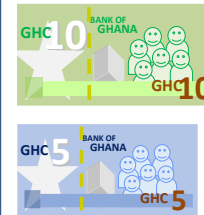
GH¢ 600

Cost



GH¢ 205

Interest



GH¢ 15

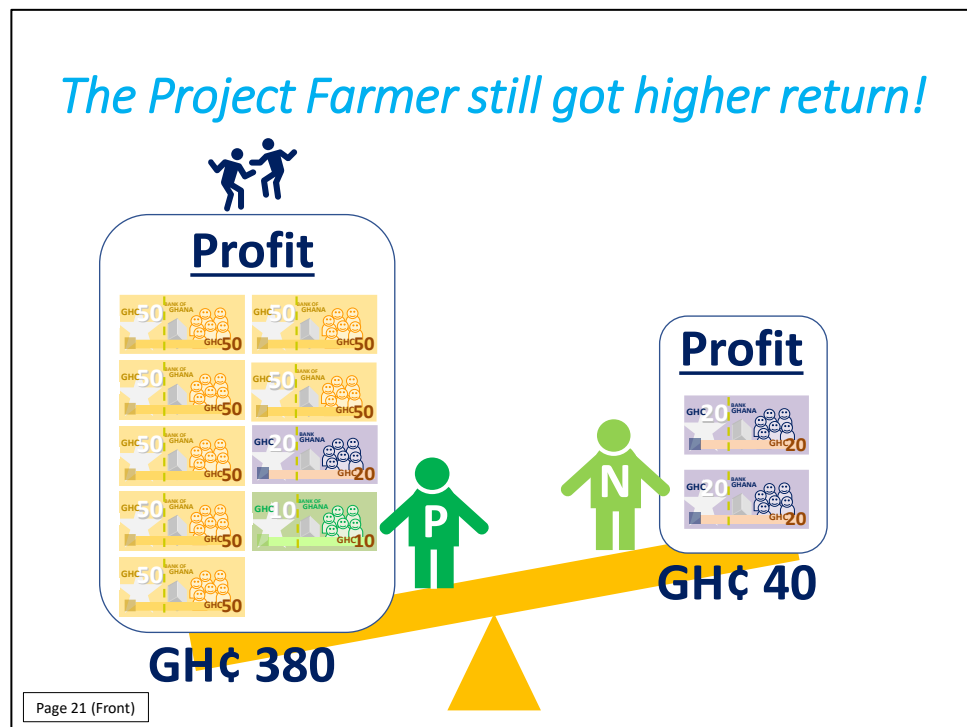
Profit



GH¢ 380

The Project Farmer still got higher return!

- Although the produce price of the Project Farmer's high quality paddy was same as the one of the Non-Project Farmer's low quality paddy, 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!



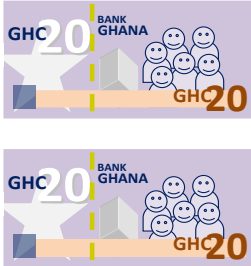
Profit



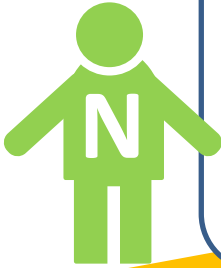
GHC 380



Profit



GHC 40





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!



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)



MOFA/JICA TENSUI RICE PROJECT

Nutrition Improvement

Let's enjoy parboiled rice for our health!!



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

Rice
Cultivation

Farming
Management

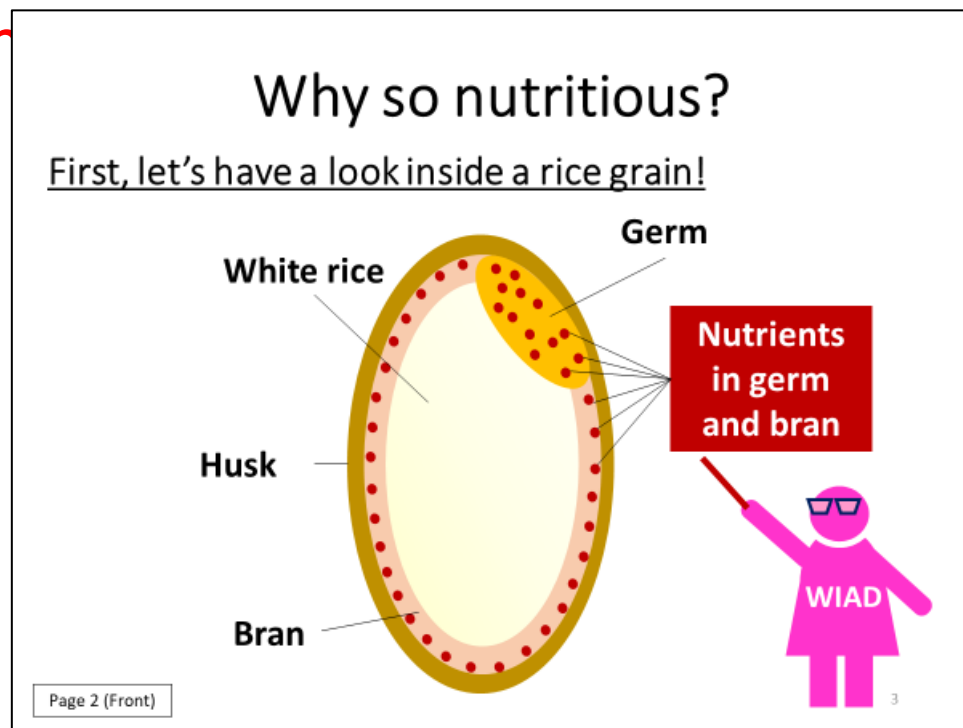
Land
Development

Extension

Other

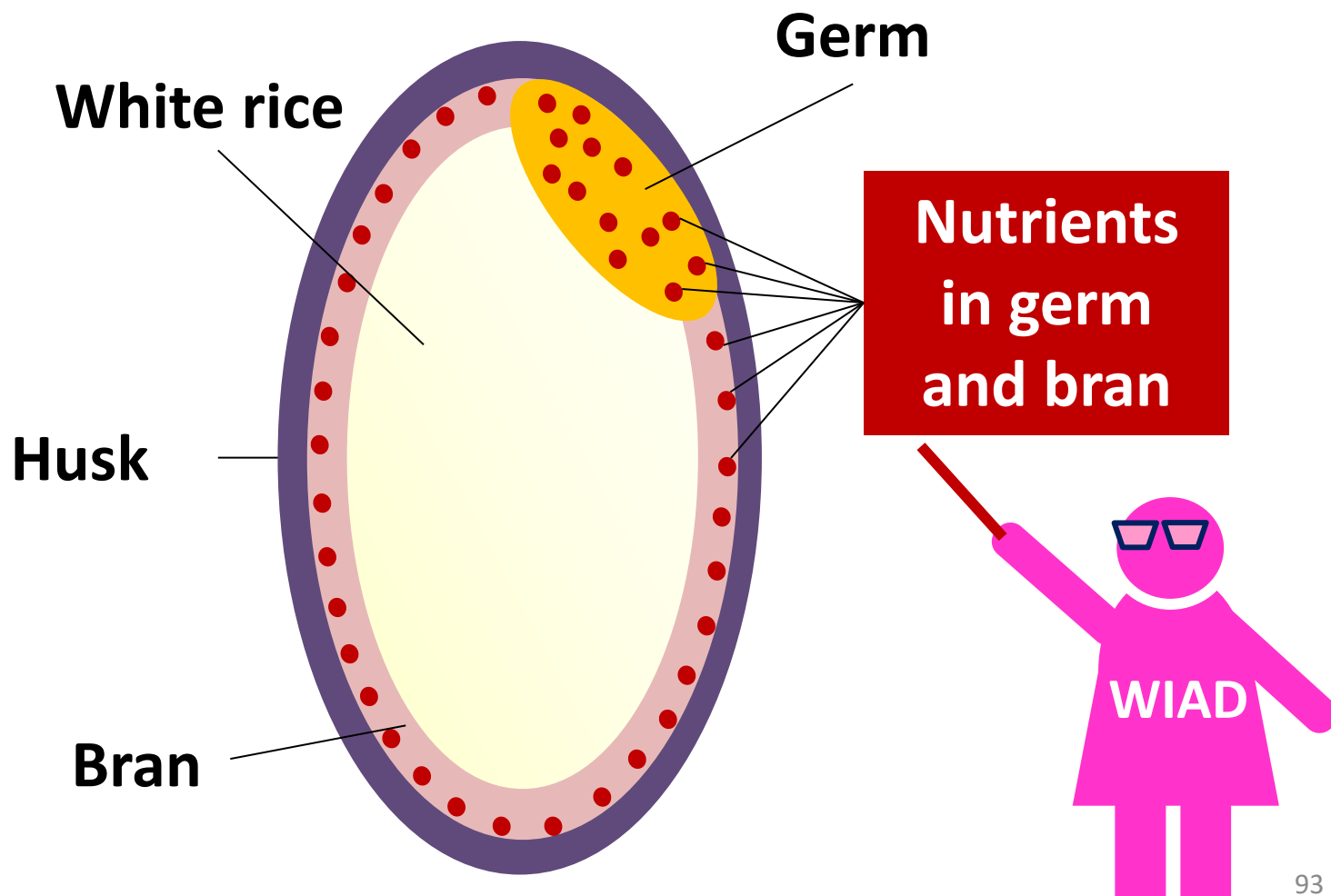
Why So Nutritious?

- 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 showing its section)
- Germ and bran contain nutrient components such as vitamin Bs and minerals.



Why so nutritious?

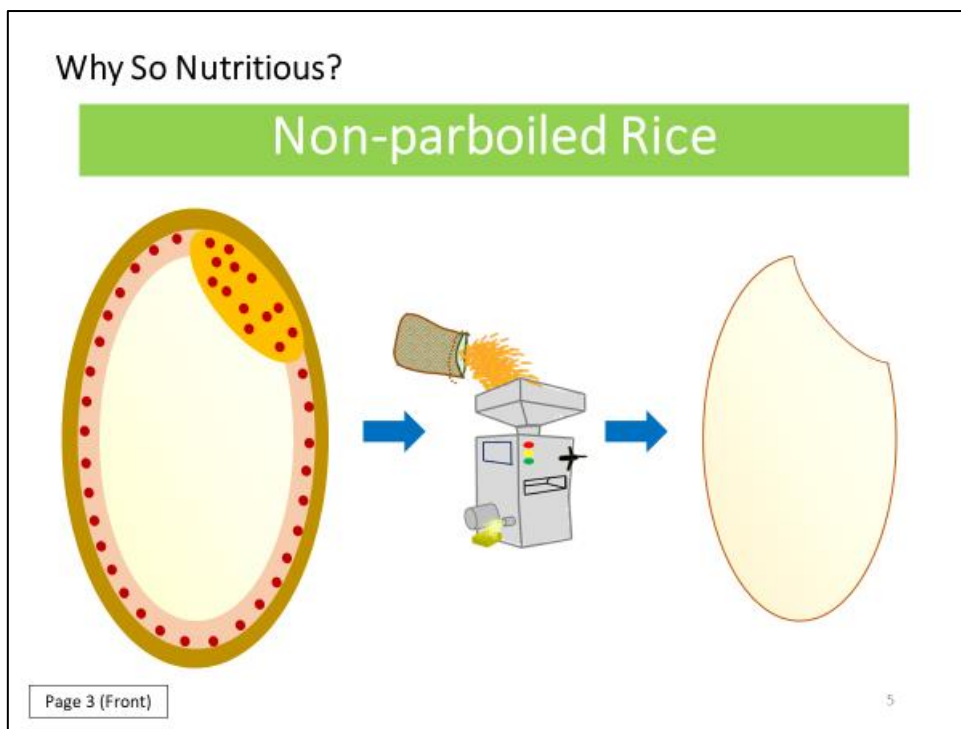
First, let's have a look inside a rice grain!



Why so nutritious?

~Inside non-parboiled rice grain~

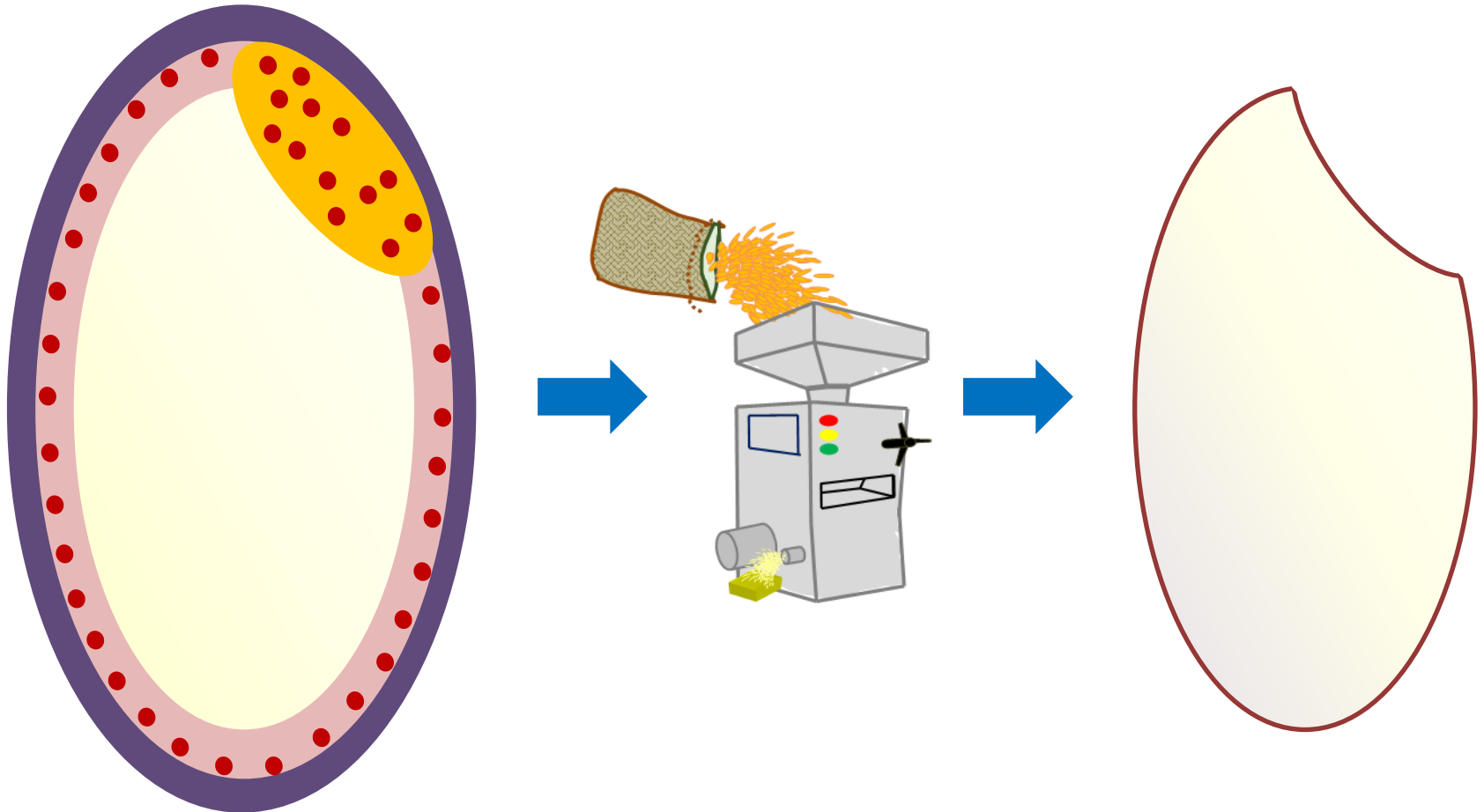
- Next, let's have a look inside a non-parboiled rice grain.
- After milling, all the outer parts, including germ and bran, are removed.
- Consequently, important nutrient components are lost in non-parboiled white rice...



Why So Nutritious?



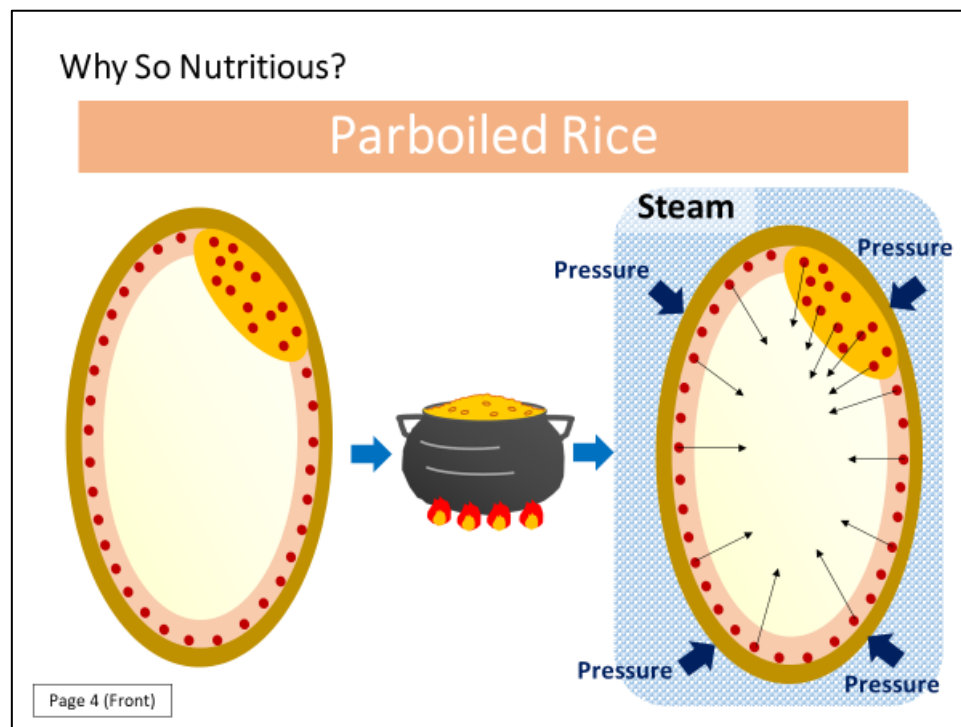
Non-parboiled Rice



Why so nutritious?

~Inside parboiled rice grain~

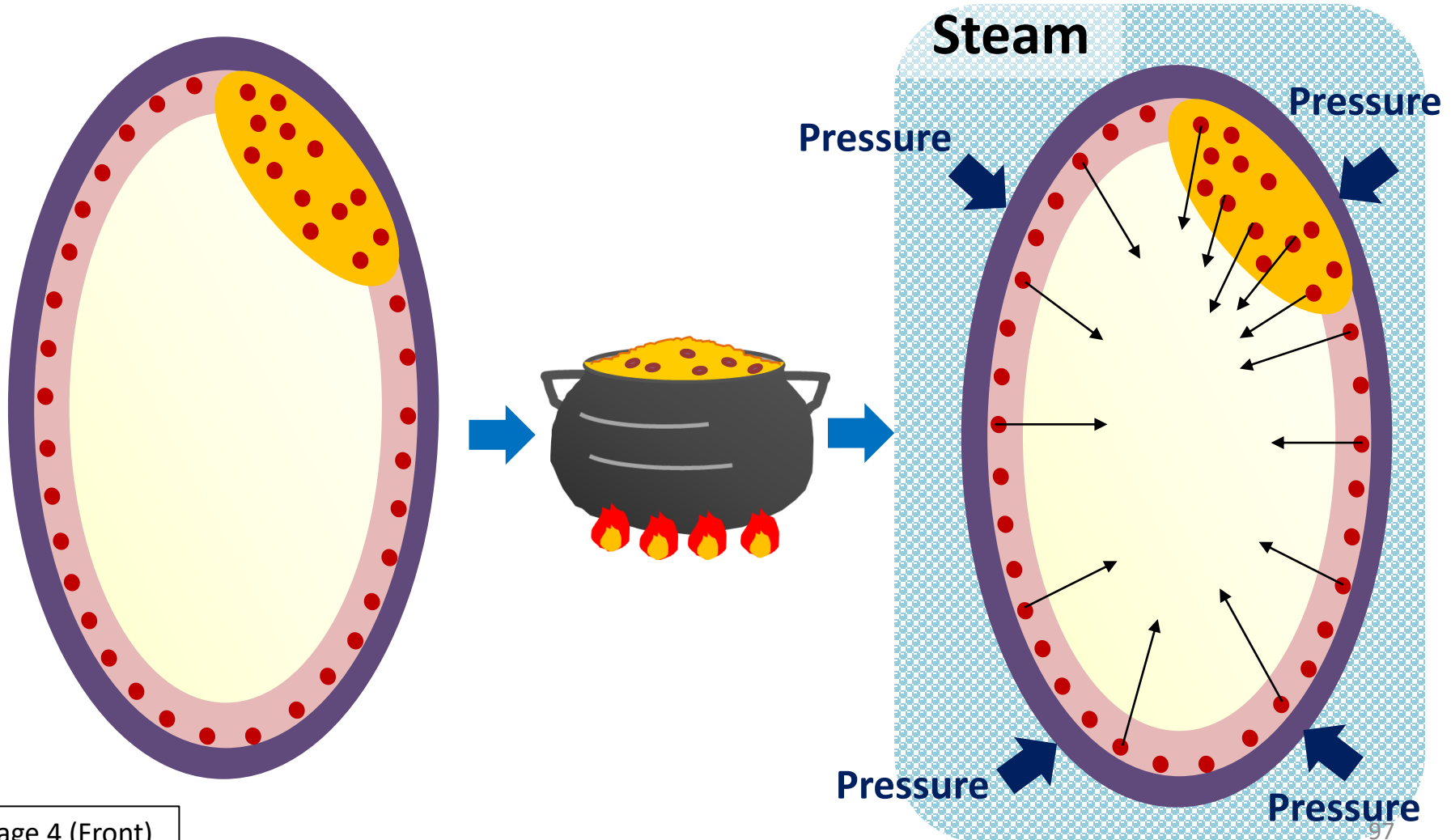
- Then, let's have a look inside parboiled rice grains!
- As you know, paddies are steamed inside the parboiling pot. During this process, nutrient components inside the germ and bran move to white rice by the water pressure.



Why So Nutritious?



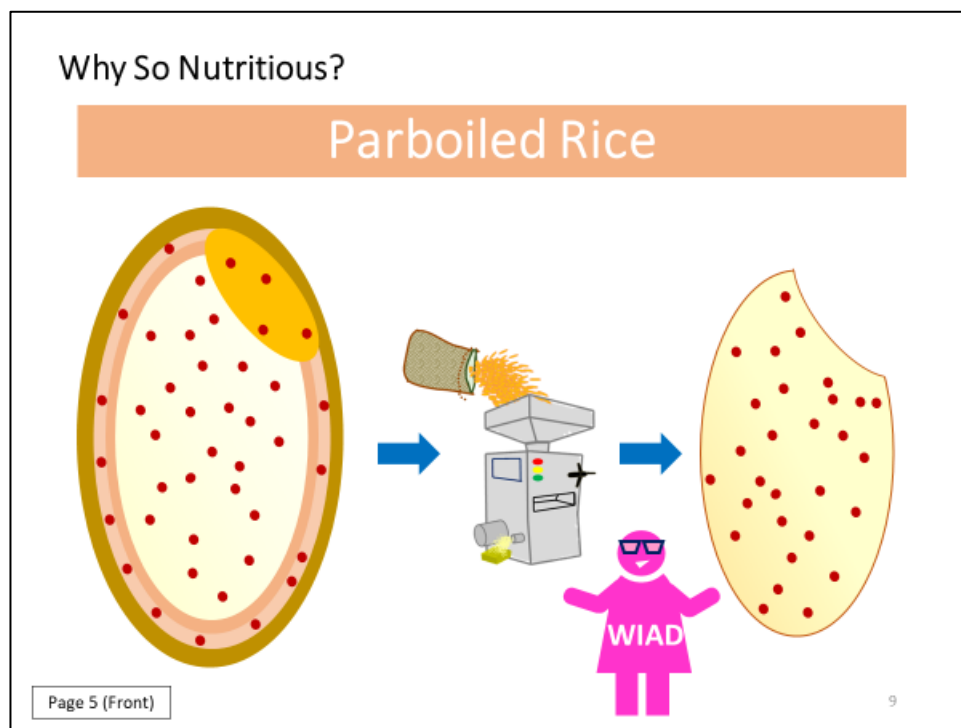
Parboiled Rice



Why so nutritious?

~Inside parboiled rice grain~

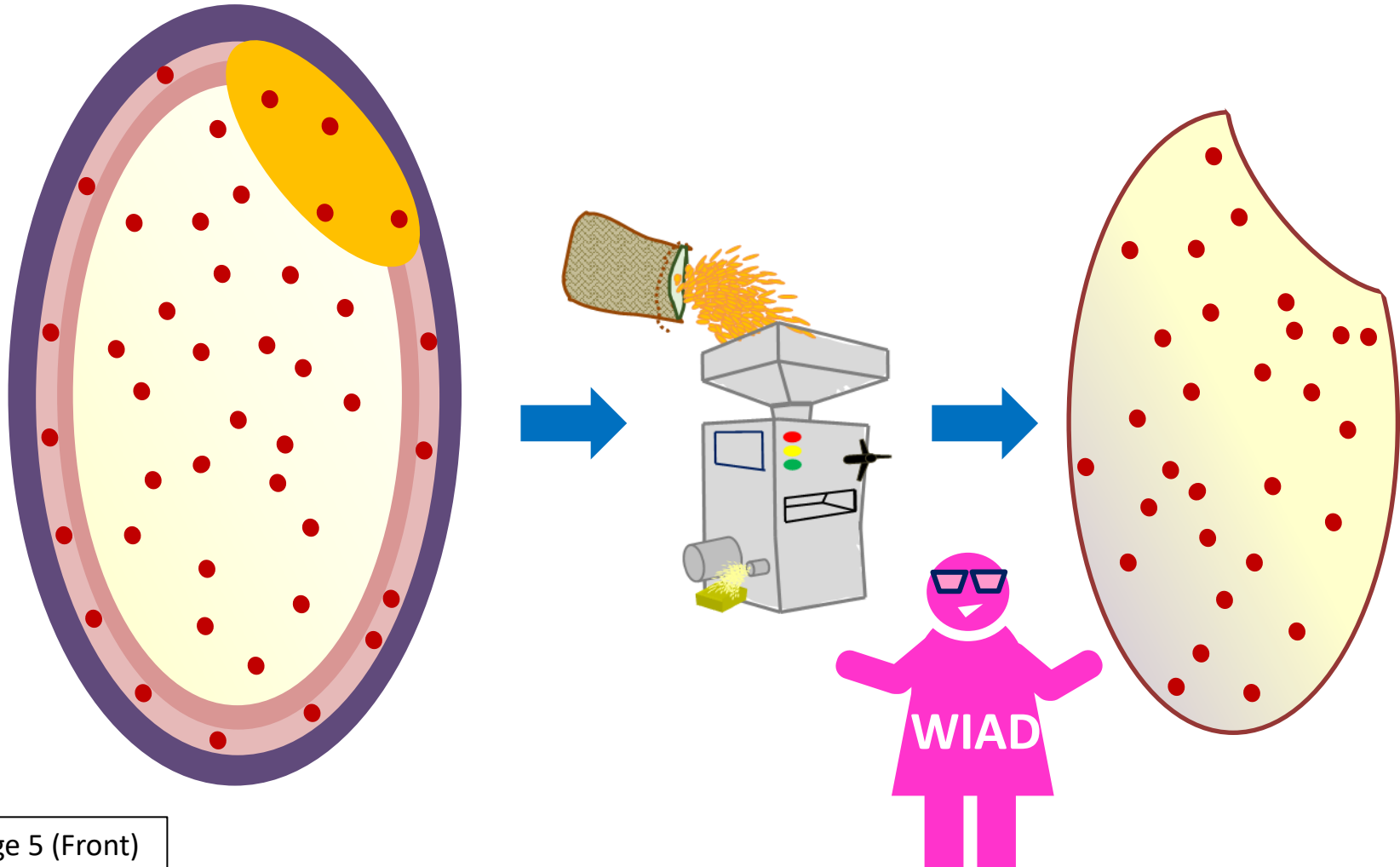
- After parboiling, nutrient components of the germ and bran retain in white rice.
- Consequently, even after milling, white rice contain nutrient components originally from the germ and bran.
- This is how parboiling process increases nutritive value of white rice!
(Confirm if farmers have understood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



Why So Nutritious?



Parboiled Rice



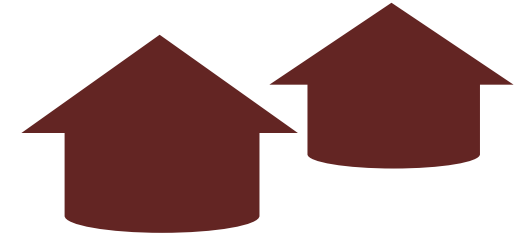
Did you know that rice can be grinded into flour like maize?!



- 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!



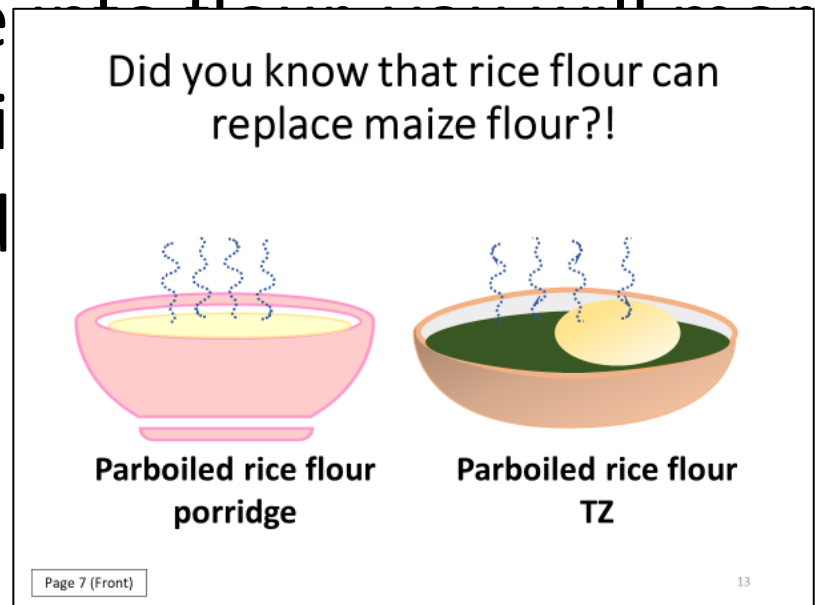
Did you know that rice can be grinded into flour like maize?!



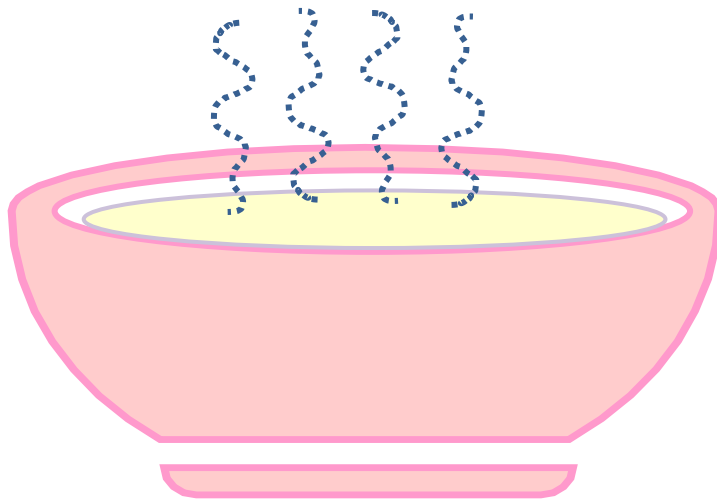
Did you know that rice flour can replace maize flour?!



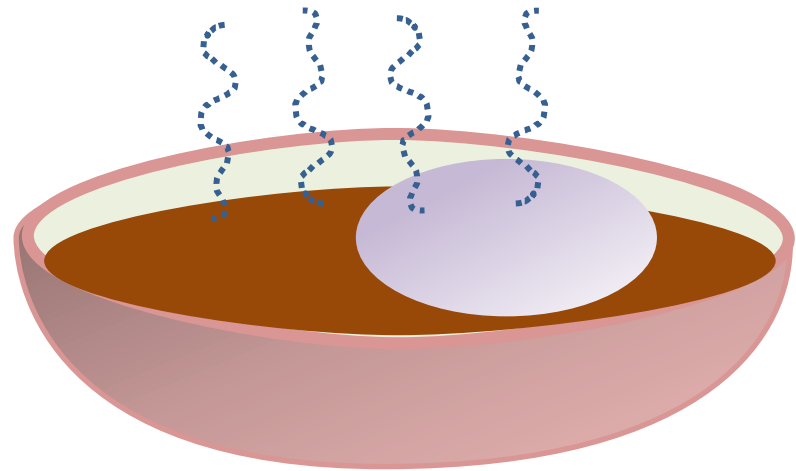
- Did you know that rice flour can replace maize flour for some dishes such as porridge and TZ?
- Once you grind rice...
- ...often feel like cooking...
- ...storing it in the...



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



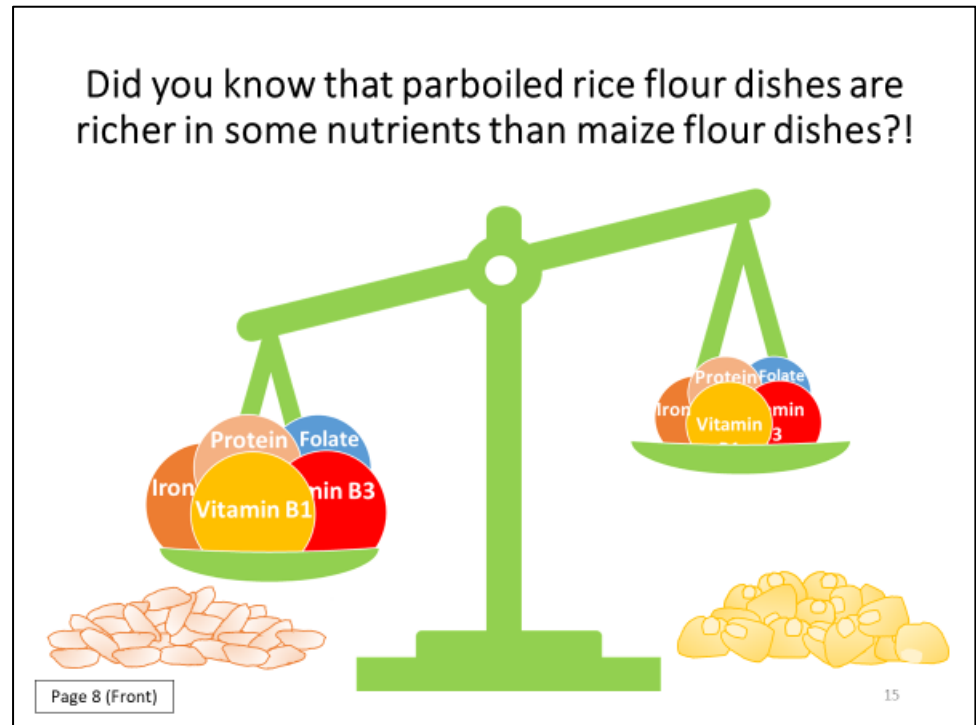
**Parboiled rice flour
porridge**



**Parboiled rice flour
TZ**

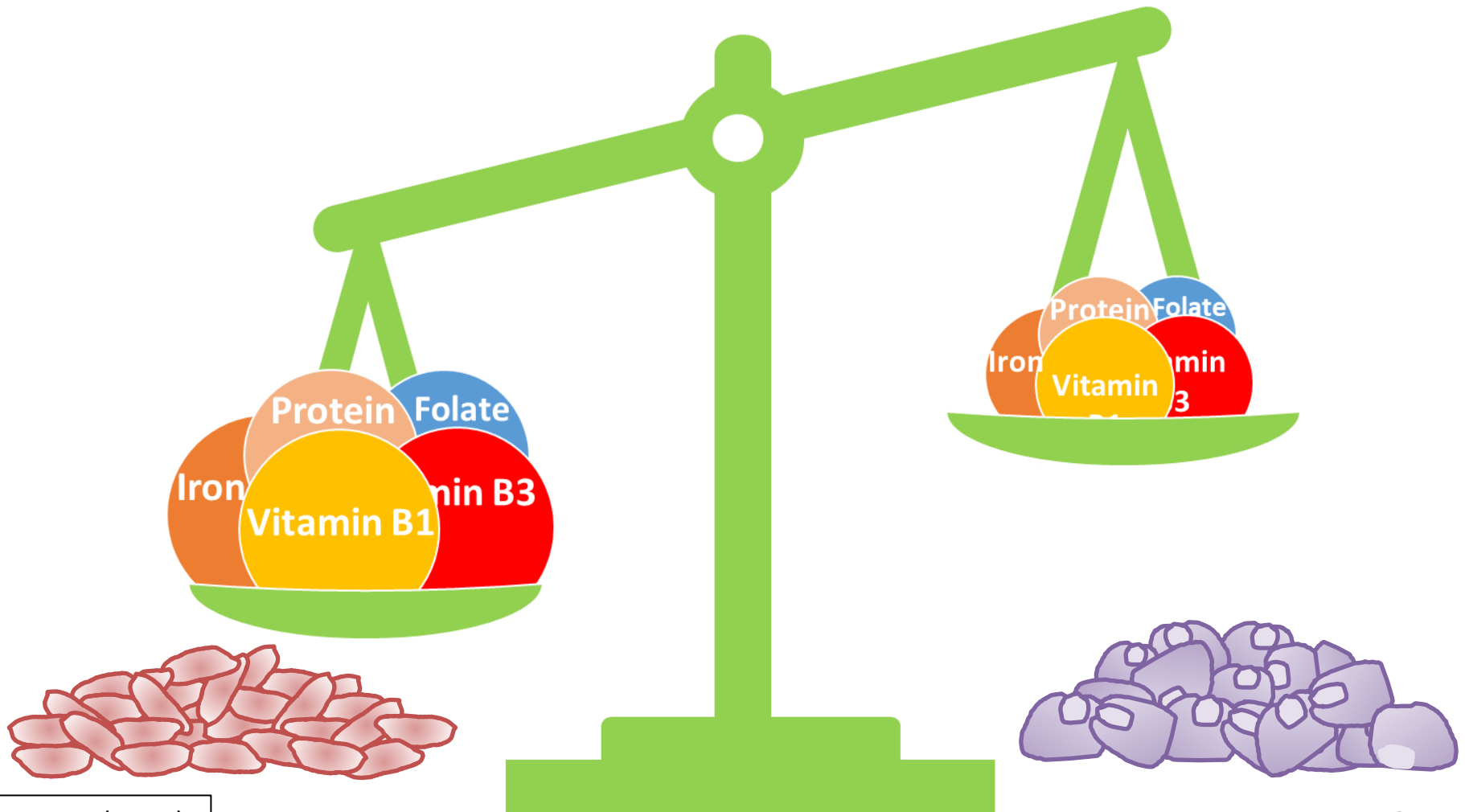
Did you know that parboiled rice flour dishes are richer in some nutrients than maize flour dishes?!

- 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!





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

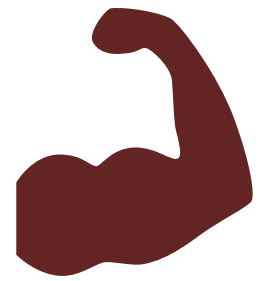
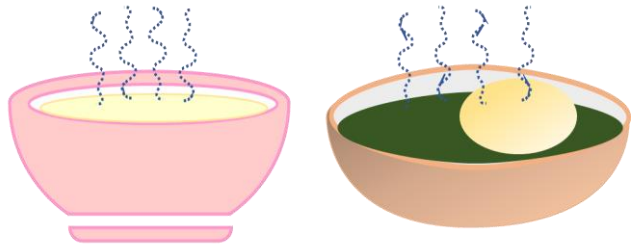


How effective for your health?

- 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!



How effective for your health?



Improve muscle strength

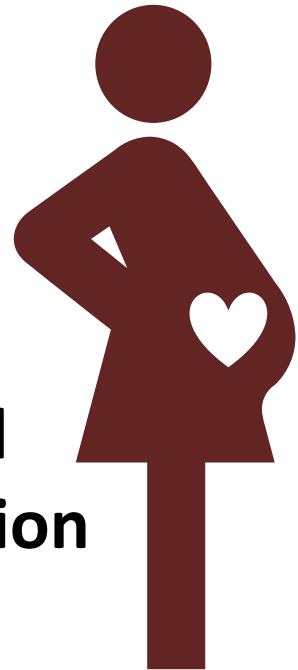


Prevent beriberi



Prevent pellagra

Prevent fatal growth restriction



Prevent anemia

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!

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



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



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

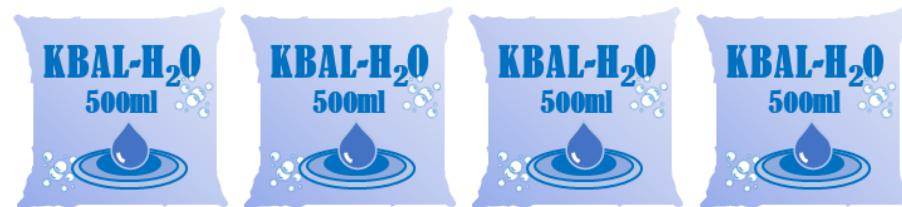
Salt and Sugar: To taste

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1. RICE-SOYA WEANIMIX PORRIDGE

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



Rice-Soya Weanimix: 1 cup (200g)

Water: 2L



or



Milk:
1 small tin (160g)

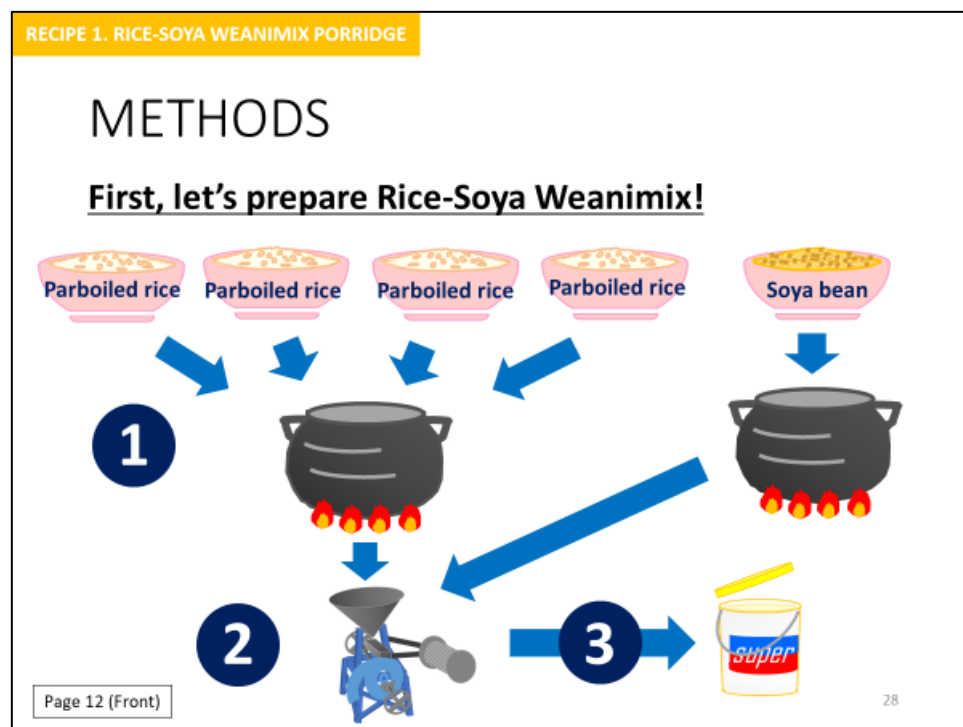
Powder milk:
To taste

Salt and Sugar: To taste

METHODS

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

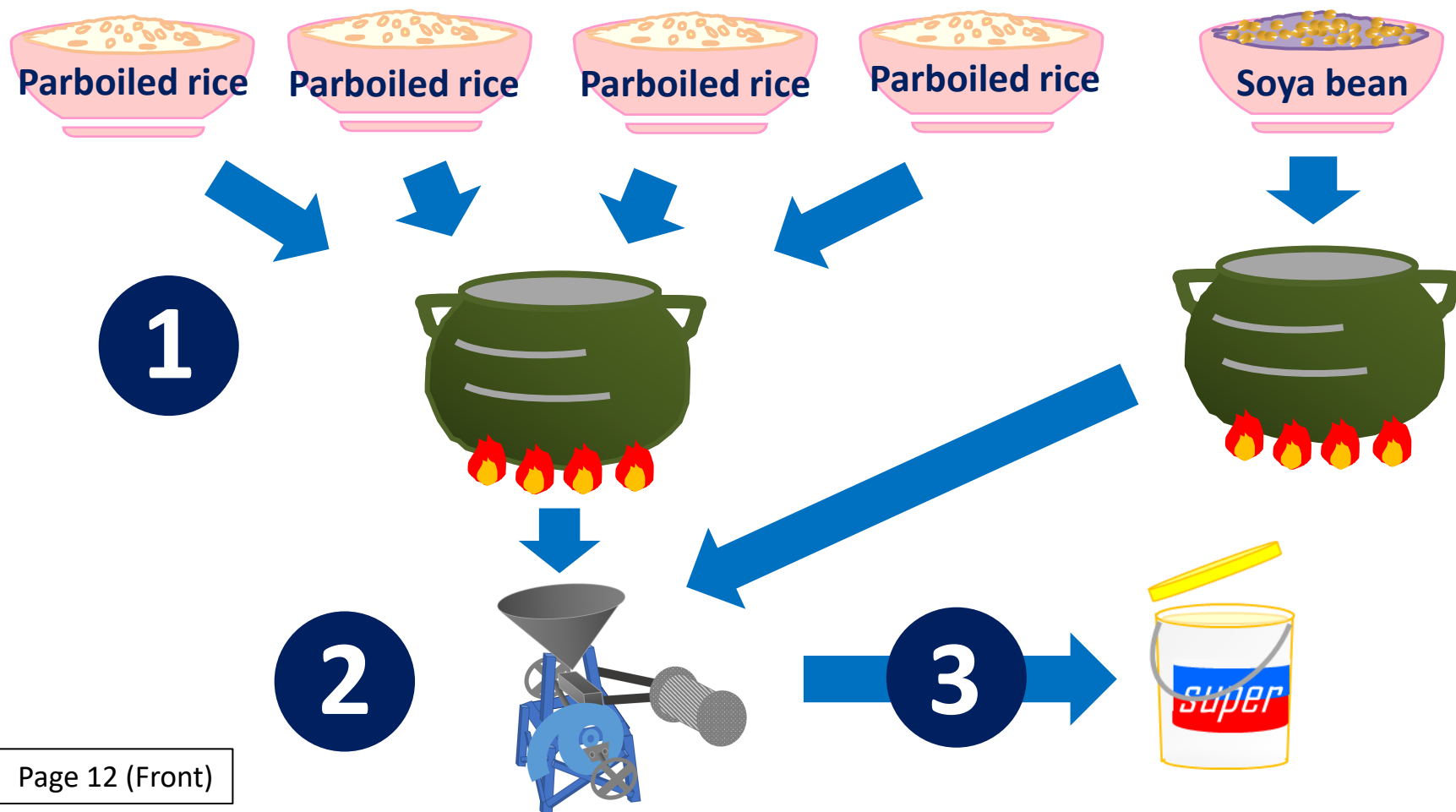
1. Roast 4 parts of parboiled rice and 1 part of dehulled soya beans separately.
2. Put them together and mill into fine flour.
3. Store the weanimix in an airtight container not more than 3 months.





METHODS

First, let's prepare Rice-Soya Weanimix!



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

1



2



3



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

RECIPE 1. RICE-SOYA WEANIMIX PORRIDGE


METHODS (CONTD.)

4

5-10 min.



5



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METHODS (CONTRD.)

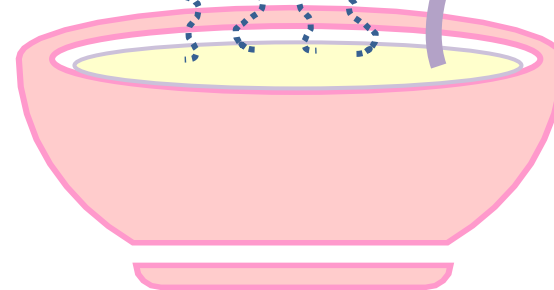
4



5-10 min.



5



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) 29



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

METHODS

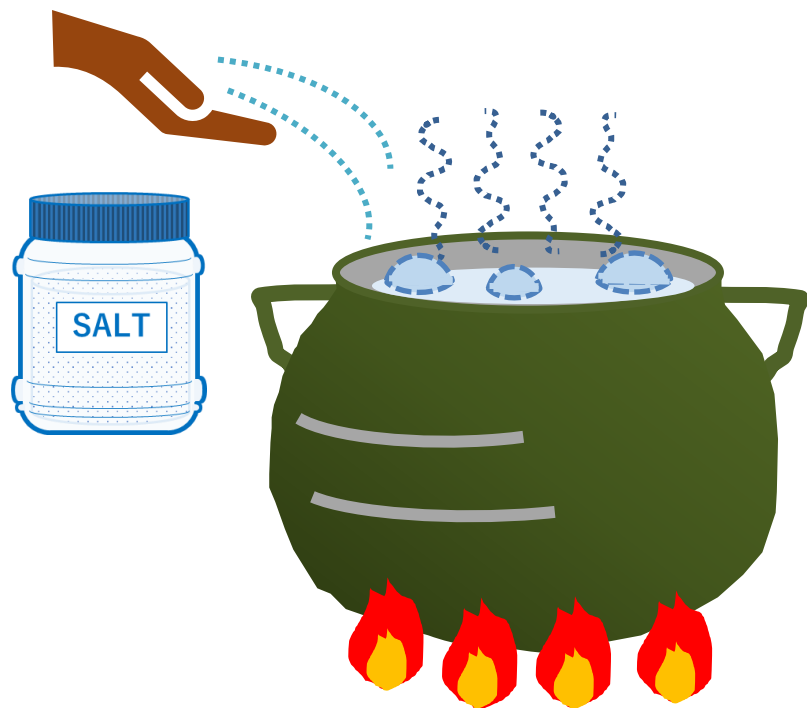
1. Bring water to boil and add salt.
2. Mix parboiled rice flour with cold water into pouring consistency





METHODS

1

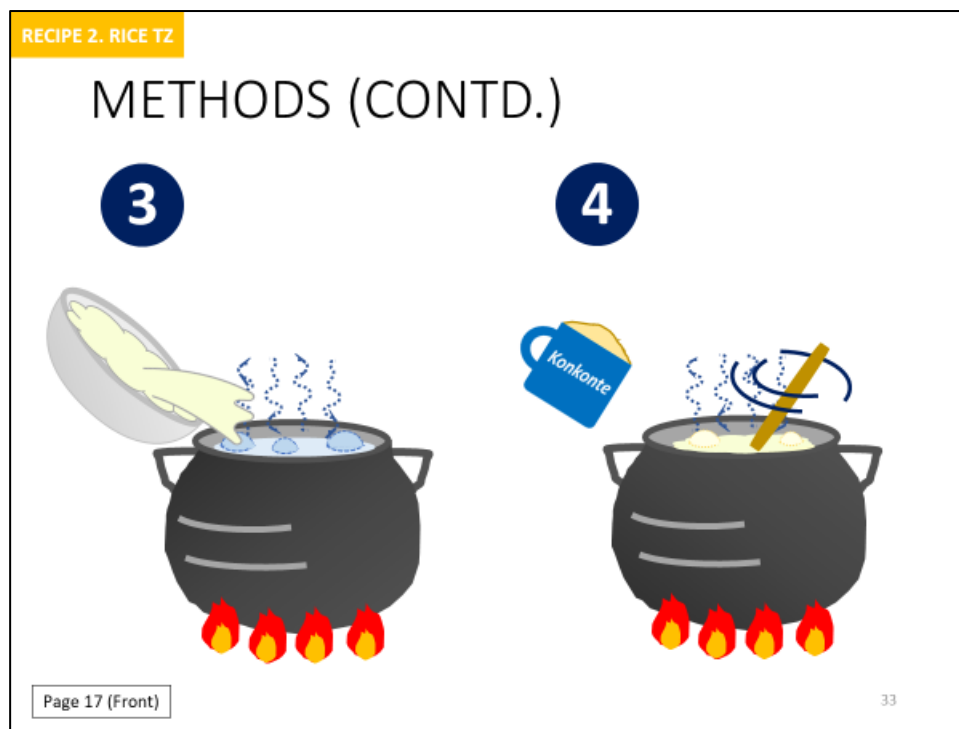


2



METHODS (CONTD.)

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





METHODS (CONTD.)

3

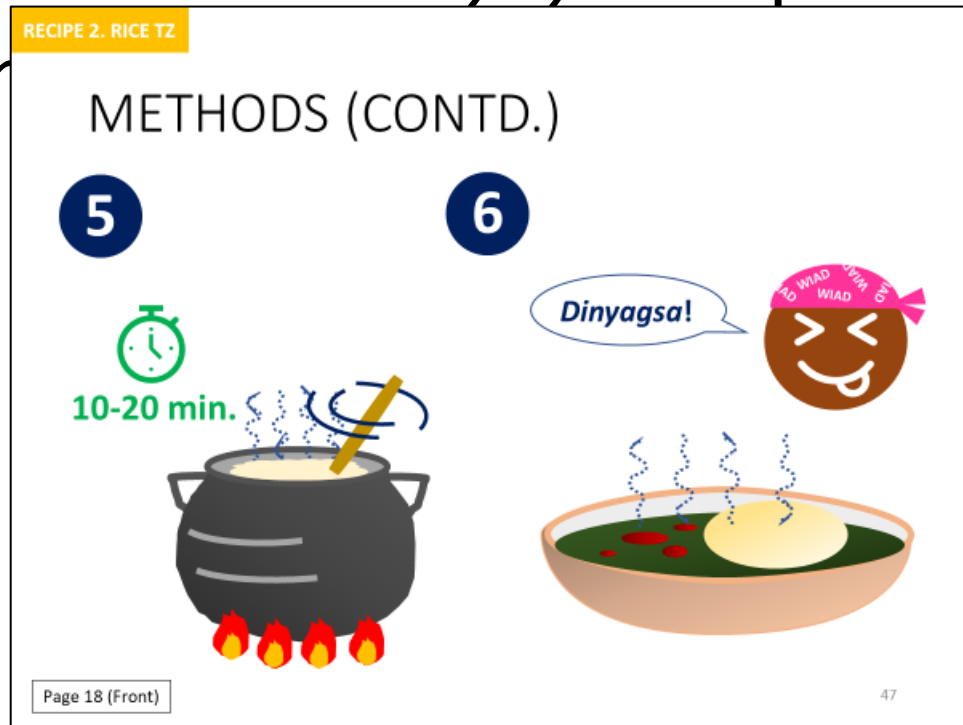


4



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)

METHODS (CONTD.)

5

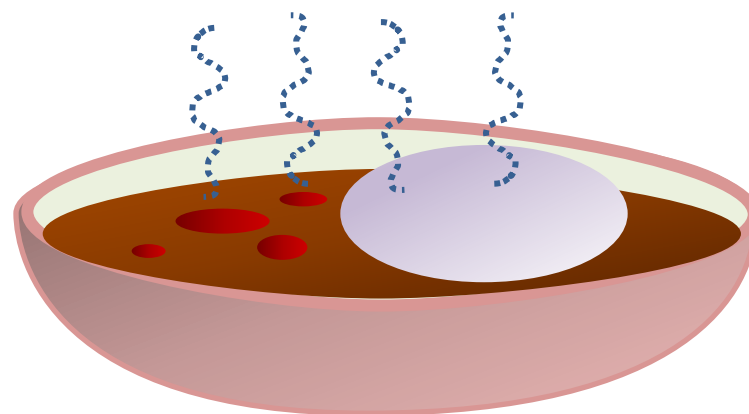


10-20 min.



6

Dinyagsa!



Back side

- 3rd on-site training should be conducted before harvesting season.
- 3rd on-sit training includes 2 topics;
 1. Bird scaring & timing of harvest
 2. Harvesting & Post harvesting

Face



MOFA/JICA TENSUI RICE

Rice
Cultivation

3rd Onsite Training



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