General Extension Activities of Rice Extension Guideline

1st In-House Training

Extension

Rice Extension Guideline

- The Guideline shows how to implement the “Model” of rain-fed lowland rice production with improved techniques through existing extension delivery system.

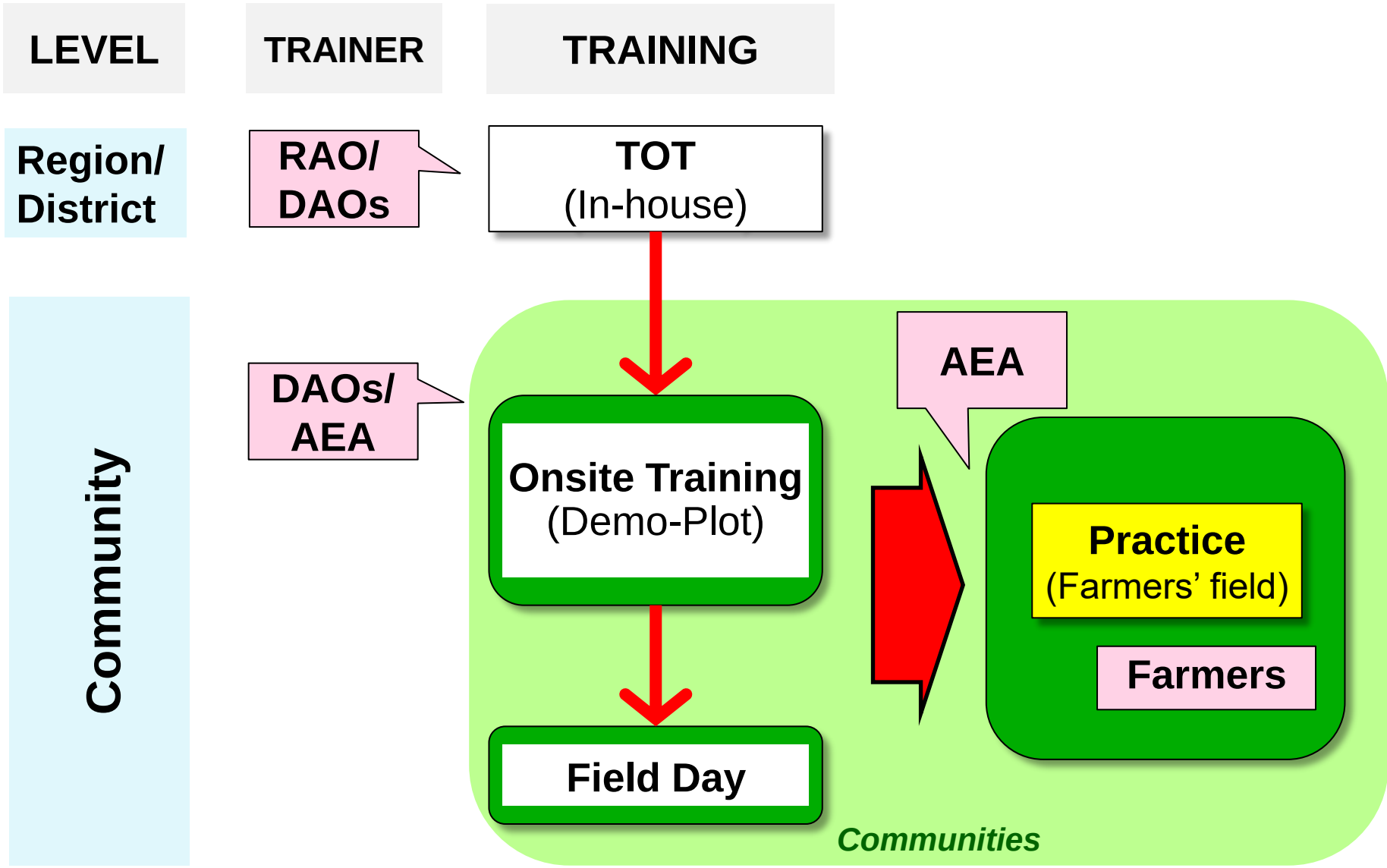
Technical Package	Land Development
	Rice Cultivation
	Farm Management and Support System

- Recommended Techniques compiled into Technical Package were developed in consideration of **User friendly**, **Low cost**, Utilizing **available resources**, and **Sustainable** way.
- Main users of the Guideline are District Officers who are involved in providing extension services to rice farmers.

Extension Procedure

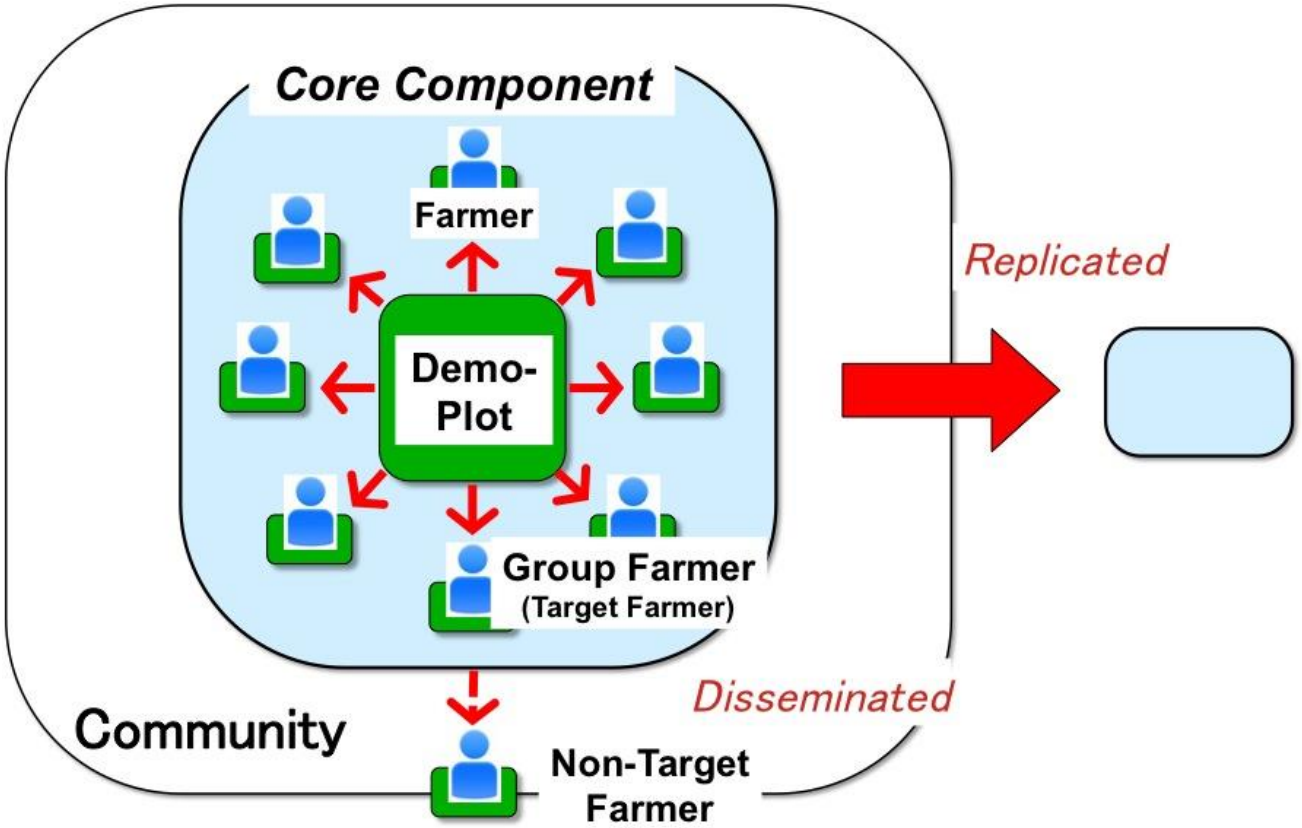
1. In-House Training (TOT)
   - Theoretical training to officers organized by regional and district MoFA.
2. On-Site Training
   - Practical training conducted by officers at the field.
     - Training plot: training for AEA and key farmers
     - Demo plot: training for group farmers
3. Exchange Program (Filed Trip/Visit)
   - "Farmer to Farmer Extension" through field observation and exchange opinions.

Cascade Training



Approach at the Field Level

- A set of demonstration plots (**Demo-Plots**) and group of farmers (**Group Famer**) in communities is a core component of the extension at the field.



Implementation set up

- District Agriculture Department (DAD) together with District Assembly (MMDAs) **play key role** of implementing Rice Extension Plan under the decentralization process.

Roles and Responsibilities

District Director of Agriculture (DDA)

- ✓ Overall coordination of the activities
- ✓ Prepare District Rice Extension Plan/ *its budget in a composite budget* and implement them
- ✓ Monitor the achievement of related targets regularly
- ✓ Monitor field activities
- ✓ Report at Quarterly Review Meeting
- ✓ Close working relationship with MMDAs
- ✓ Communicate with RAD for backstopping

Roles and Responsibilities cont.

District Agriculture Officers (DAOs)

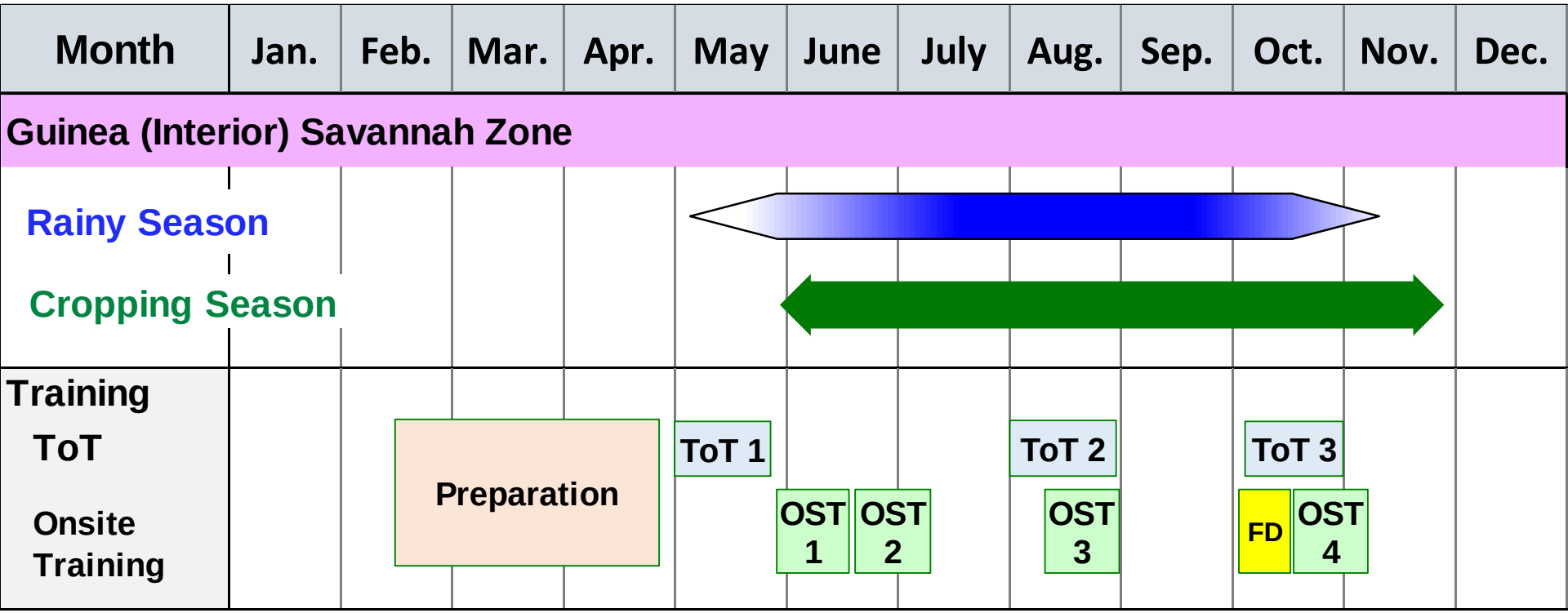
- ✓ Organize and implement necessary meetings assigned by DDA
- ✓ Collect necessary information and compile reports
- ✓ Organize and implement District Joint Training
- ✓ Arrange On-site Training at Training Plot
- ✓ Monitor On-site Training at Demo Plot organized by each AEA
- ✓ Organize Field Trip within a District
- ✓ Monitor AEAs

Roles and Responsibilities cont.

Agriculture Extension Agents (AEAs)

- ✓ Organize meeting at target communities
- ✓ Arrange On-site Training at Demo-Plots at Each Sites
- ✓ Manage Demo-Plots
- ✓ Organize Field Days for non-target farmers
- ✓ Make regular field visits
- ✓ Collect baseline and end-line data from target farmers
- ✓ Prepare field reports

Annual Schedule



Note: ToT: Training of trainers; OST: Onsite Training; FD: Field Day; FT: Field Trip

Step 1: Preparing District Rice Extension Plan

- DDA/DAOs prepare and finance District Rice Extension Plan.
- Identify candidate sites and review the existing target sites to confirm the activities of the year according to the approved budget.

Planning Session by DDA and DAOs

Meeting with DCD

Step 2: Community Entry

- DAOs and AEAs sensitize chief, opinion leaders and community members, and explain the purpose of rice extension activities.
- Select farmers as target farmers (**Group Farmers**) based on their willingness. AEAs sensitize and facilitate farmers to form a group and select representative farmer (**Key Farmer**) from the group.

Points:
Commitment, willingness and ownership of group farmers are important!!

Step 3: Site visit

- DDA/DAOs visit and examine the suitability of candidate sites using the selection criteria form.
- DAOs select the target sites based on the result of the site visit.
- AEA demarcate land for demo-plot.

Step 4: Training of Trainers (In-House Training)

- Purpose: To train DAOs and AEAs to be competent trainers
- Training is composed of theoretical and practical sessions.

	1st TOT	2nd TOT	3rd TOT
Period	Before sowing	After 2nd fertilization	Before harvesting
Contents	Site selection criteria, Bund construction, Ploughing, land leveling, Seed preparation & treatment, Sowing, Fertilizer management, Weed control, Farm management, record keeping, M&E tools etc.	Water management, Bund maintenance, Fertilizer management, Disease & pest control, Quality seed production, Marketing and rice value chain, 2nd quarter report and next year planning etc.	Bird scaring, Timing of harvesting, Yield component, Harvesting and Post harvesting, Cost profit analysis, 3rd quarter report and annual report preparation etc.

Step 4: Training of Trainers cont.

Theoretical training

Group exercise

Practical training of
Hot Water Seed Treatment

Observation of a young panicle

Step 5: Baseline Survey

- Conduct Baseline Survey.

  AEAs make interview with all group farmers to understand the real situation before the farmers use Technical Package.

  ✓ Field size

  ✓ Production

  ✓ Cost

  ✓ Sales

  Submit filled-in baseline survey questionnaires to MIS officer.

We produced 10 bags last year…

Is that paddy or milled rice? Which size of bag do you usually use to measure harvest?

Step 6: On Site Training (Demo Plot)

- Resource person: Trained AEA and Key Farmer
- Target: Group Farmers
- Purpose: To train Group Farmers in the target community to obtain the improved techniques and apply into their own field

Bund construction

sowing

weeding

Coverage of activities in Onsite Training

- Onsite Training is organized according to the Action Plan for Demo-Plot.
- It is recommended to conduct 4 times during the rice cropping season.

1st OST	2nd OST	3rd OST	4th OST
Land development (bond construction, levelling, puddling)	Salt water seed selection, Hot water seed treatment, Sowing	Fertilizer application and weeding	Harvesting

Step 7: Sharing Results

1. Field Trip is organized to **invite DCE, DCD, and other Assembly officials** and show the positive outcome of District Rice Extension Plan.
2. Field Day is organized for non-target farmers in the community.
3. Farmers Day is also one of the opportunities of sharing experience among stakeholders.

Participants of a Field Trip

Step 8: Monitoring & Evaluation

Assess the achievement of the Rice Extension Plan through;

(1) Monitoring Visit

- Regularly done by DAO and backstopping from RAO/PCU,
- Frequently done by AEAs to check and confirm the planed activities are implemented in the field and provide backstopping.

(2) End-line Survey

- AEA make interview with all group farmers to know how much rice production and income increase compare to the baseline data and how many farmers apply technical package.

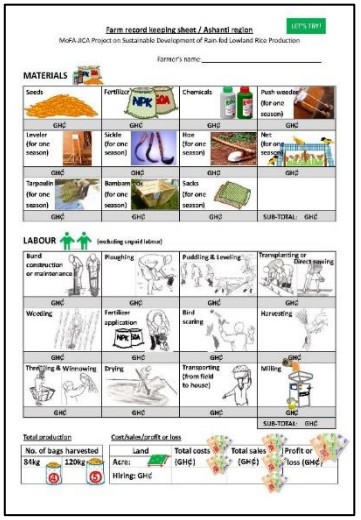
(3) Reporting

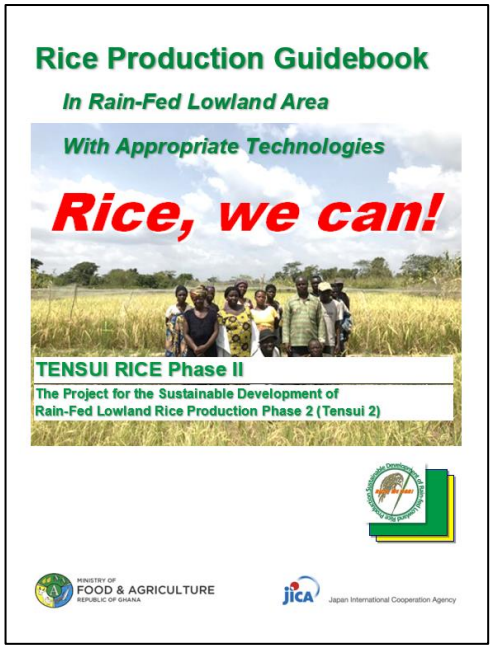
- DAO attach Quarterly Report of Rice Extension Plan to existing regular monitoring report and send it to DA with copy to RAD.

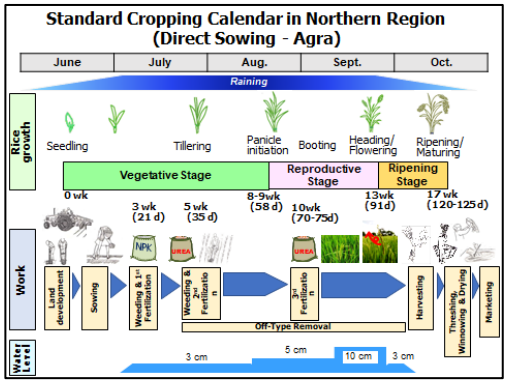
Annex. Dissemination Kit

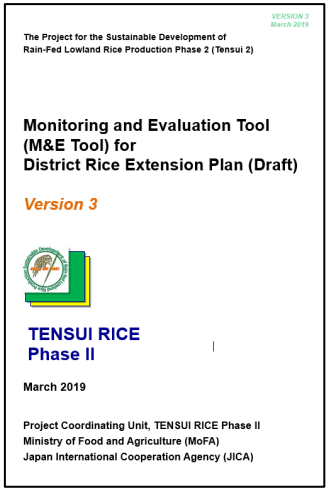
Training materials

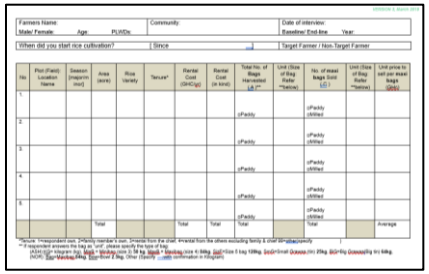
(in the form of a flipchart)











M&E tools

Handbook for AEAs

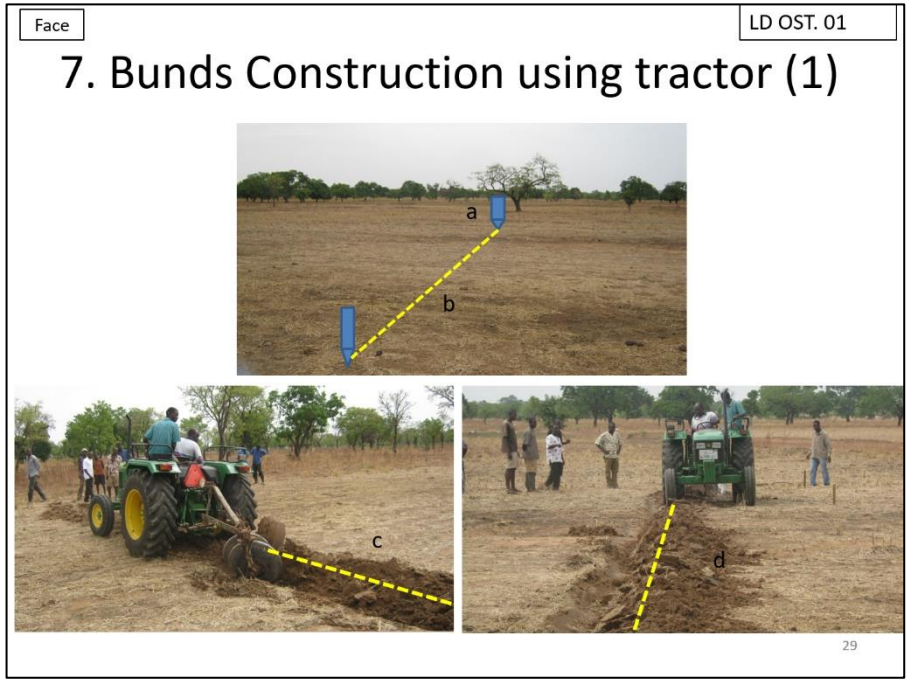
Tools for farmers

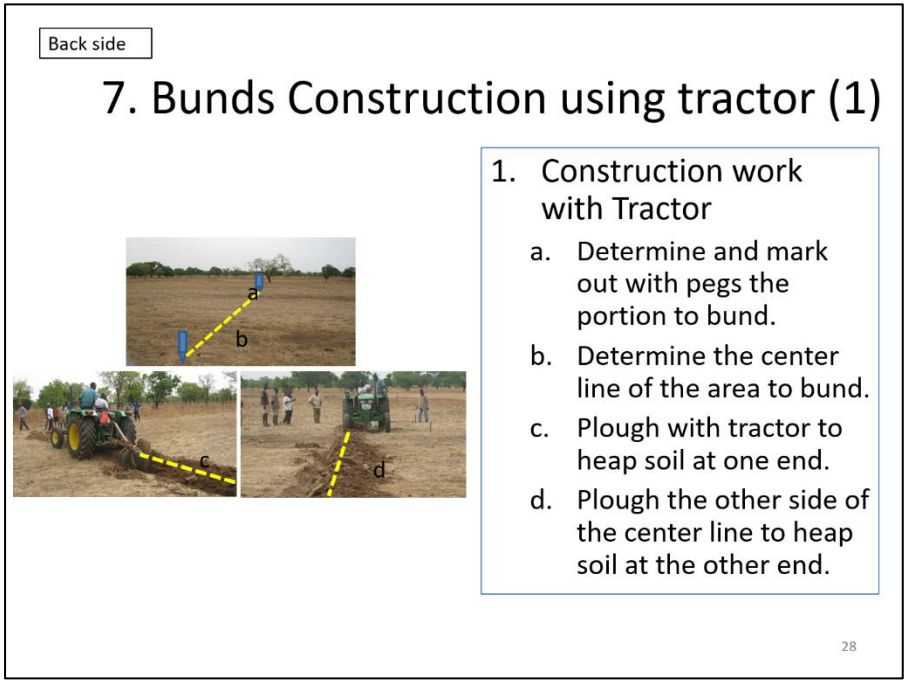
How to use Dissemination Kit?

- **On-Site Training Materials** are consist of 3 sections namely;
  1) Land Development,
  2) Rice Cultivation,
  3) Farm Management and Support System.
- 1st On-Site Training Materials cover the topics learnt at 1st TOT/JT only.
- 2nd and 3rd On-Site Training Materials will be provided later.

How to use Dissemination Kit?

On-Site Training Materials





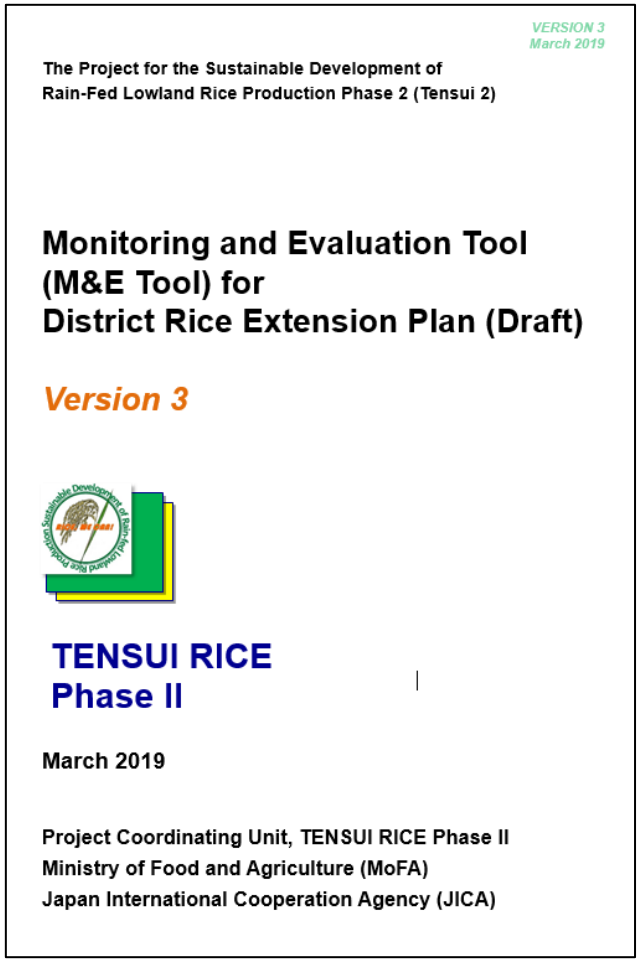
Show front side to farmers.

Back side is for AEA use.
AEA can explain in accordance with the instructions provided.

How to use Dissemination Kit?

- 2 sets of **On-Site Training Materials** will be given from the Project. Keep them in DAD office basically and lend one to AEA whenever AEA conducts OST. AEA should return it after use.
- **Rice Production Guidebook** should be provided to all AEAs as their textbook.

How to use Dissemination Kit?



VERSION 3
March 2019

The Project for the Sustainable Development of
Rain-Fed Lowland Rice Production Phase 2 (Tensui 2)

Monitoring and Evaluation Tool (M&E Tool) for District Rice Extension Plan (Draft)

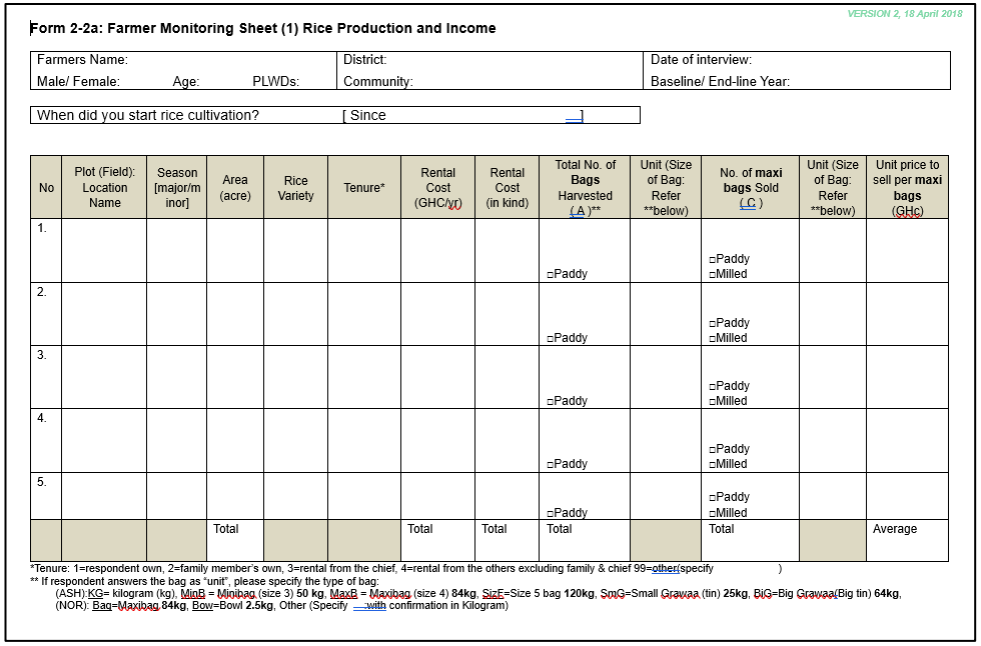
Version 3

TENSUI RICE Phase II

March 2019

Project Coordinating Unit, TENSUI RICE Phase II
Ministry of Food and Agriculture (MoFA)
Japan International Cooperation Agency (JICA)

- **M&E Tools** are provided to each officer.
- Distribute baseline format and action plan format to AEAs.



VERSION 2, 18 April 2018

Form 2-2a: Farmer Monitoring Sheet (1) Rice Production and Income

Farmers Name:	District:	Date of interview:
Male/ Female: Age: PLWDs:	Community:	Baseline/ End-line Year:

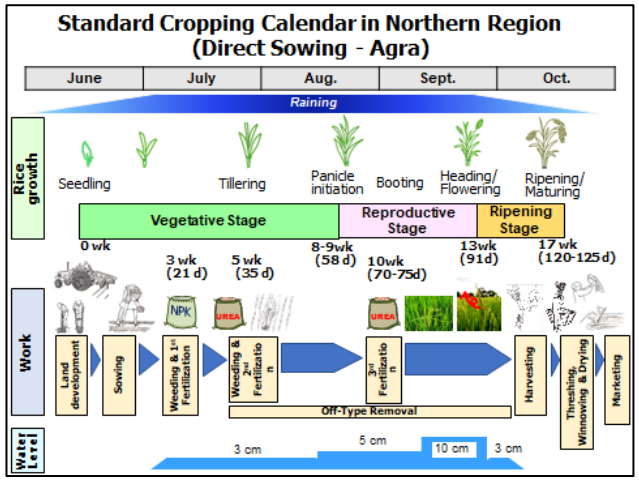
When did you start rice cultivation? [Since]

No	Plot (Field): Location Name	Season [major/minor]	Area (acre)	Rice Variety	Tenure*	Rental Cost (GHC/yr)	Rental Cost (in kind)	Total No. of **Bags** Harvested (A)**	Unit (Size of Bag: Refer **below)	No. of **maxi bags** Sold (C)	Unit (Size of Bag: Refer **below)	Unit price to sell per **maxi bags** (GHc)
1.								□Paddy		□Paddy □Milled		
2.								□Paddy		□Paddy □Milled		
3.								□Paddy		□Paddy □Milled		
4.								□Paddy		□Paddy □Milled		
5.								□Paddy		□Paddy □Milled		
			Total			Total	Total	Total		Total		Average

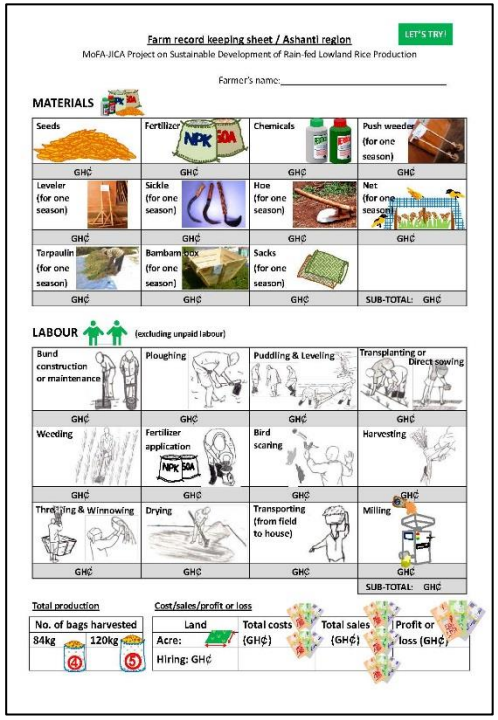
*Tenure: 1=respondent own, 2=family member's own, 3=rental from the chief, 4=rental from the others excluding family & chief 99=other(specify)
** If respondent answers the bag as "unit", please specify the type of bag:
(ASH):KG= kilogram (kg), MinB = Minibag (size 3) **50 kg**, MaxB = Maxibag (size 4) **84kg**, SizE=Size 5 bag **120kg**, SmG=Small Grawaa (tin) **25kg**, BiG=Big Grawaa(Big tin) **64kg**,
(NOR): Bag=Maxibag **84kg**, Bow=Bowl **2.5kg**, Other (Specify ...with confirmation in Kilogram)

How to use Dissemination Kit?

- **Tools for farmers** will be provided to every farmer those who apply the technical package of the Rice Extension Guideline and produce high quality rice.



Rice Cropping Calendar will help farmers to recognize around when they should take every action for rice cultivation.



Record Keeping Sheet will help farmers to record cost and sales to calculate profit.

Promotion Sheet will help farmers to negotiate to sell at reasonably higher price.

LAND DEVELOPMENT

1st TOT

TRAINING CONTENT

1-1. Site Selection and Guidelines

1-2. Land Demarcation & Field Measurements

1-3. Bunds Construction

1-4. Land Levelling

1-5. Water Use and Management

Site Selection and Guidance

Content

- Land development process
- Tools for Demonstration plots
- Training content and time line

Land Development Process

- Good site selection techniques
- Ploughing
- Bund construction
- Land leveling and paddling
- Water management and harvesting

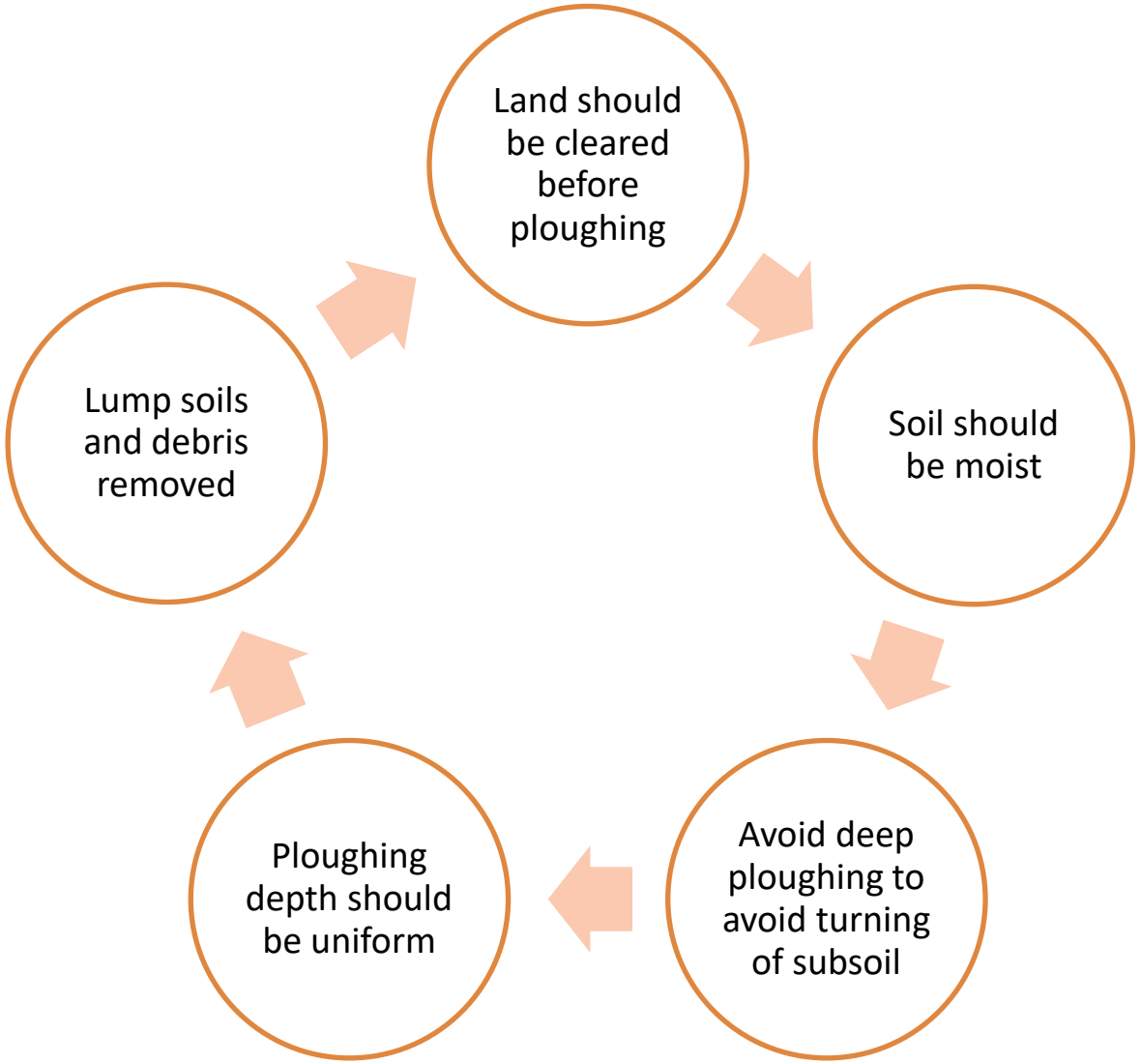
Valley Selection

- The attitude of the owner/farmer or user of the plot or valley
- Accessibility by the project, and other group farmers to the valley
- Stream order of the rivers/stream should be bigger
- Valley ownership
- Number of farmers working in the valleys
- Access road for a car/vehicle
- Good source of water (temporary and permanent, but permanent preferred)

Valley Selection

- Flood water level should not be more than a knee level
- The valley should always have some level of soil moisture
- As much as possible valleys should be flat (gentle slope)
- Avoid steep or high undulating fields/valleys
- Avoid reserved or protected/totem areas
- Check for Gamba, achampong, biriwa sikan, elephant, oil palm and other local grasses that grows in good valleys

Ploughing


Land should be cleared before ploughing
Soil should be moist
Avoid deep ploughing to avoid turning of subsoil
Ploughing depth should be uniform
Lump soils and debris removed

Bund Construction

Requirements

Height 30-50cm Main/peripheral bunds 10-15cm for interlocking bunds	Soil should be scooped from both sides of the bund	Compacted, heaped and firmed

Land Leveling

- Soil depth layer should be considered
- Replacement of top soil layer after scraping
- Use flat board leveler for leveling

Water management techniques

- Use of interlocking bunds
- Use of diverging and drainage canal
- Use dug outs, weirs
- Use of sand bags

Trainings on LD for old and New AEAs and DDOs

- Basic land development techniques

✓ Ploughing

✓ Bunding

✓ Leveling

- Field measurements and demarcation (GPS, tape and hand Level)
- Water management and harvesting techniques

✓ Canal construction (dual purpose, drainage)

✓ Weirs

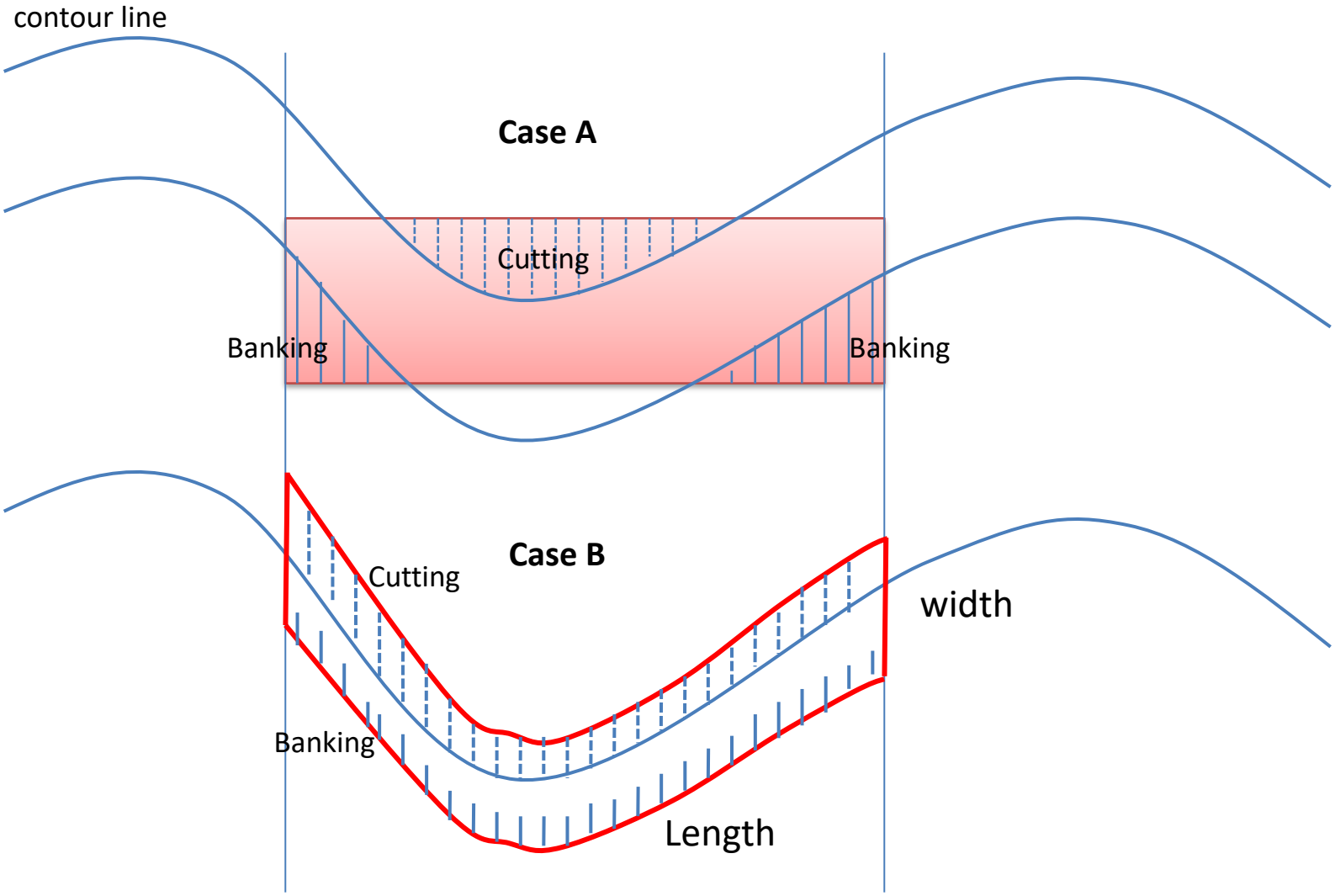
Land Demarcation and Field Measurements

General points for determination of field size

1. The length of a field should be along contour line and then the width should be across the contour line.
2. The how wide the width of a field should be is determined by land slope of the valley.
3. As the width becomes longer in paddy field at lowland, the volume of earth work will be increased, consequently high different land elevation will be occurring at next field.

Therefore, determination of the width of the field on the sloping land should be determined by available resources such as time, labor force and budget.

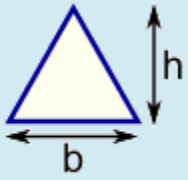
LD along contour line



Tools and Equipments Used

- GPS
- Tape measure
- Laser finder
- Hand levels

Measuring the Fields

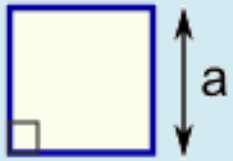


Triangle

Area = ½b × h

b = base

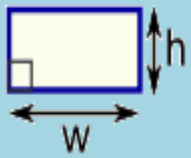
h = vertical height



Square

Area = a^2

a = length of side

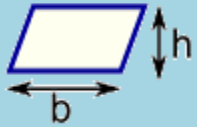


Rectangle

Area = w × h

w = width

h = height

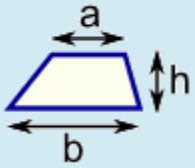


Parallelogram

Area = b × h

b = base

h = vertical height

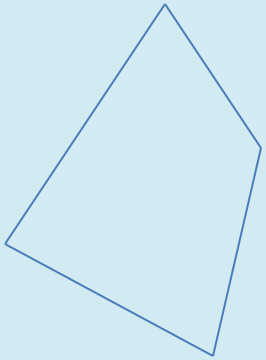


Trapezoid (US)

Trapezium (UK)

Area = ½(a+b) × h

h = vertical height



Herons Formulae

A= √s(s-a) (s-b) (s-c)

S= ½(A+B+C)

A=area S= semi perimeter

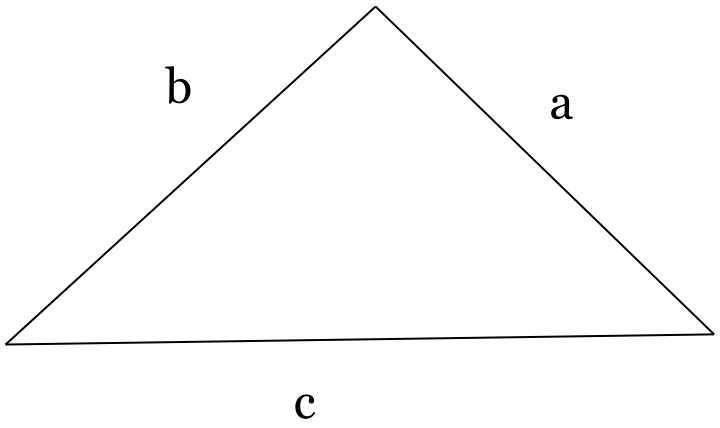
Why Area calculation?

- To know the exact area size of the field cultivated
- To help calculate yield of crops
- To help determine plant population in the field

What is Heron's formula?

In geometry, **Heron's (or Hero's) formula**, named after Heron of Alexandria, states that the area ***A*** of a triangle whose sides have lengths *a*, *b*, and *c* is

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$



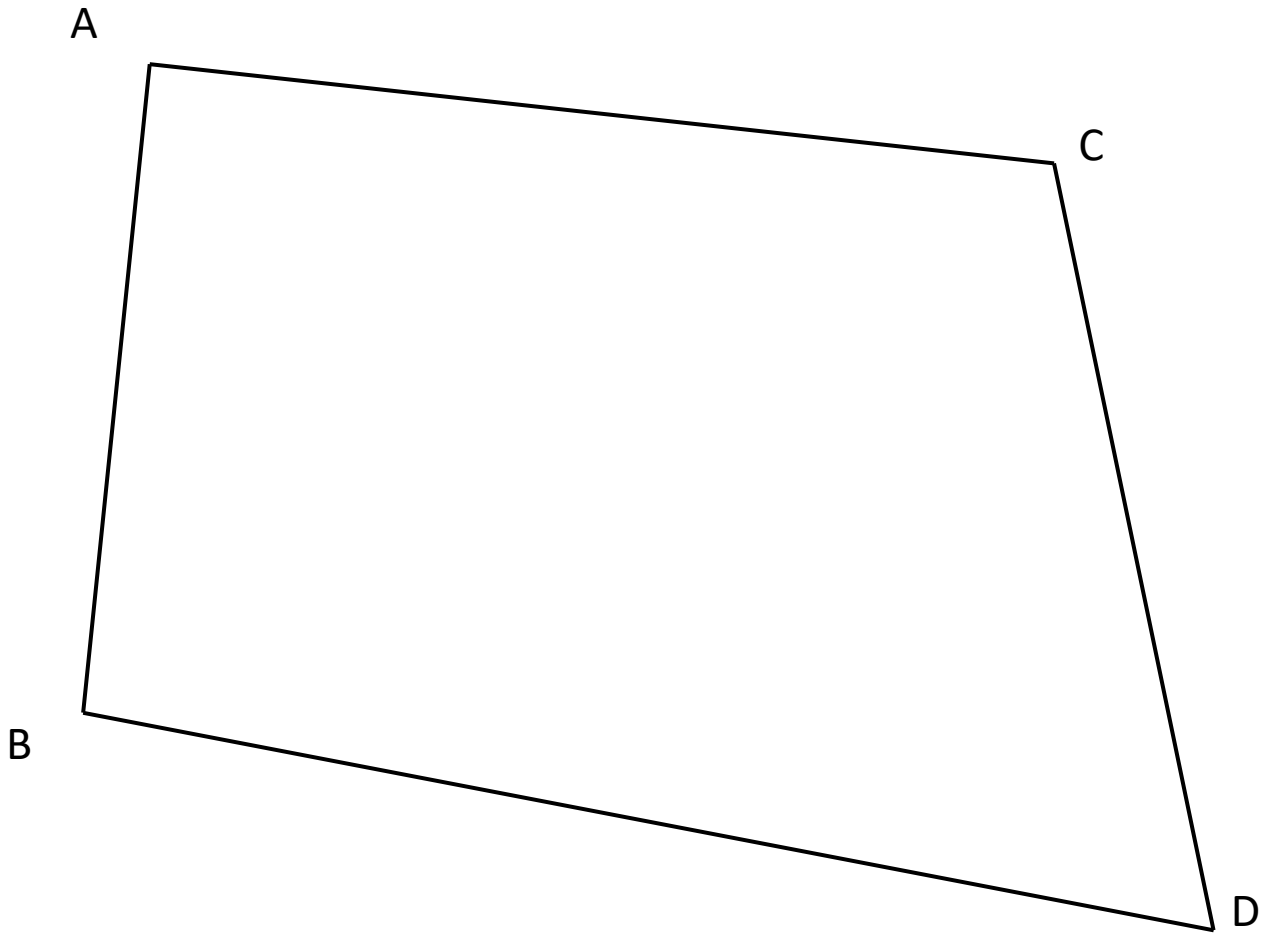
where *s* is the semi perimeter of the triangle

$$s = \frac{1}{2}(a+b+c)$$

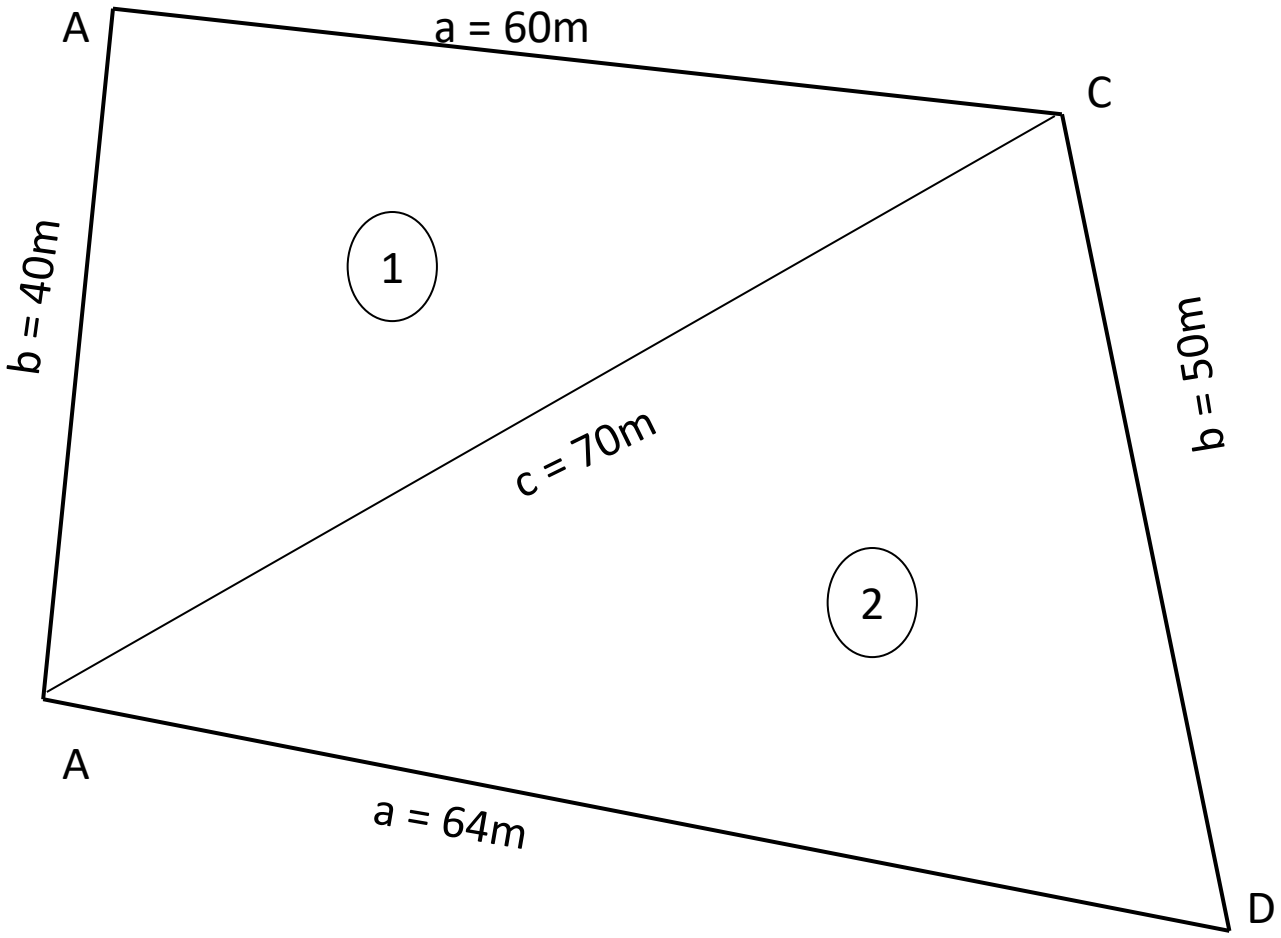
Practice 1

Step 1: Measure a distance at each sides.

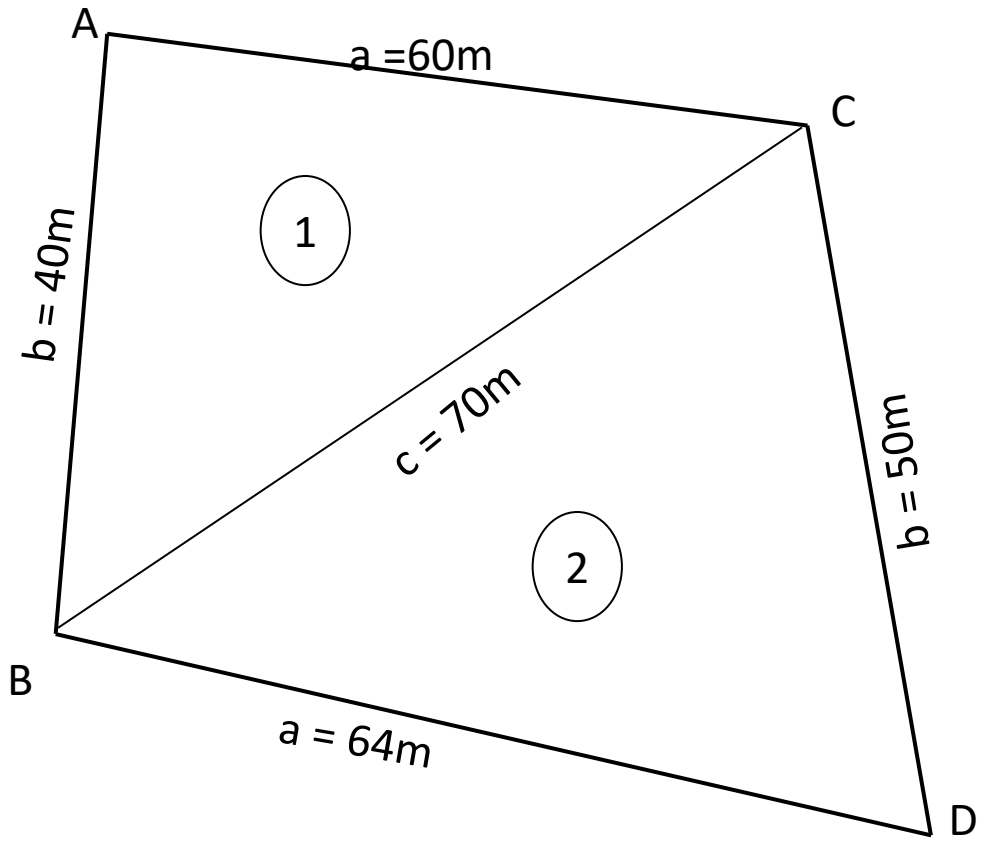
Step2: Dividing the polygon above into a triangle



Step 3: put a number/mark for divided triangle
Step 4: Draw a sketch as follows.



Step 5: Calculation



	Triangle1	Triangle 2
a	60	64
b	40	50
c	70	70
a+b+c	170	184
s=1/2 (a+b+c)	85	92
(s-a)	25	28
(s-b)	45	42
(s-c)	15	22
s (s-a)(s-b)(s-c)	1434375	2380224
$A=\sqrt{s(s-a)(s-b)(s-c)}$	1197	1542
Total area	2739	

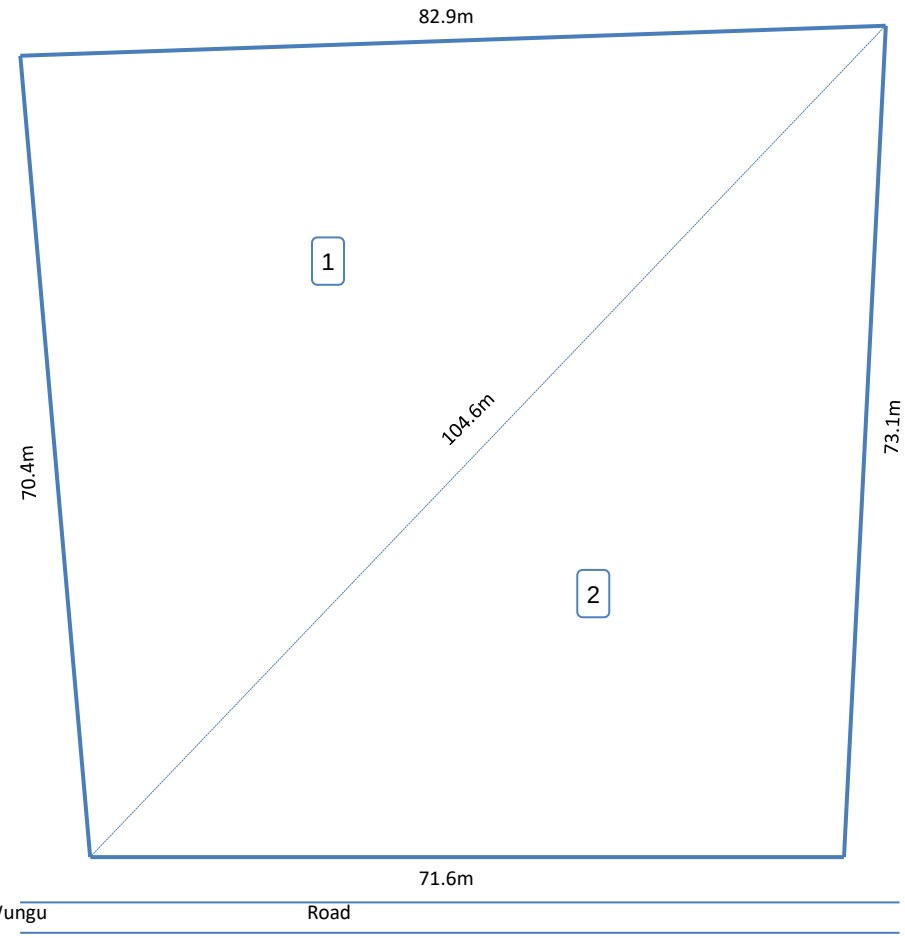
Other Formulae's

- Other formulae's can be used depending on the shape of the area
- Data can be gotten from GPS, tape measure, geographical map etc
- Data from tape measure are more accurate than GPS and Laser

PRACTICE 2

Wungu, West Mamprusi

S=No Scale



Location: N10° 19'24.6"
W000° 52'29.0"
Elevation: 142.0 m

From Heron's Formula

$$s = \frac{1}{2}(a+b+c)$$

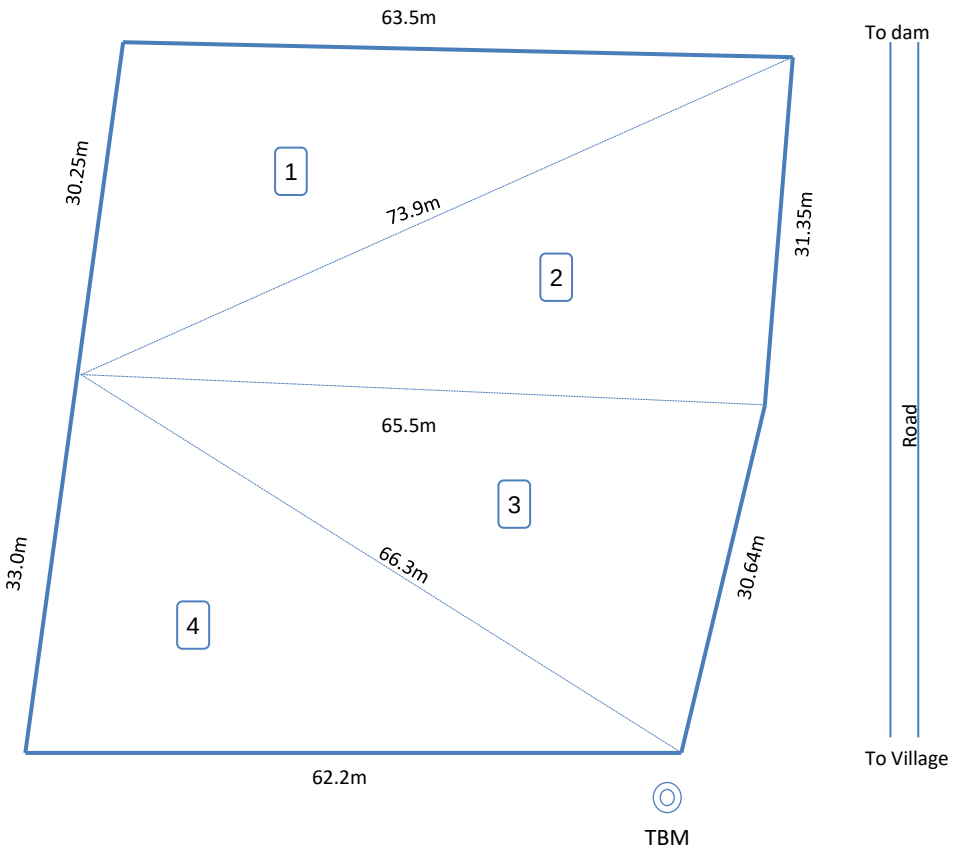
$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

	Triangle1	Triangle 2
a		
b		
c		
a+b+c		
s=1/2 (a+b+c)		
(s-a)		
(s-b)		
(s-c)		
s (s-a)(s-b)(s-c)		
$A = \sqrt{s(s-a)(s-b)(s-c)}$		
Total area		

PRACTICE 3

Nachimiya, Tamale Metropolitan

S=No Scale



From Heron's Formula

$$s = \frac{1}{2}(a+b+c)$$

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

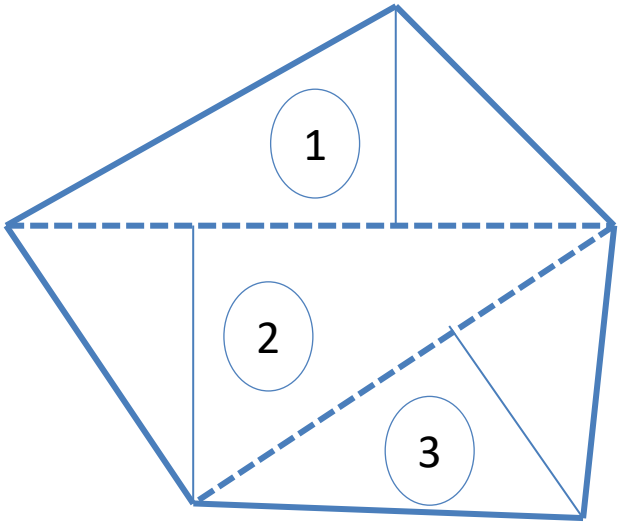
Location: N09° 18′47″
W000° 53′16″

Elevation: ? m

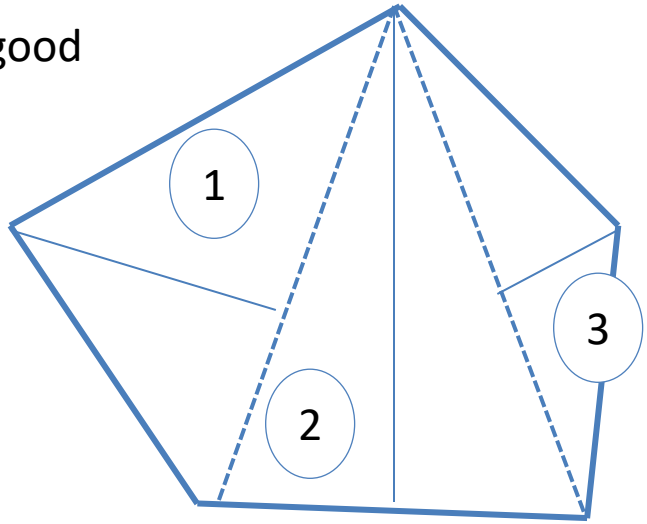
	Triangle1	Triangle 2	Triangle 3	Triangle 4
a				
b				
c				
a+b+c				
s=1/2 (a+b+c)				
(s-a)				
(s-b)				
(s-c)				
s (s-a)(s-b)(s-c)				
$A=\sqrt{s(s-a)(s-b)(s-c)}$				
Total area				

Dividing the polygon into triangles

Good



Not good



- <u>The base of a triangle and height should be almost same as much as possible</u>.
- Put a number
- Measure a distance at each sides.

Bunds Construction (Northern Region)

Why bunds are necessary for rice cultivation

Purpose (function)

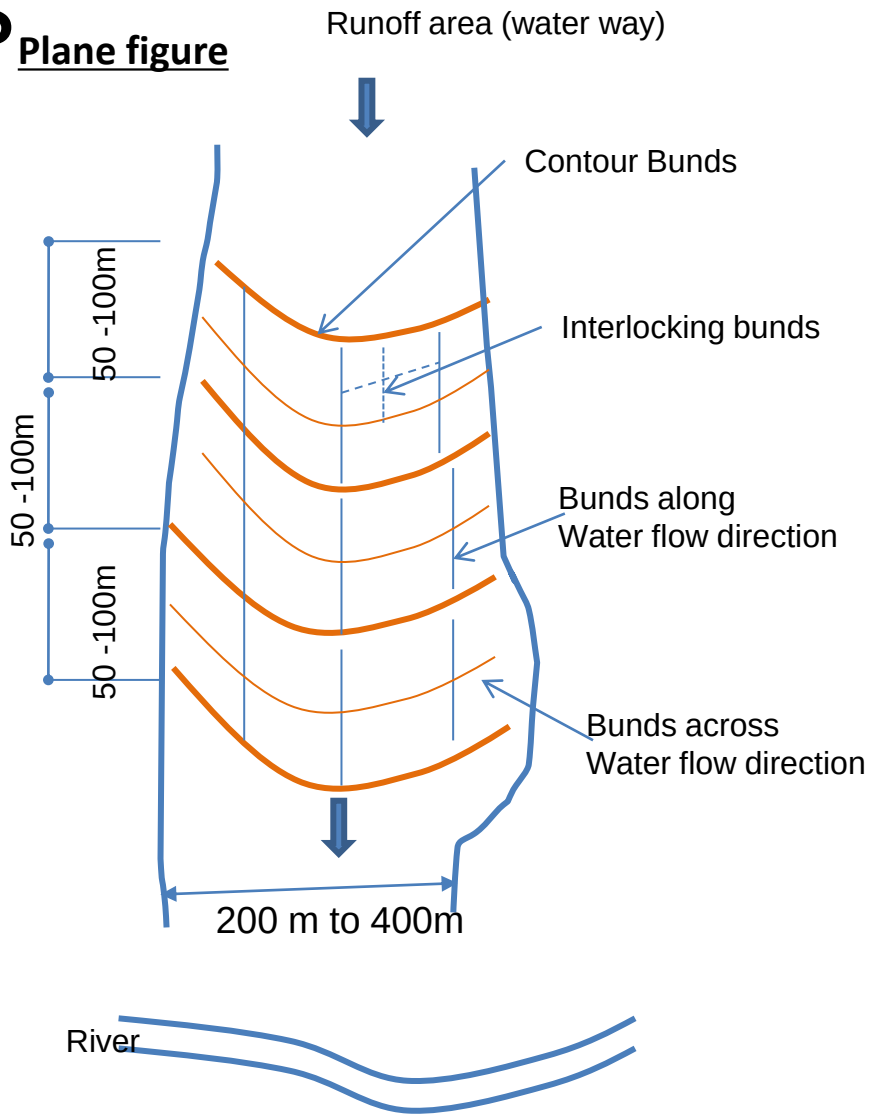
- Store and keep water
- Create soil moisture content
- Avoid loss of fertilizer through moving water
- Pathway
- Boundary

Nachimbiya site

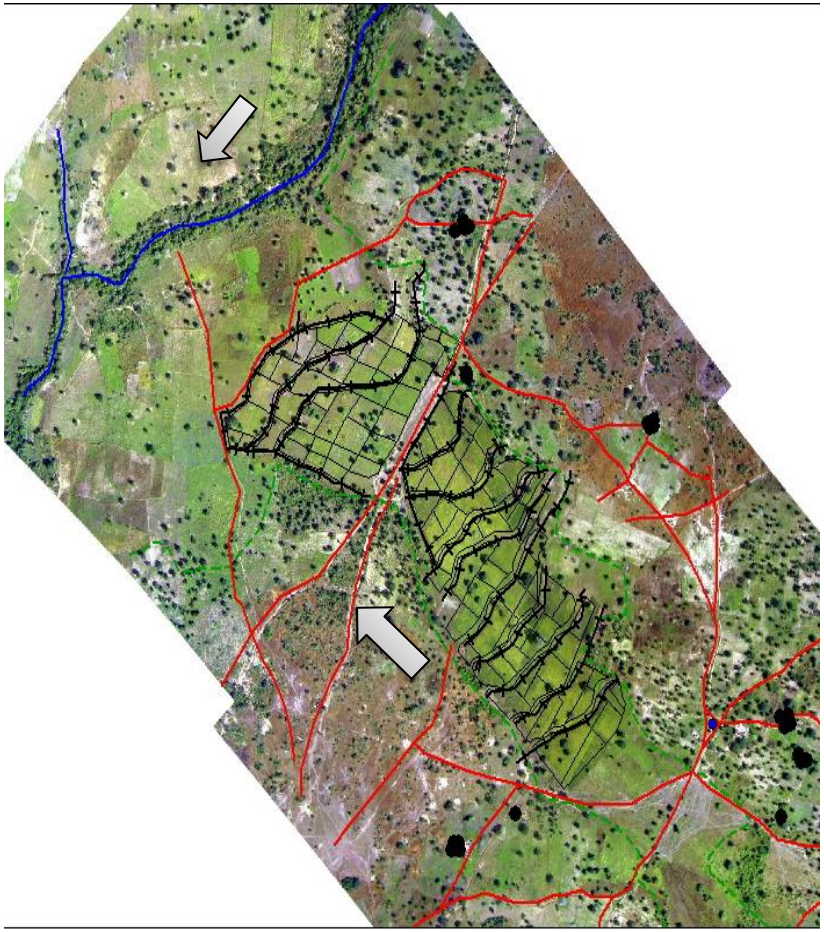
Types of Bunds

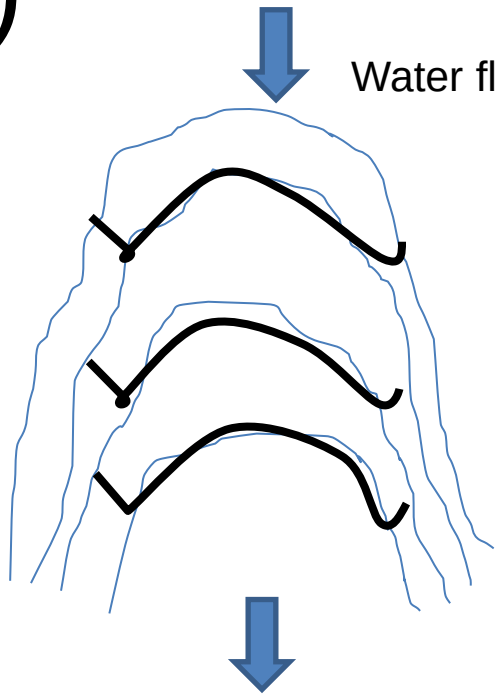
- Contour Bunds – Normally done in a stretch of valley/lowland.
- Bunds along the water flow direction (Normally at plot level)
- Bunds across the water flow direction (Normally at plot level)
- Interlocking bunds (divide a plot into small size/ make uniform water depth)

Plane figure



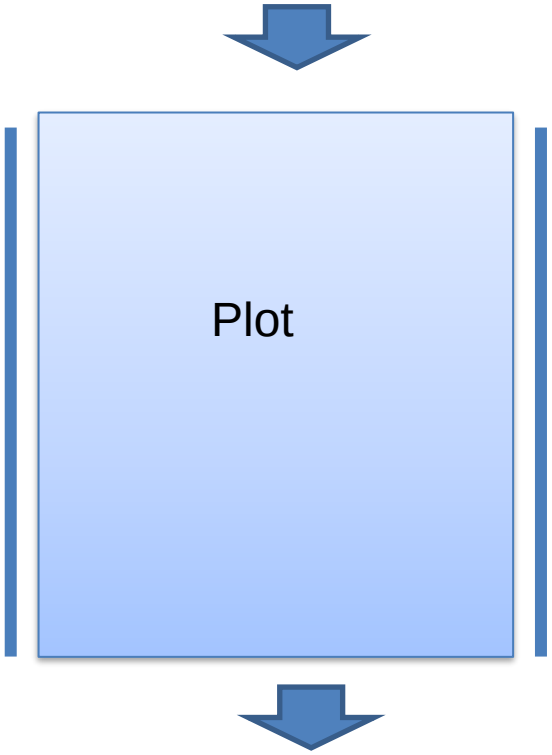
Contour bunds (at off-farm level)



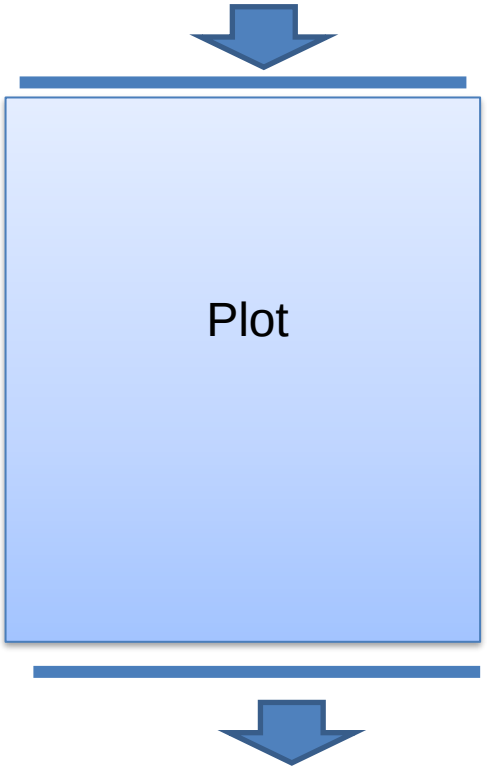


Bunds at plot level

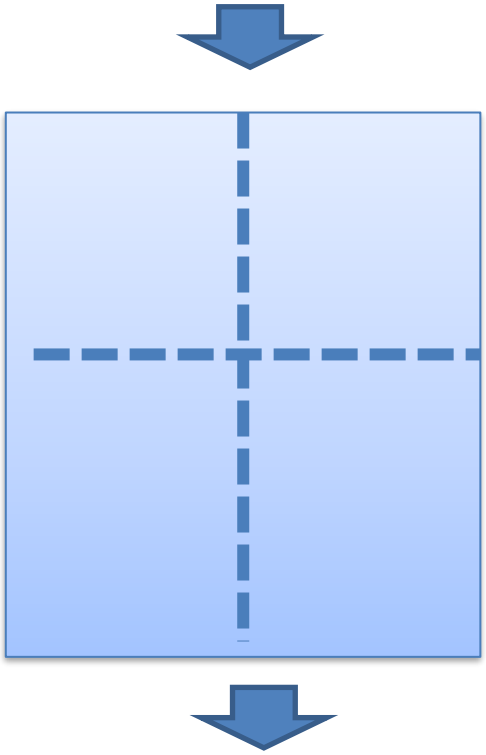
Along the water flow direction



Across the water flow direction

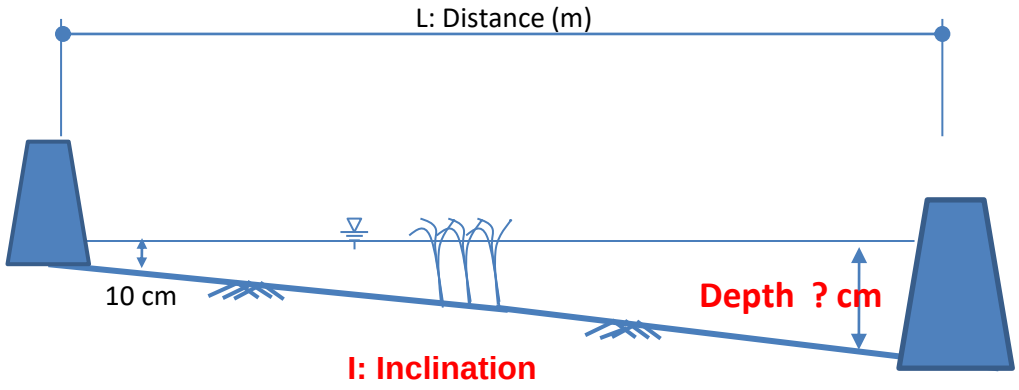


Interlocking bunds



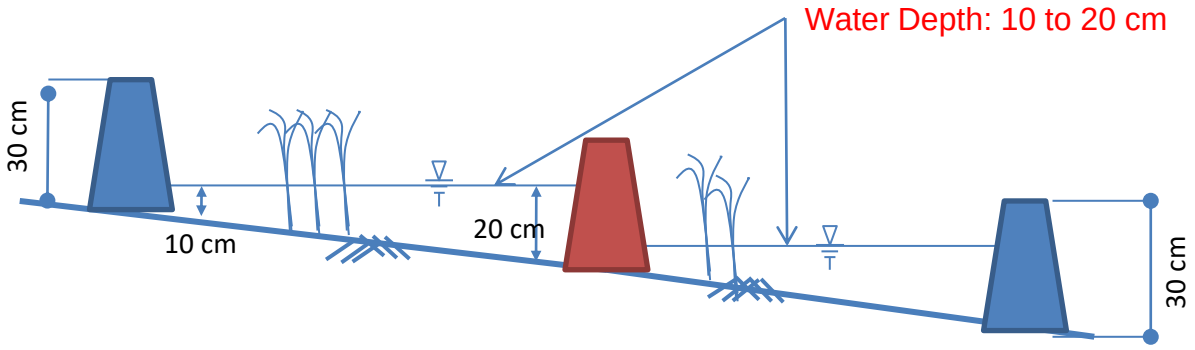
Interlocking Bunds

(depends on water availability)



Example

I Inclination	L Distance	Depth ? cm
1 %	10 m	10+10=20cm
	20 m	10+20=30cm
2 %	10 m	10+20=30cm
	20 m	10+40=50cm

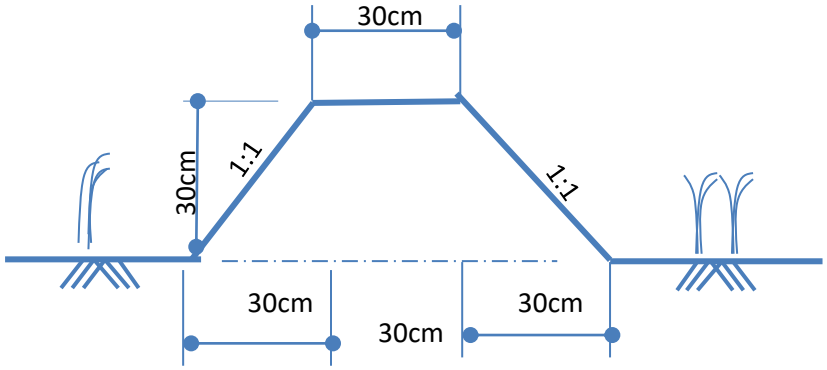


To avoid deep water deposit in the field, create interlocking bunds
(Divide a plot into small size to make uniform water depth)

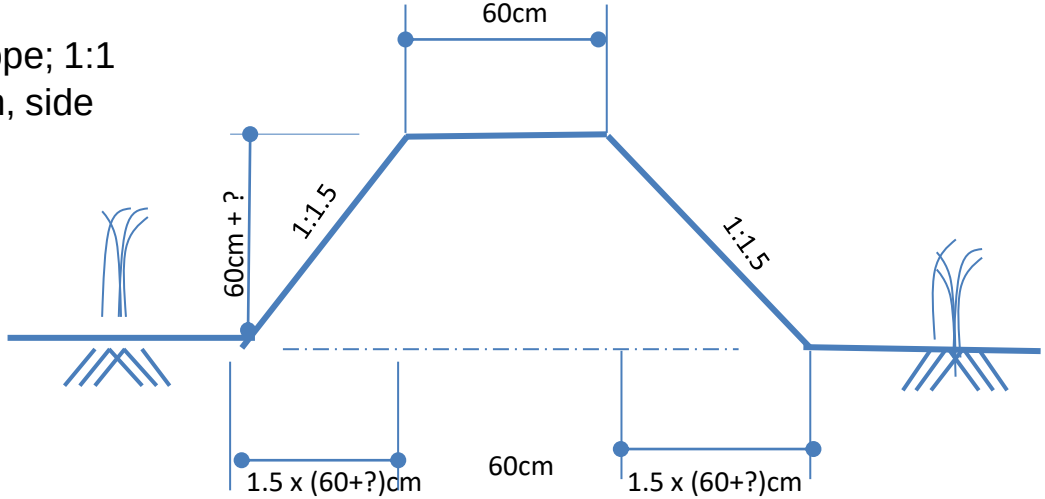
General Guideline on Bunds Construction

1. Material Required:
   - Tractor with disk plough
   - Soil (with or without rock)
   - Water (Including watering cans)
   - Shovel
   - Compactors (Round and side compactors)
   - Measuring rule
   - Rope
2. Shape
   - Trapezoid
   - Top Width 30cm, Height 30cm,Slope; 1:1
   - Top Width 60cm, Height (60+?)cm, side Slope 1:1.5
3. Structure Required
   - Stability (no erosion, slide)
   - Impermeability (no side penetration)
4. Others
   - Passable path for farming activity
   - Economical
   - technically simple

•Interlocking bunds
•Bunds along the water flow direction



Bunds across the water flow direction



Determination of height of 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)

Spilled water over bunds

Bunding Materials

material	Earth		Stone		Concrete	
	Advantage	Disadv.	Advantage	Disadv.	Advantage	Disadv.
Contour Bunds	➢Easy construction ➢Low cost	➢Weak to erosion	•Strong against heavy water flow •Resistant to erosion	•Expensive •Might be scattered on field	•Strong against heavy water flow •High durability	•Expensive
Bunds across H2O					Not appropriate	
Bunds along H2O			Not appropriate (ploughing with tractor)			
Interlocking bunds						

Earth Bunding

Contour Bunds

Bunds with sand bags

Interlocking Bunds

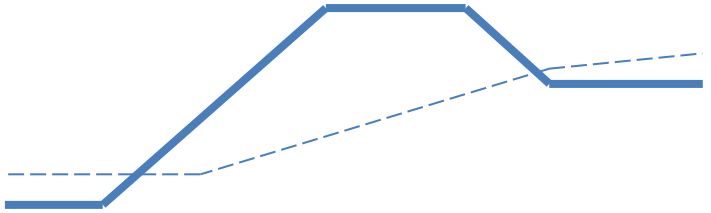
Stone Bunding

Stone Bunding

Stone Bunding (across H2O)

Combined earth & Stone Bunding with impermeable sheet

Contour Bunds



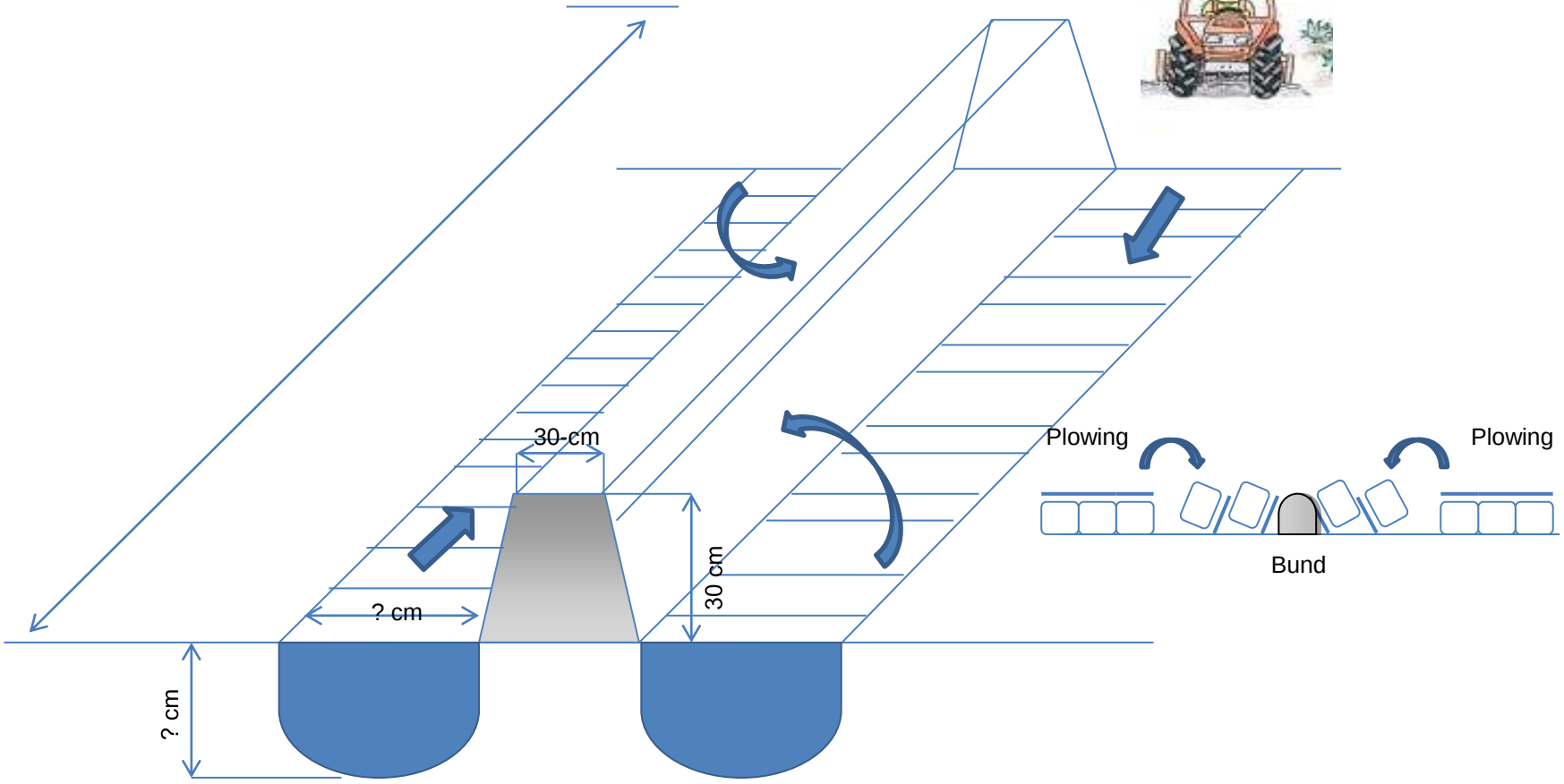
Bunds construction using tractor

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.

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.


30-cm
? cm
30 cm
? cm
Plowing
Plowing
Bund

3. Compaction

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

4. Reshaping

- Shapen the sides with the back of the shovel and compact with the side compactor.

Point to be paid attention for Bunds construction using tractor

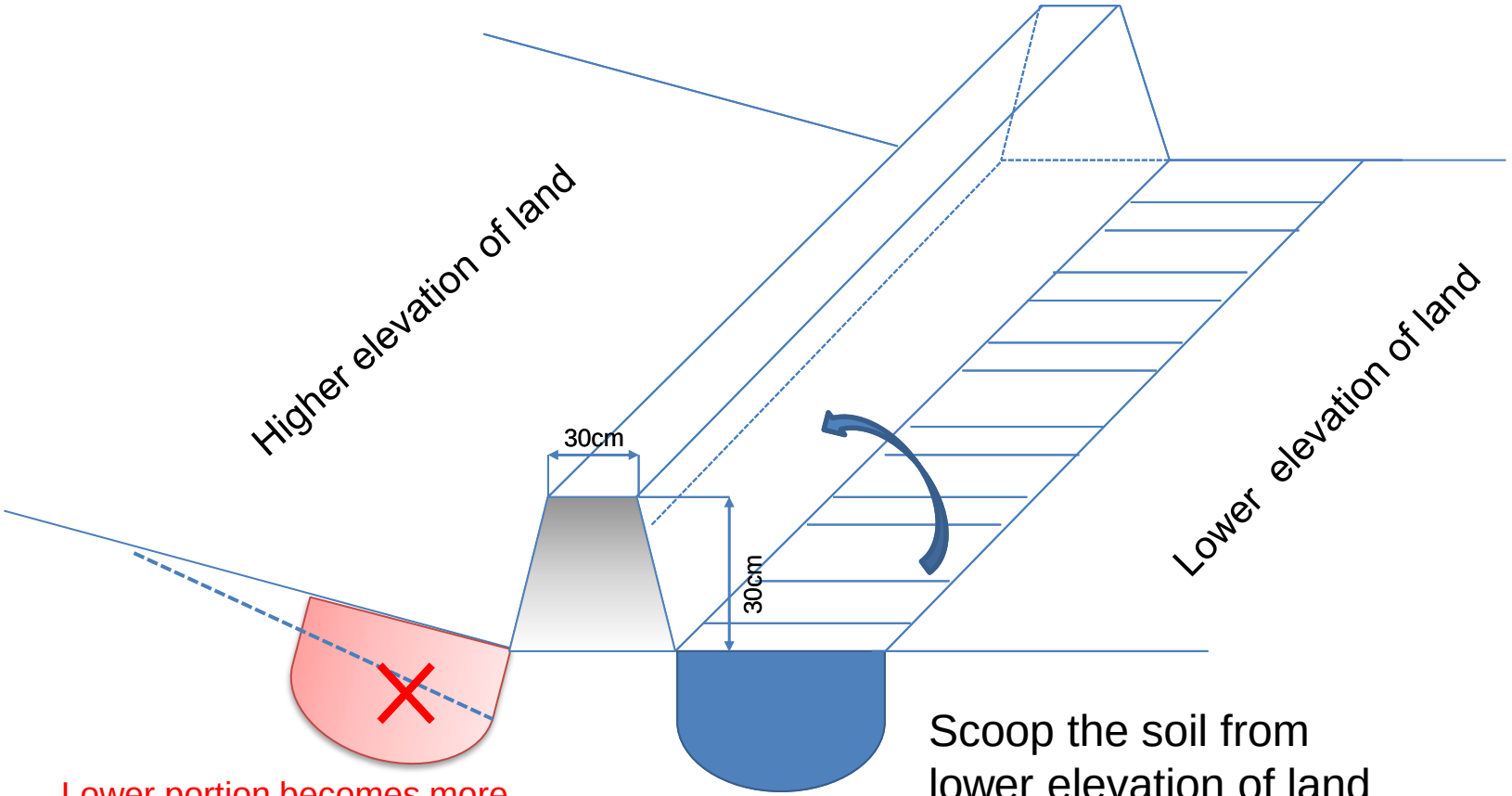
1. Technical instructions to tractor operator
2. Use last 2 discs of plough for bund construction with furrow wheel
3. Scooping of soil from one side should be about 0.7m away from Center. The other side should also be about 0.7m away from the center, making a total 0f 1.4m.
4. Both rear and front tyres should pass along furrow created when scooping for the 2nd time.
5. Operation speed should be slow for deeper scooping of soil.
6. There must be enough moisture in the soil for easy ploughing.
7. The scooping depth of soil should be 10-15cm.

Con……Bunds construction using tractor

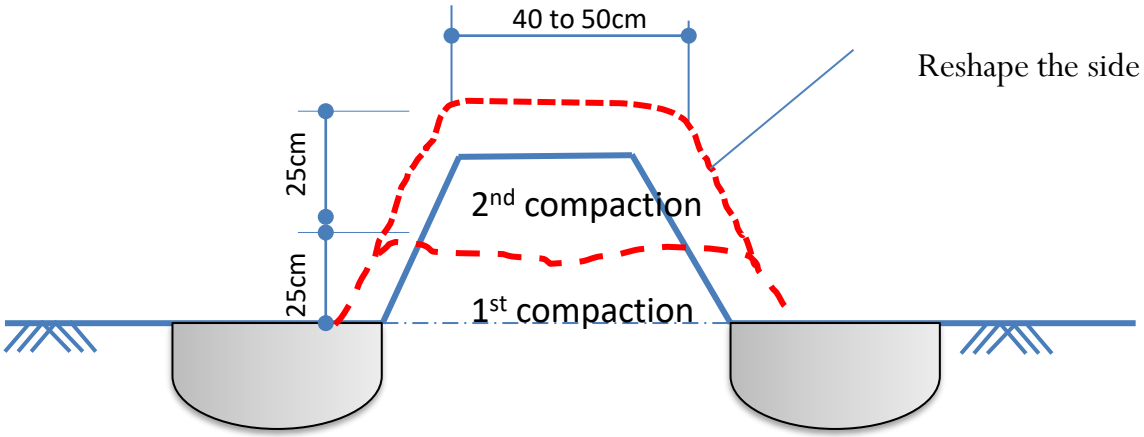
- 2 times pass by the tractor can hill-up soil for a bund.
- Making a 3 times pass can cause difficulty in handling during operation of the tractor.
- Furrow wheel directs plough for straight movement and therefore must be used during bunds construction.
- The hydraulic system of the tractor should be good to avoid the hitching points of the tractor from dragging on the ground. This can cause spreading of the scooped soil back into the furrow.
- Ploughing should be done before bund construction for unbunded fields.
- For bunded field reshaping of bunds should also be done after ploughing.

1st ploughing to heap soil for bund

Bunds on the Sloping land

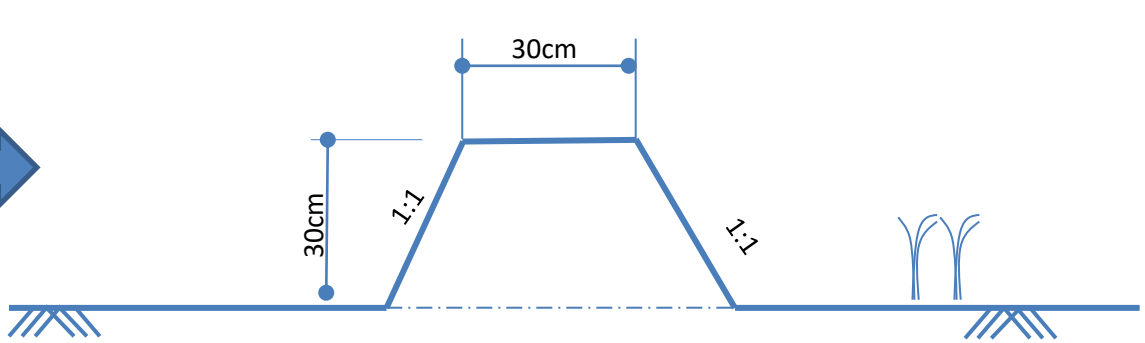


Compaction and Reshaping



During construction

1. Scoop the soil from both sides equally
2. Compact the soil at 1st layer and 2nd layer each
   - soil with certain soil moisture content is required
3. tapping side slope
   - With side compactor
   - Muddy soil: Compact with the back of shovel
4. Reshape the bunds



Completed bunds

Some Tools for Bunds Compaction

Round compactor (with 2 persons)

Side Compactor

Rope

IVRDP site

Maintenance of Bunds

During cropping season

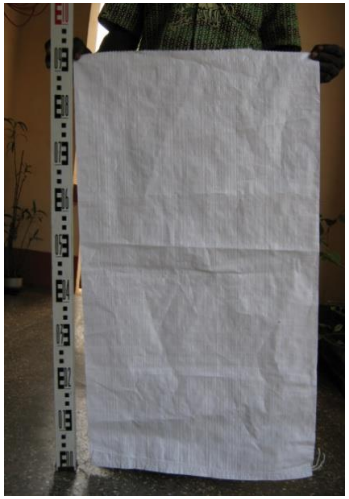
- Minor repairs such as hilling up the soil, reshaping and cutting grasses should be done to maintain the function of bunds.

Approaching Next-Cropping season

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

Land Leveling Tools(Inland Valley)

- Manual land leveler
- Flat leveler tied with a rope
- Ladder tied with a rope
- Sack with 2 holders
- Sack with a rope

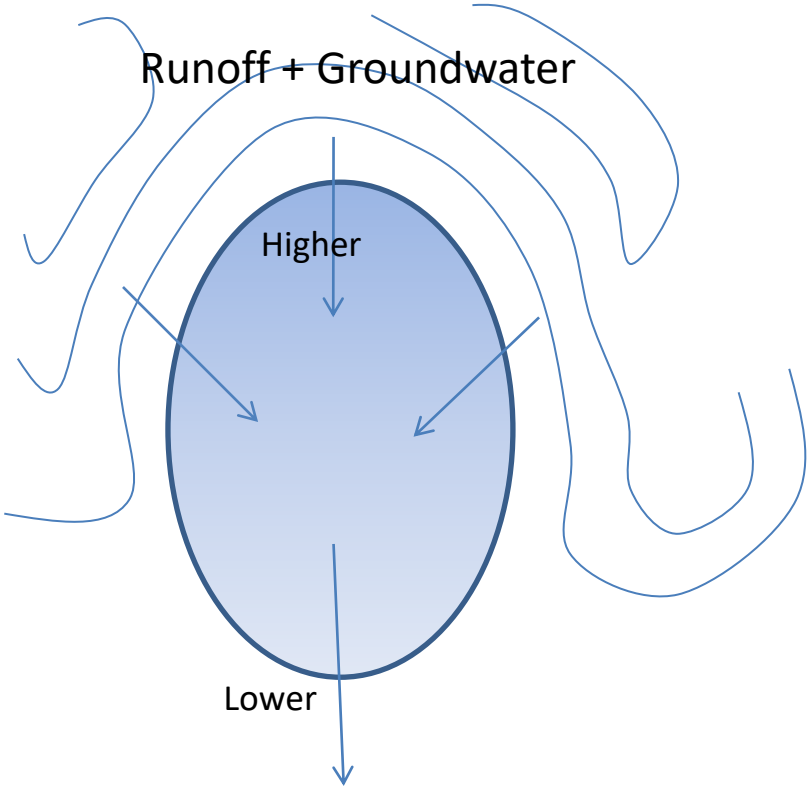


Water Use and Management

Shape and the Nature of the Inland Valley

A) Shape: egg or oval shape

B) Rainwater and ground water gather and run in lower place in the valley.

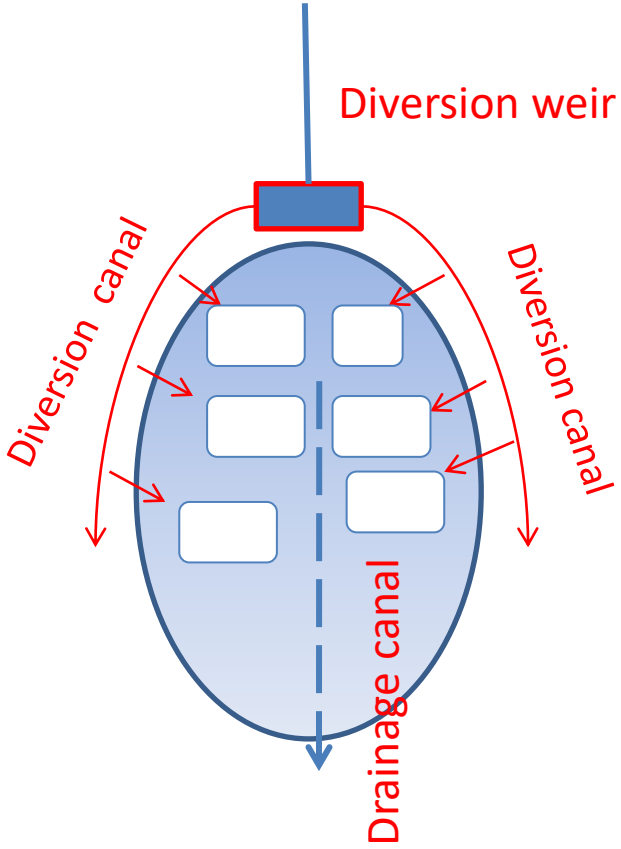


Quoted from JIRCAS paper : Activities in FY 2010
The study on DIITRPA in Ghana , 23/02/2011

Type of Water Use (1)

Divided-canal type

- Diversion weir/dug out is constructed to gather and raise water level at upstream for gravity water use.
- Around the land, providing– diversion canals are constructed.
- In the center of the land, existing river is developed as a drainage canal.

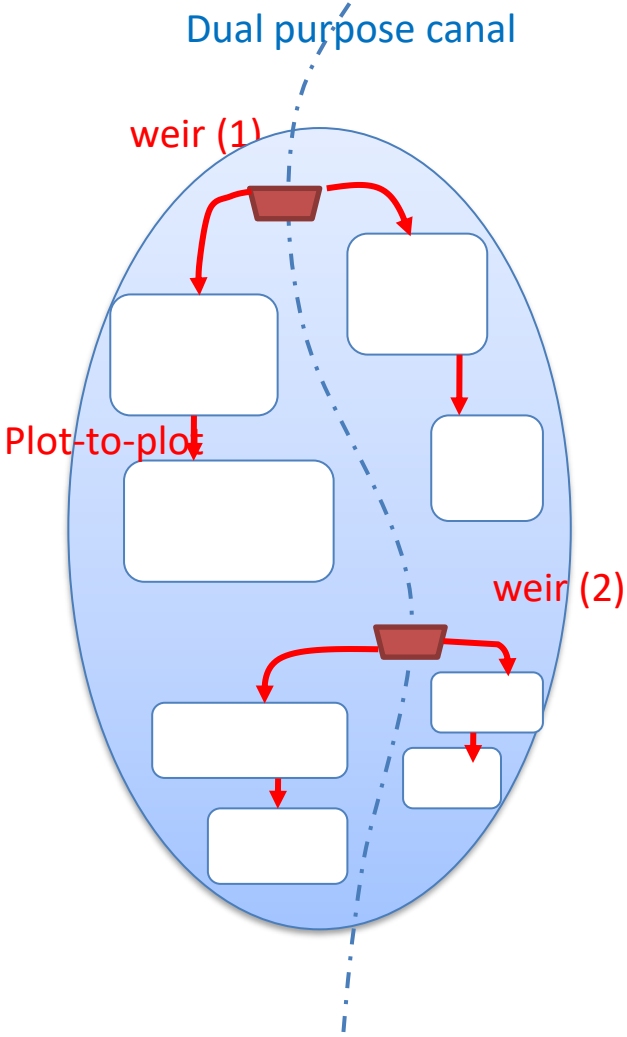


Quoted from JIRCAS paper : Activities in FY 2010
The study on DIITRPA in Ghana , 23/02/2011

Type of Water Use (2)

Dual purpose canal type

- Original water way is developed as a dual purpose canal.
- Along this canal, a weir is put in the canal in order to raise water level.
- Raised water go into rice field, then use in plot-to-plot.



Pictures

Divided-canal type

Dual purpose canal type

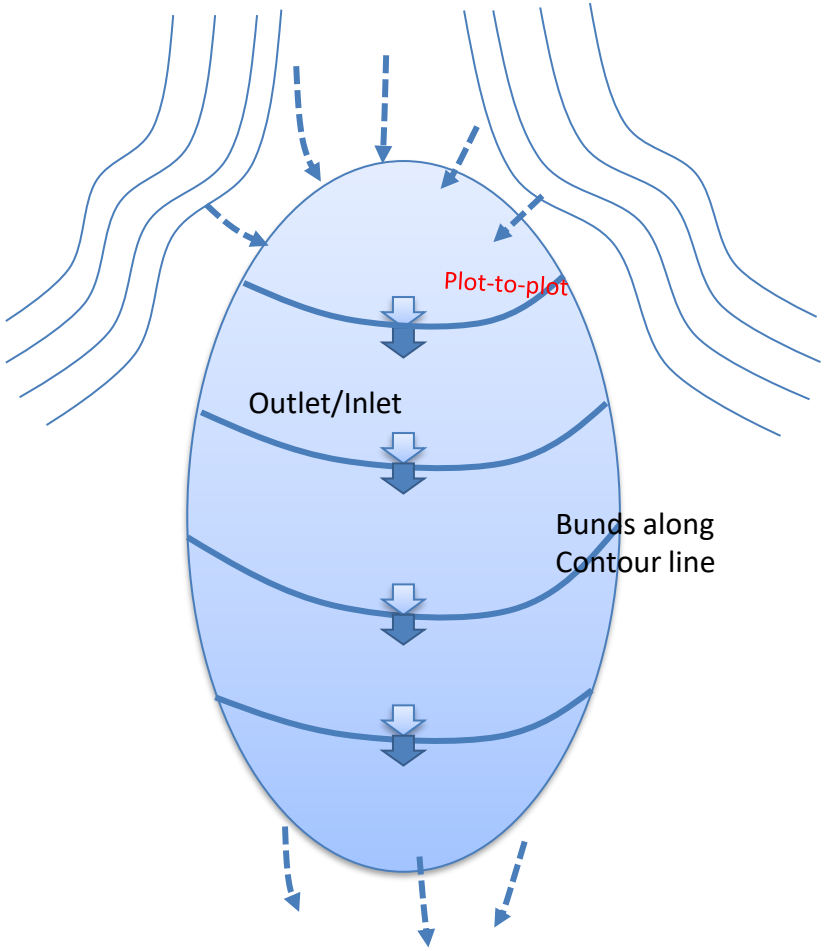
Type of water use (2-1)

Plot to plot type

- Water from the valley edge is not directed in particular water way. (Scattered)
- Harvest water with bunds along the contour at 1st field.
- Water use in plot-to-plot.

Note:

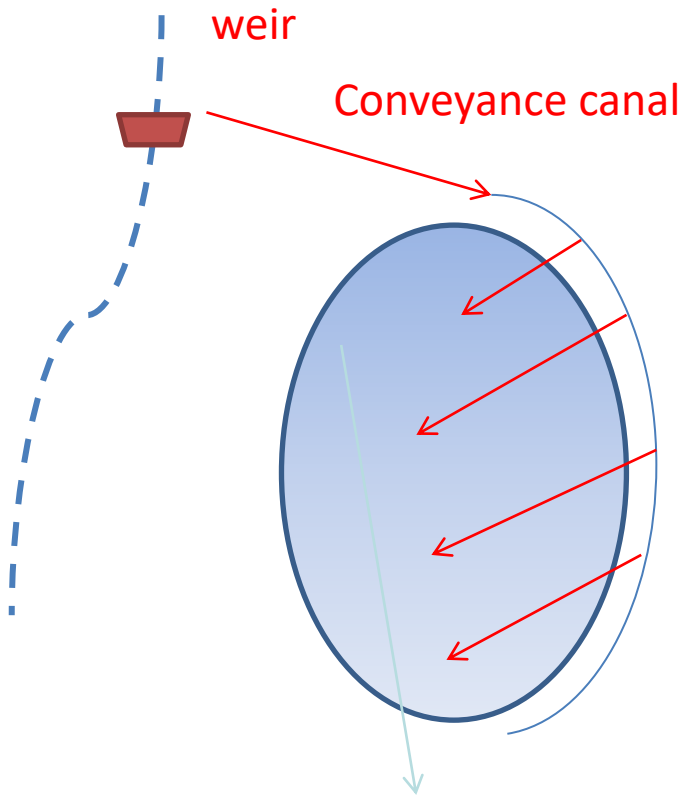
Not recommendable for big Valley width.



Type of water use (3)

Weir(spring)-and-canal type

- Water source is near the land, but no existing water way within the land.
- Conveyance canal is constructed.
- Using canal or water way deliver or direct the water.

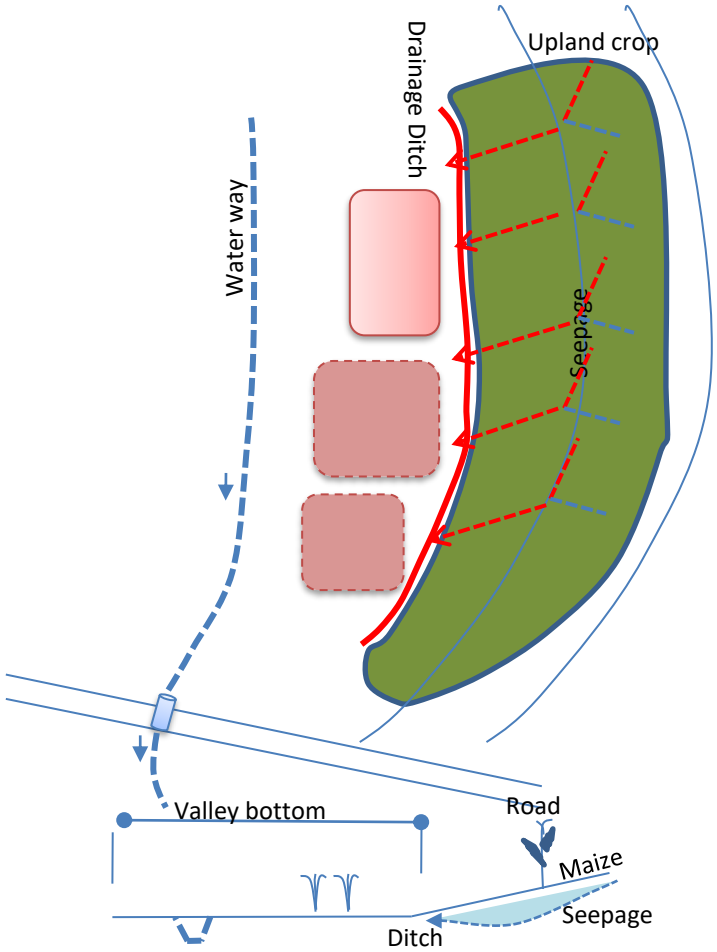


Quoted from JIRCAS paper : Activities in FY 2010
The study on DIITRPA in Ghana , 23/02/2011

Type of Water Use (4)

Seepage water use type on a sloppy land

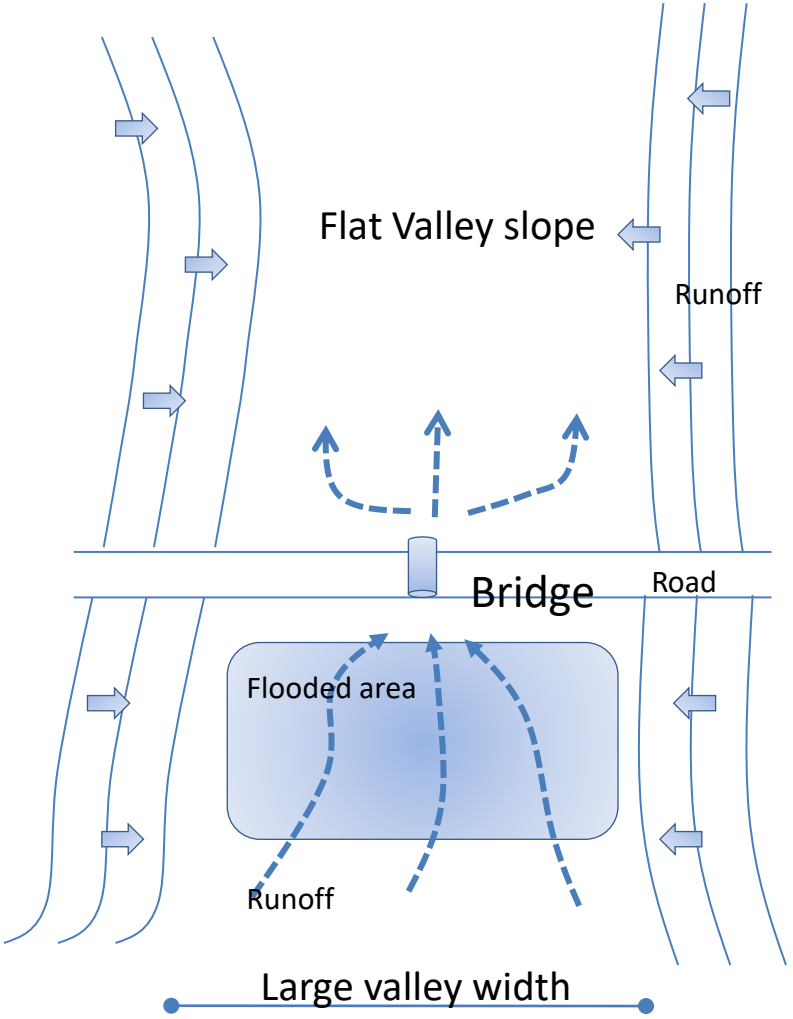
- Along the edge of upland farm, drainage ditch is developed as a water harvesting facility.
- During non raining days, collected seepage water will help for the rice growth.



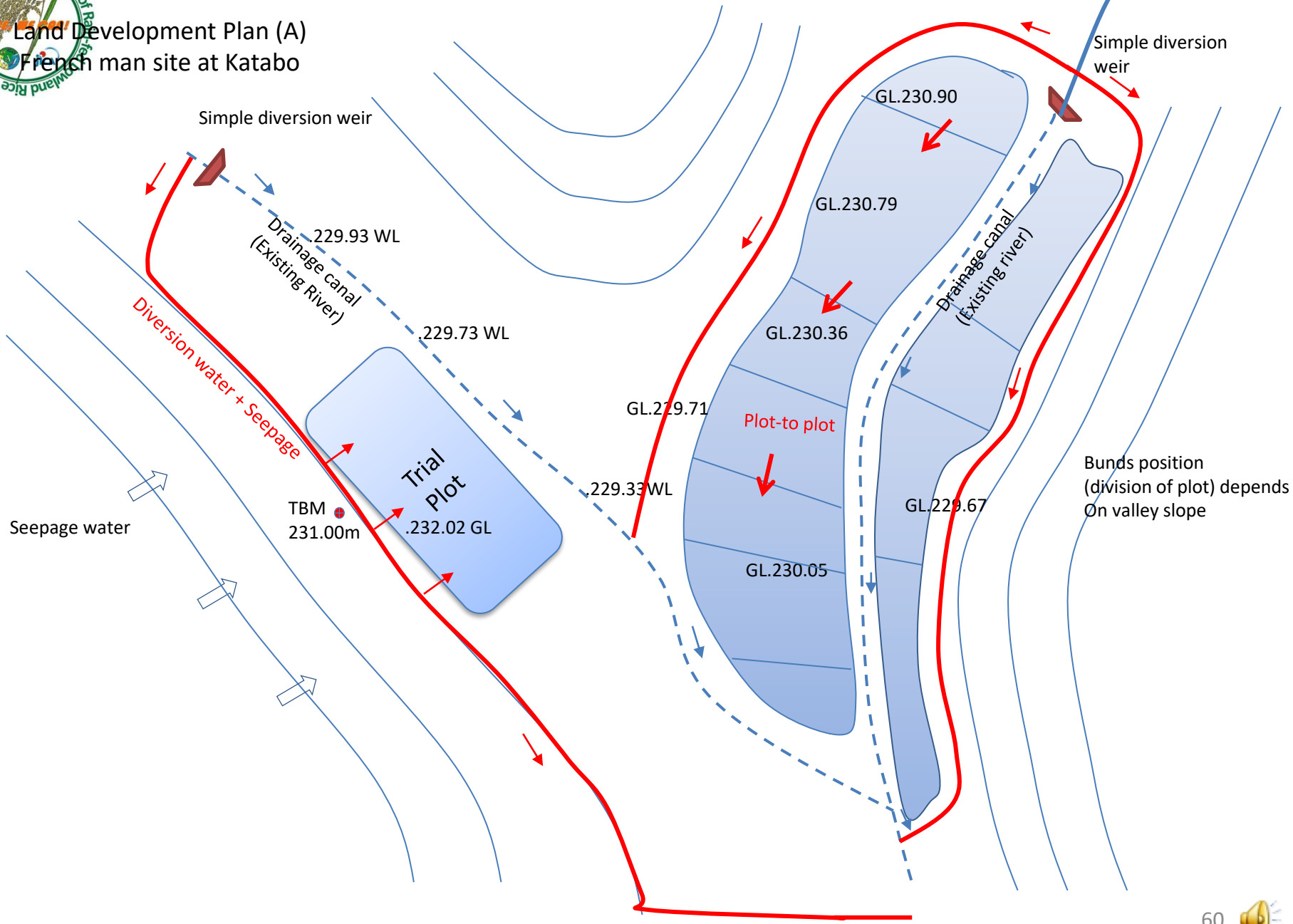
Type of water use (5)

Runoff water use affected by the structure

- Runoff gathers at lower portion of the valley.
- Due to cross-sectional area of flow, water in the valley create flood area at upstream of the structure.
- At downstream, water flows gradually.



Land Development Plan (A)
French man site at Katabo



THE PROJECT FOR SUSTAINABLE DEVELOPMENT OF RAIN-FED LOWLAND RICE PRODUCTION
COMMUNITY SELECTION CRITERIA FOR DEMO PLOTS

	DISTRICT:			
	NAME OF COMMUNITY:			
	NAME OF AEA			
	DATE:			
		INDICATOR FOR SELECTION	**NOTE/REMARKS**	
NO.	**FACTORS**			
	A.BIO-PHYSICAL			
1	Good rainfall pattern and period			
2	Land Level			flat *Not flat
3	Distance from the community to the valleys			
4	Accessibility to the Community			*Accessible *Not Accessible
5	Type of soil			
6	Source of water (eg. Stream, river spring, dams or none)			
	B.TECHNICAL			
7	Maximum water depth during the rainfall season			*below knee level *knee level *above knee level
8	Flooding period (Days it takes for flood to recede			
9	Water management / Agronomic practices			
10	Free from water borne diseases			
11	Availability of power tillers/threshers/tractors			
	C. SOCIO-ECONOMIC			
12	Accessibility (state of road network to Valley)			*Good *Poor
13	Easy entry to community (hospitality)			*Hospitable *Inhospitable
14	Existing farmer groups in rice production			
15	Farmers motivation and willingness			*Strong *Weak
16	Number of farmers working in the valley			
17	Number of male farmers			
18	Number of female farmers			
19	Taboo days			
20	Market days			
	D. Other factors			
21	Harvesting period			
22	Current Yield/ acre(paddy)-bags/kg			
E	PCU VISITING TEAM MEMBERS			
F	NAME OF DISTRICT/MUNICIPAL DIRECTOR:			
G	DATE:			

NB.	**Indicator** :Shows how suitable and relevant those factors are for rice cultivation
	Note: Additional comments to be added to the factors for consideration

RICE CULTIVATION

1st Training of Trainers

edited 2020

Contents

SEED PREPARATION

Seed selection

Sowing Rate

- **Prepare <u>6 kg</u> of dry seed for 1/4 acre or <u>25 - 30 kg</u> for 1 acre.**

6 kg

Seeds for one large Voltic bottle (1.5L) equivalent <u>1 kg</u>.

8 kg

× 3 buckets = **24** kg

× 4 buckets = **32** kg

A full rubber bucket of dry seeds (13%) equivalent <u>8 kg</u>.

Qualities of good seeds

- **Germination above 80%**
- **Not mixed with seeds of other crops and weeds**
- **Free from pests and diseases**
- **Free from stone, dirt and foreign matter**
- **Well dried with moisture content between 10-12%**
- **Past the rest period (Dormancy)**

Optimum seeding period of Jasmine 85 is from 3 months after harvesting

Purpose of seed selection

To obtain viable seeds

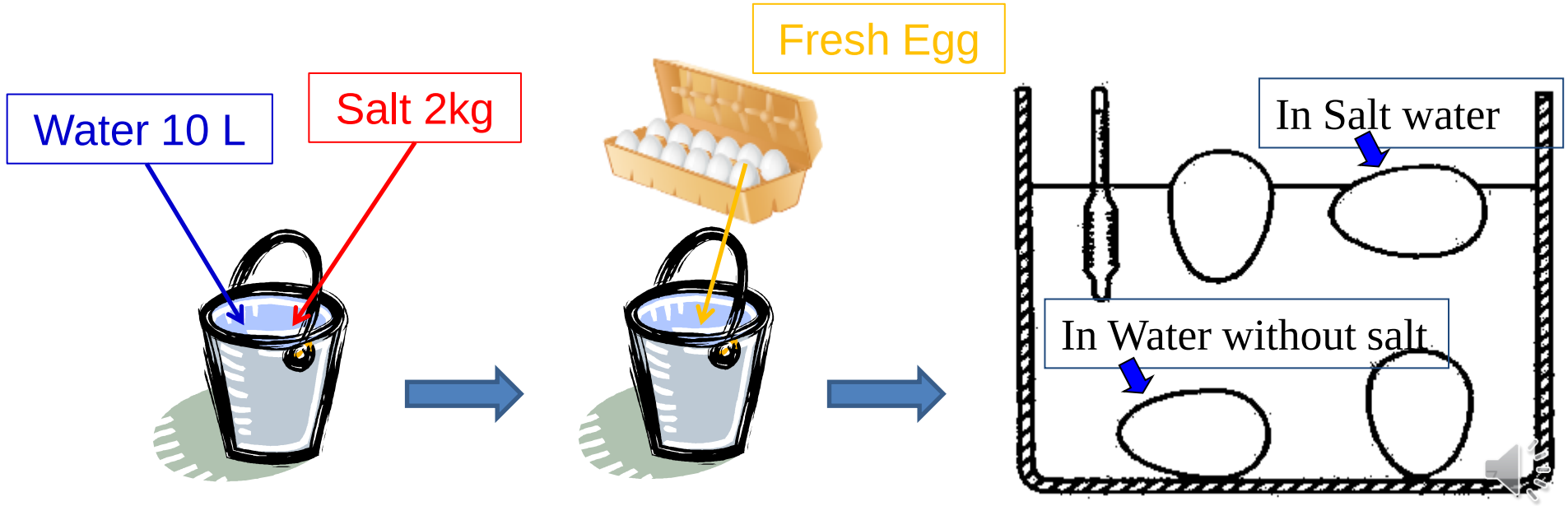
- **The heavier seeds normally germinate uniformly and give sufficient nutrients to become healthy seedlings**

Some unfulfilled grains mixed in the seed

All the seeds fulfilled

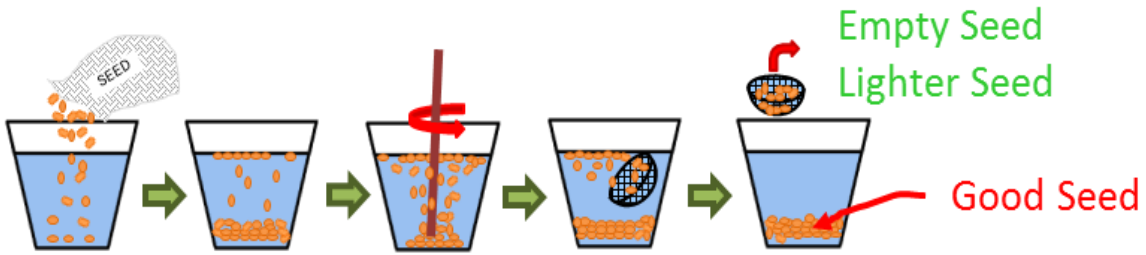
Seed selection (1)
by salt water method

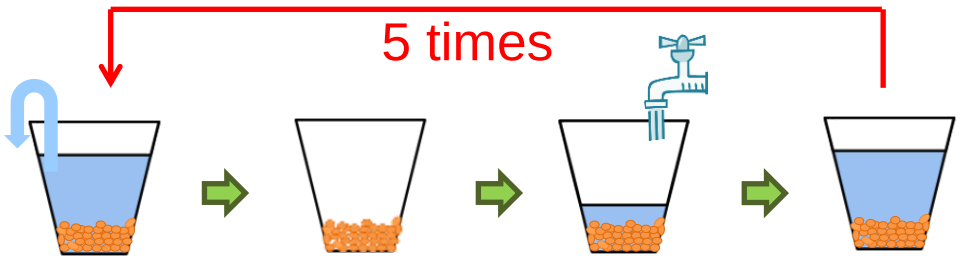
1. **Measure ten 10 liters of water and 2kg salt**
2. **Mix salt and water then stir well**
3. **Put the fresh egg in the solution, if the egg float above the water, the solution is correct for seed selection**



Cont.

4. **Remove the egg and pour the seeds into the solution**
5. **Remove the floating seeds**
6. **Wash the remaining seeds with fresh water 5 times**





Cont.

7. **Quantity of seeds should be fully submerged into the solution.**
8. **The solution can be used for several times.**

Seed Selection (2) by Urea Solution

① Prepare 20kg of UREA fertilizer.

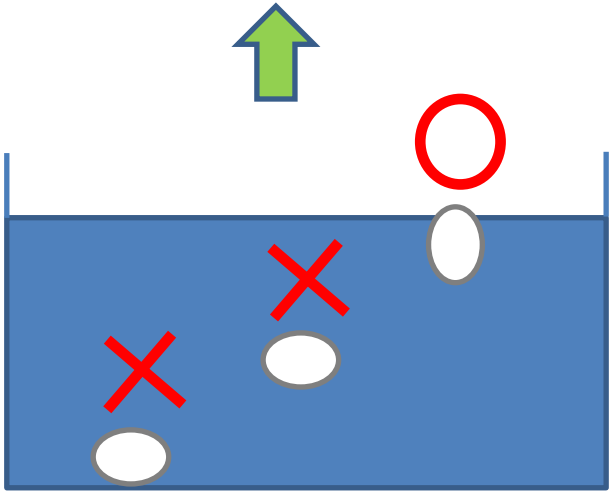
② Pour the fertilizer into 40 liters of fresh water.

③ Stir the water until the fertilizer is completely dissolved.

④ Put eggs into the Urea solution to check the specific gravity.

Salt solution can substitute Urea solution. Use 8 kg of salt for 40 liters of fresh water.

The Urea solution is poisonous. Keep away from animals and human.



Seed Selection (2)
by Urea Solution cont..

⑤ Get certified seed ready.

⑥ Put the seed into a net bag.

⑦ Put the seed in a net bag into the Urea solution. Gently stir the seed in the Urea solution.

⑧ Remove all of the floating grains.

⑨ Wash the seed with fresh water.
Drain water from the net bag for next step.

Hot Water Seed Treatment

- Objective

Some of pathogens causing diseases can be on or in seed. Seed-borne pathogens include fungi causing Rice Blast.

A comprehensive series of counter measures is required to control Rice Blast.

Hot Water Seed Treatment is one of counter measures and as effective as seed dressing.

- Diseases Controlled

Hot Water Seed Treatment can control diseases as follows:

Rice Blast, Bakanae, Bacterial Grain Rot, Bacterial Seedling Blight, rice nematodes, etc.

Hot Water Seed Treatment cont..

- Advantages

Hot Water Seed Treatment is environment friendly and cost-saving.

- Remarks

Generally speaking, in hot water seed treatment, Japonica rice shows higher temperature tolerance compared with Indica rice.

Precise control of water temperature and treatment period is important especially for Indica rice.

Procedure of Hot Water Seed Treatment

① Heat up water. Use clean water.

② Keep water temperature at 60˚C. Observe the water temperature by using thermometer

③ Put seed into hot water of **exactly 60˚C for 10 minutes**. Gently shake the seed bag from time to time.

Procedure of Hot Water Seed Treatment cont..

④ Take out the seed bag from hot water after 10 minutes.
Put the seed bag into cold water quickly and stir it for cooling down.

⑤ Allow the water to drain.
Do not place the seed directly on the ground.

⑥ For transplanting, Tensui2 recommends to go on to soaking & incubation right after this hot water seed treatment.

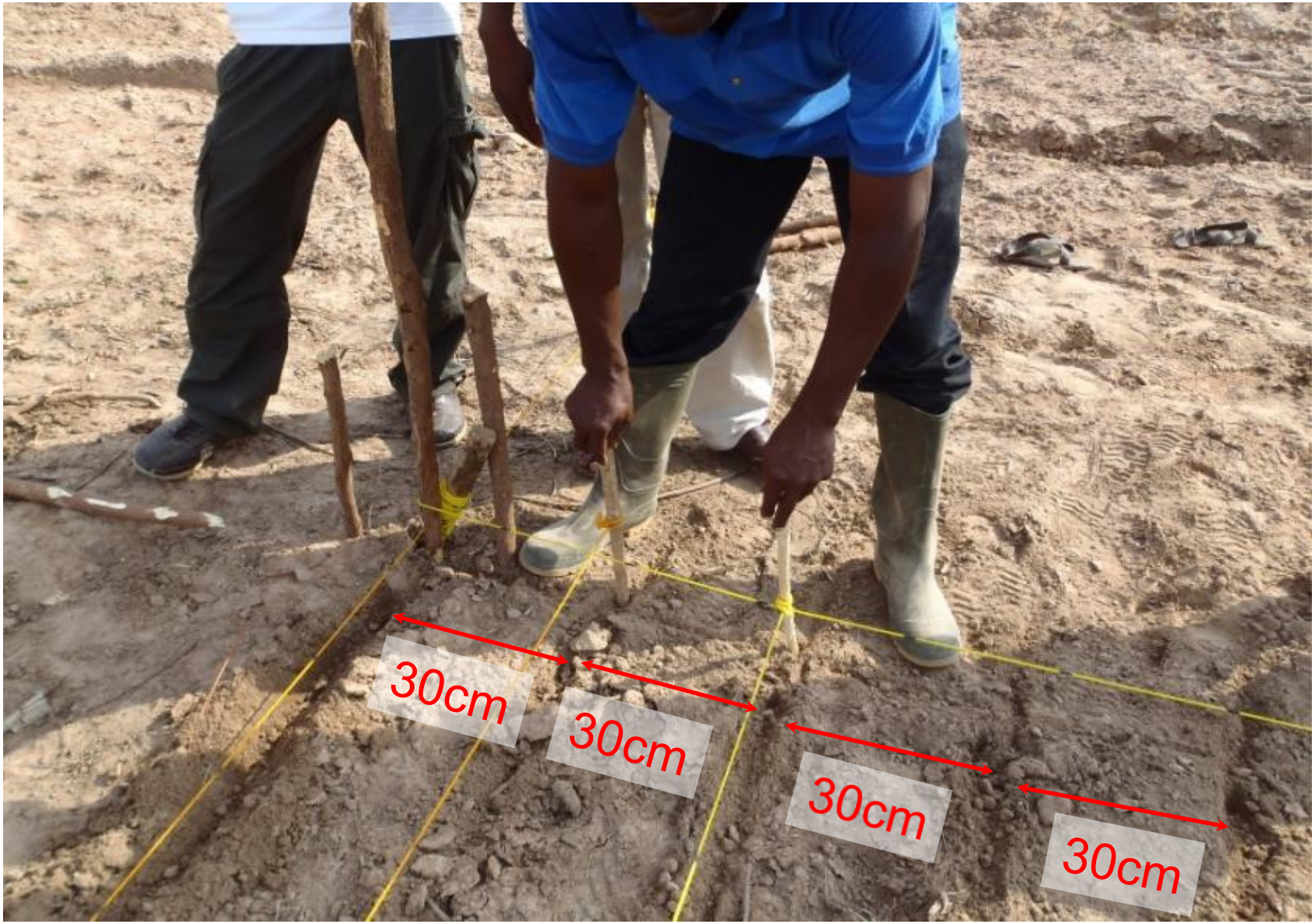
Direct Sowing

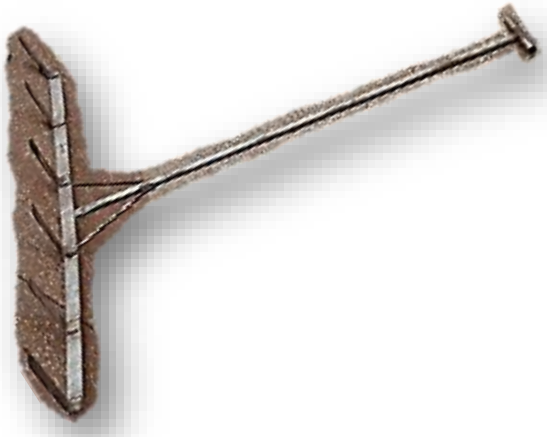
Sowing Method (1)

- Sowing method: Drilling
- Row distance: 30 cm
- Sowing rate: 25 - 30 kg of selected seed per acre
  - 62.5 - 75 per hectare
  - 6 - 7.5 kg per ¼ acre
- Sowing depth : 2 – 3 cm

Sowing Method (2)

- Sowing method: Dibbling
- Row distance: 20 cm
- Hill distance: 20 cm
- Sowing rate: 15 - 20 kg of selected seed per acre
  - 37.5 - 50 kg per hectare
- Sowing depth : 2 – 3 cm
- Number of seeds per hill: 3-4

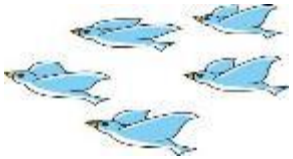

30cm
30cm
30cm
30cm




Guide rope
30cm
30cm
30cm
30cm
30cm

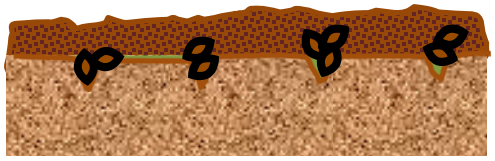
Uncovered

Covered



Damaged

Safe



Precaution of Sowing

- Sowing time: At the beginning of rainy season

  Avoid delayed sowing

  Standing water in the field inhibits germination

Precaution of Sowing

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

Pre-emergent Herbicide

- Apply pre-emergent herbicide when necessary.

- Apply the herbicide on the same day of sowing or within 2 days after sowing.

1 acre

Pre-emergent Herbicide

- *Pendimethaline* (ACTIVUS 500 EC)

Volume of ACTIVUS : 1L / acre

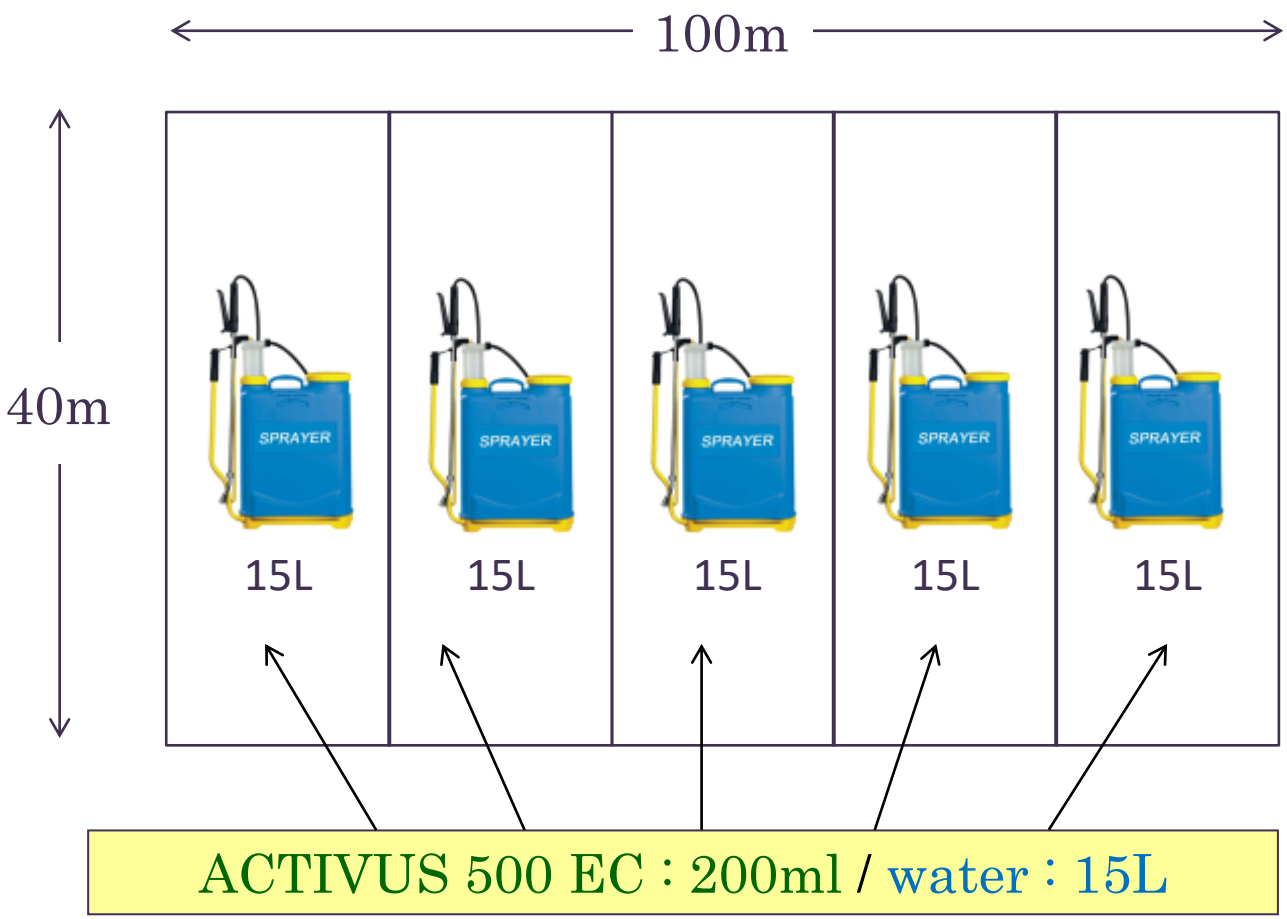
Volume of water : 80L / acre

For 1 acre, use knapsack sprayer

ACTIVUS :200ml / water:15L × 5 rounds

1 acre

Herbicide Application



1/4 acre

Pre-emergent Herbicide

- *Pendimethaline* (ACTIVUS 500 EC)

Volume of ACTIVUS : 300mL / 1/4acre

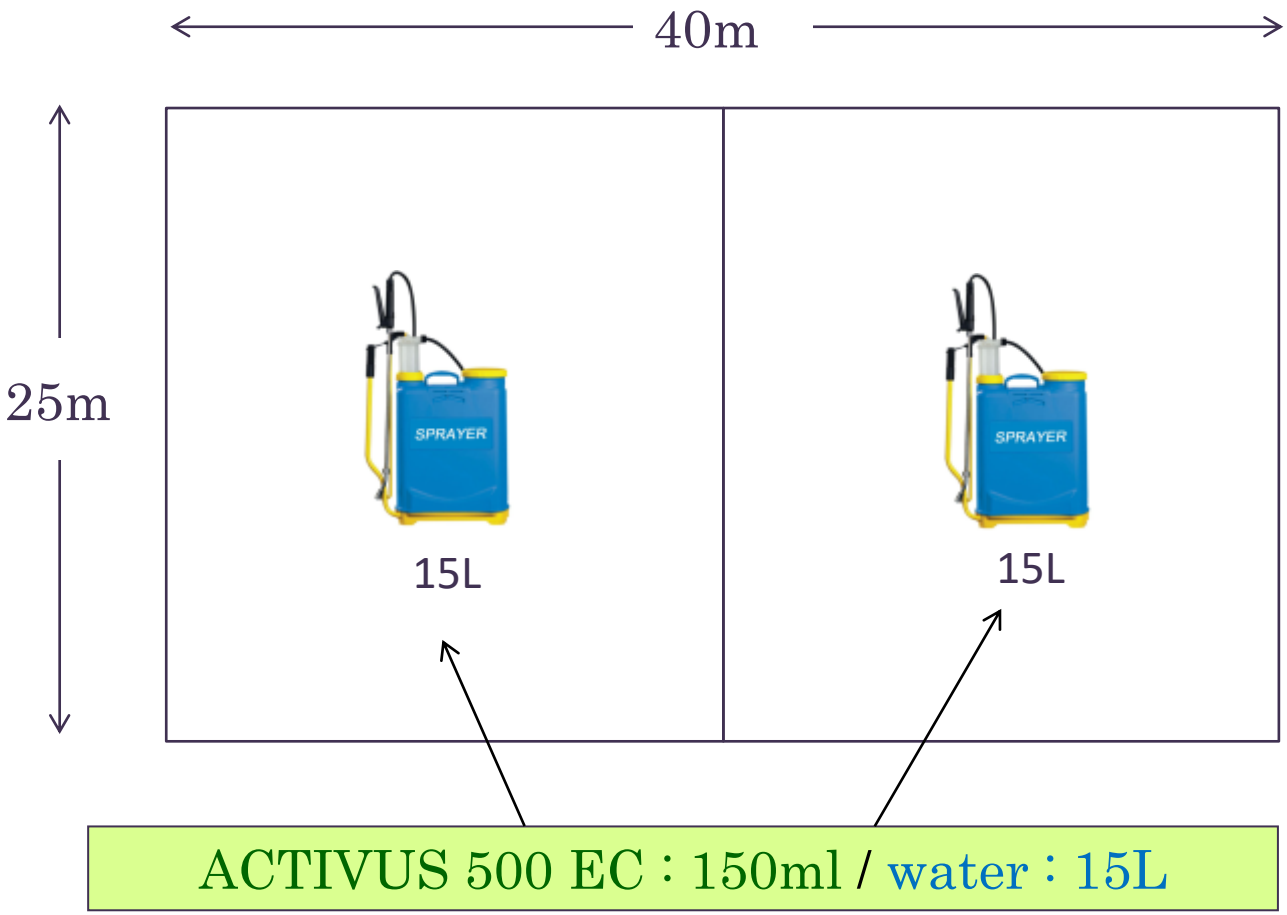
Volume of water : 30L / 1/4acre

For 1/4 acre, use knapsack sprayer

ACTIVUS :150ml / water:15L × 2 rounds

1/4 acre

Herbicide Application



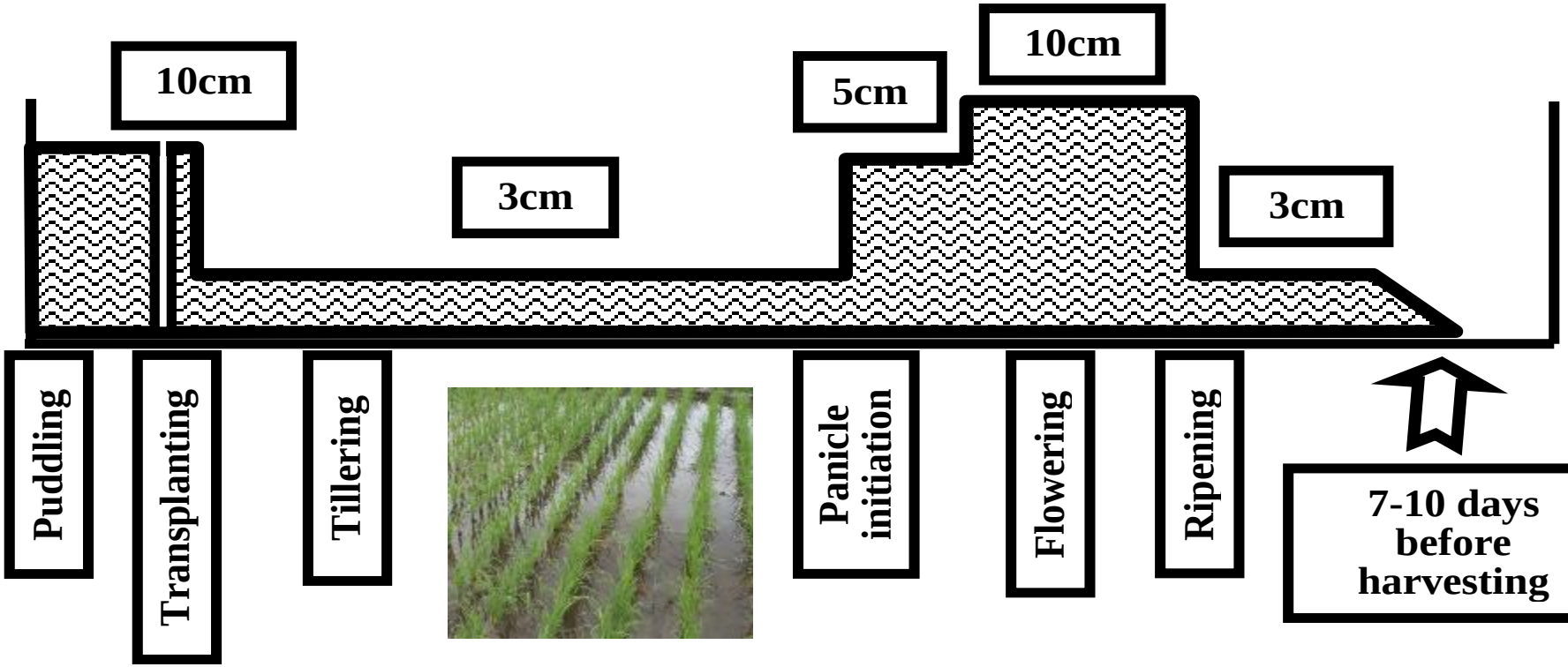
On-farm Water Management

Water level

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

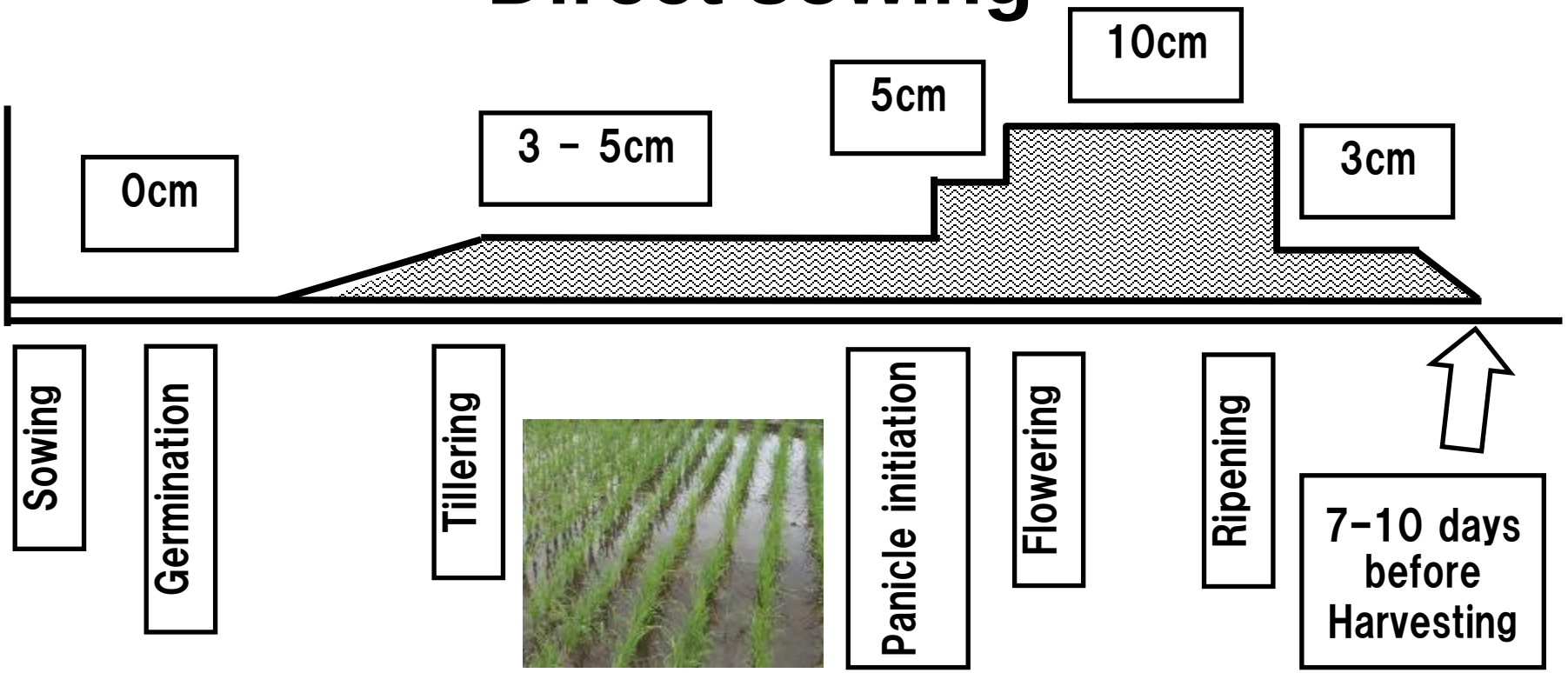
Water level in the field

Transplanting



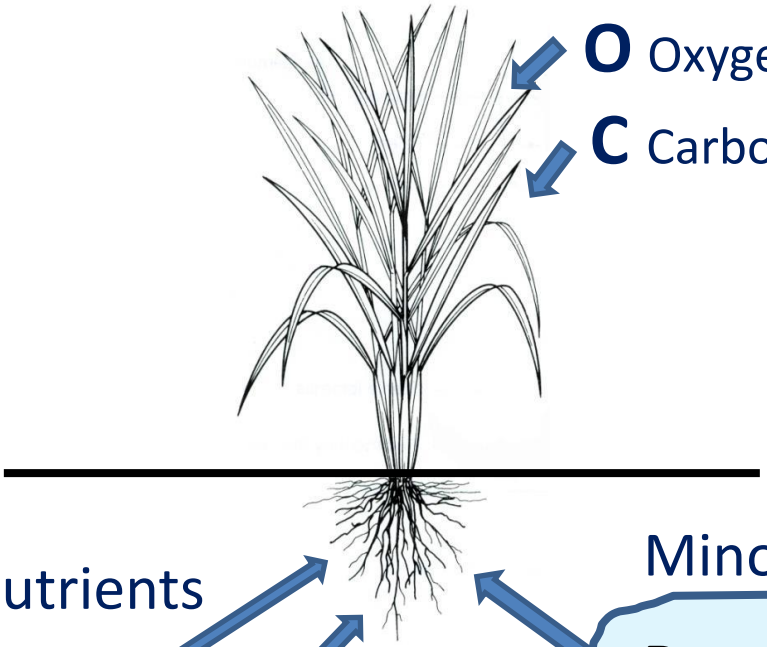
Water level in the field

Direct sowing



Fertilizer Management

Nutrients needed by the rice plant



O Oxygen

C Carbon

Major mineral nutrients

N Nitrogen

P Phosphorus

K Potassium

Minor mineral nutrients

B Boron

Ca Calcium

Cu Copper

H Hydrogen

Fe Iron

Mg Magnesium

Mn Manganese

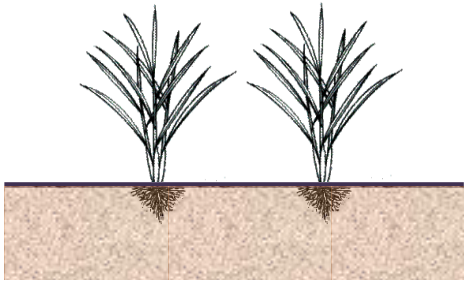
Mo Molybdenum

Si Silicon

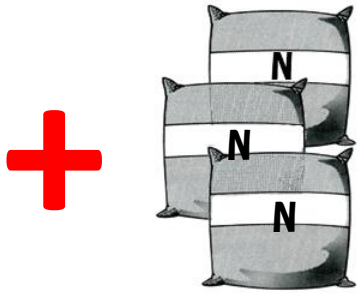
S Sulfur

Zn Zinc

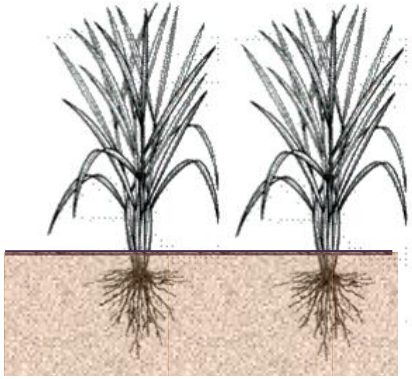
Soil fertility (Non fertile)



Non fertile soil



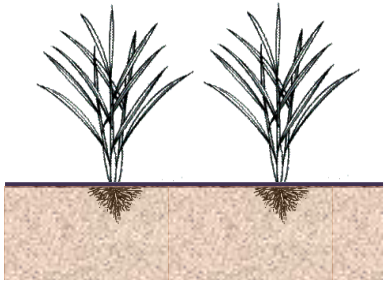
Right amount of nitrogen needed



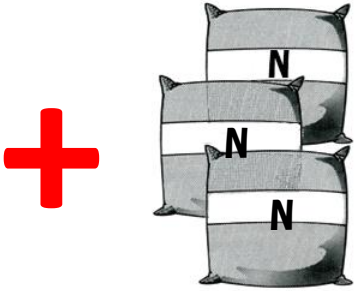
Optimum nitrogen
Optimum growth

- The right nitrogen level in the soil results in the optimum leaf area, tiller number, and proper light distribution and therefore higher grain yield
- Field trials can determine the right amount of nitrogen fertilizer needed.

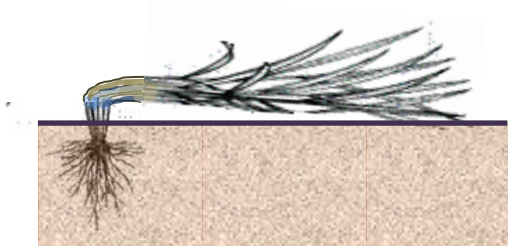
Soil fertility (fertile)



Fertile soil



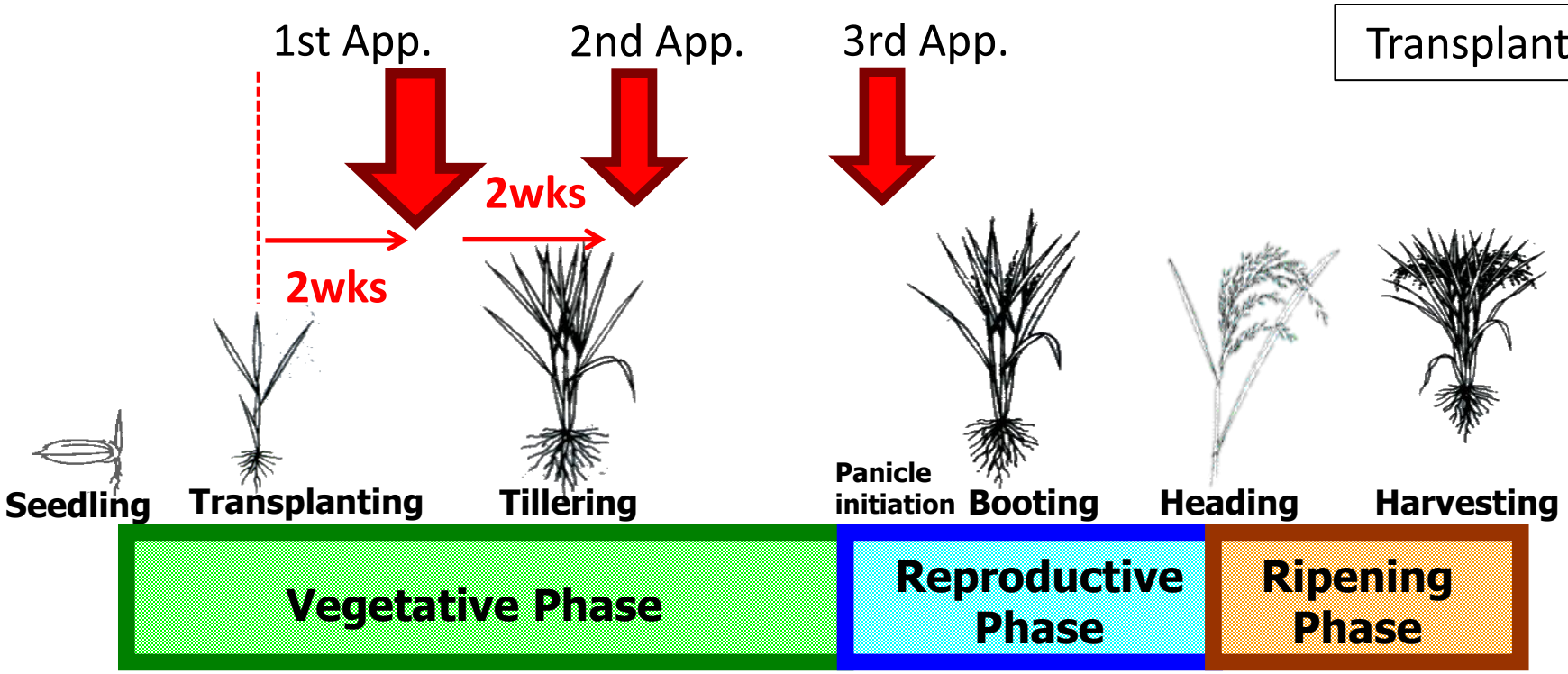
Large amount of nitrogen



Excess nitrogen

- Excess nitrogen fertilizer in the soil cause too much vegetative growth, resulting in poor light distribution and lodging.

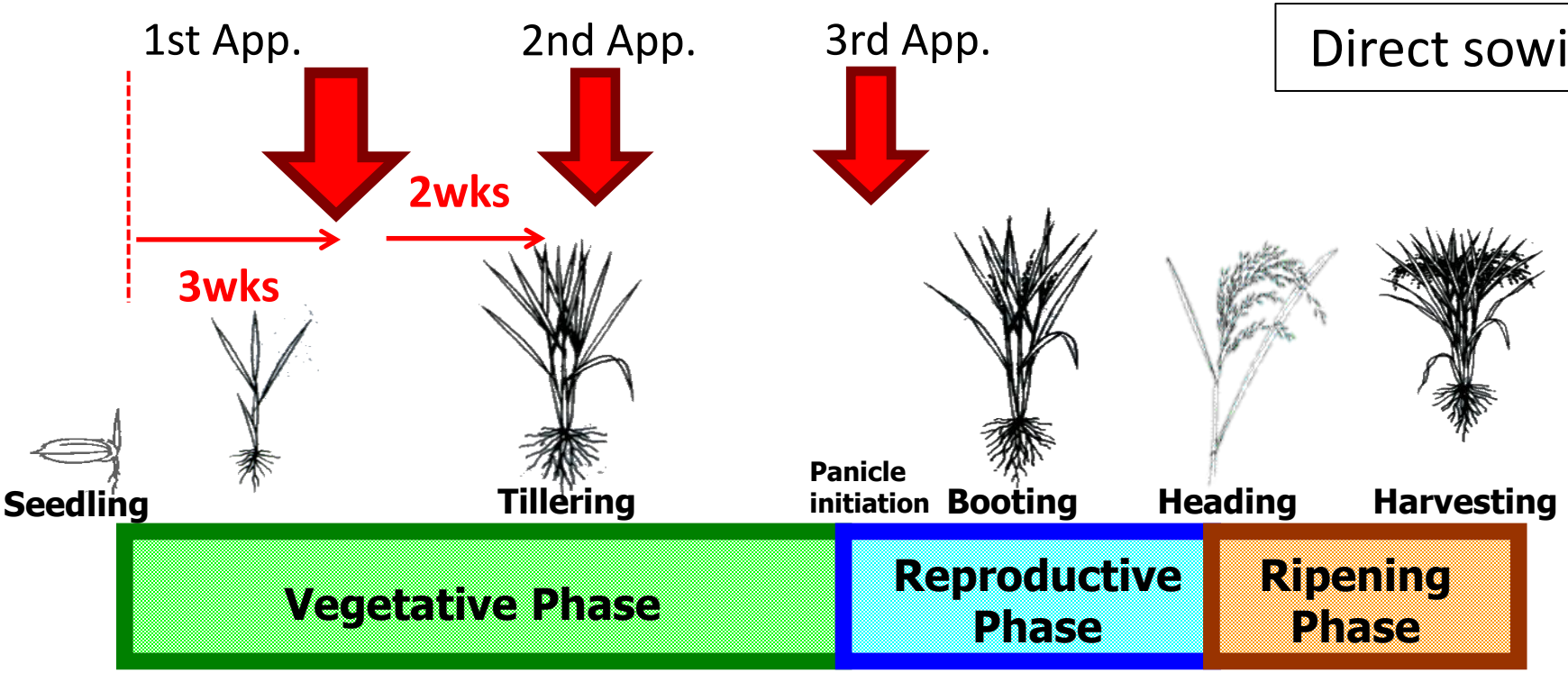
Apply fertilizer at correct growth stage



Application	Growth stage	Yield Component
1st Application	Tillering Stage	Panicle Number
2nd Application	Tillering Stage	Panicle Number
3rd Application	Panicle formation Stage	Number of Grain per Panicle

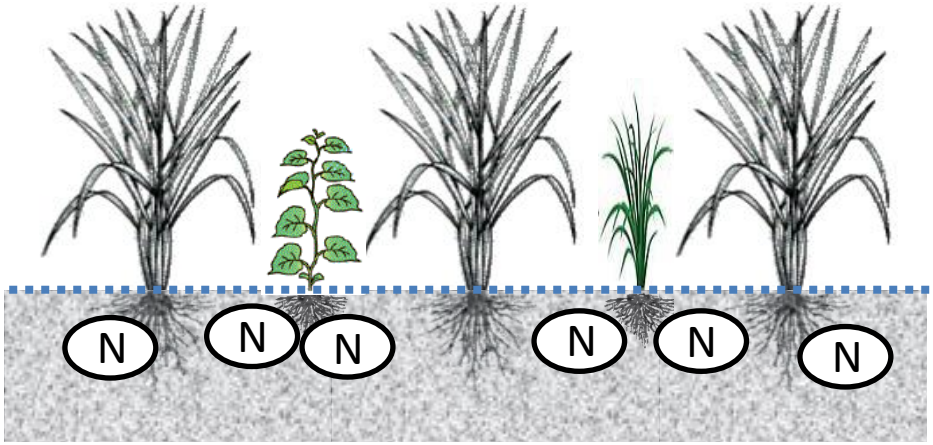
Apply fertilizer at correct growth stage

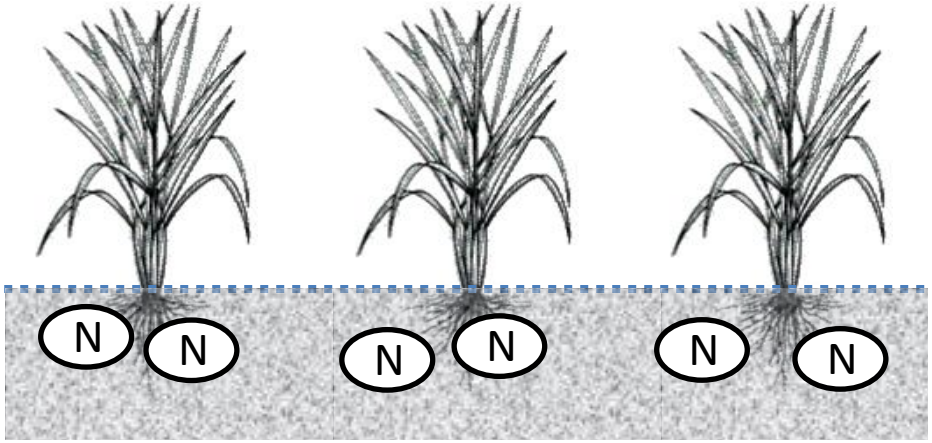
Direct sowing



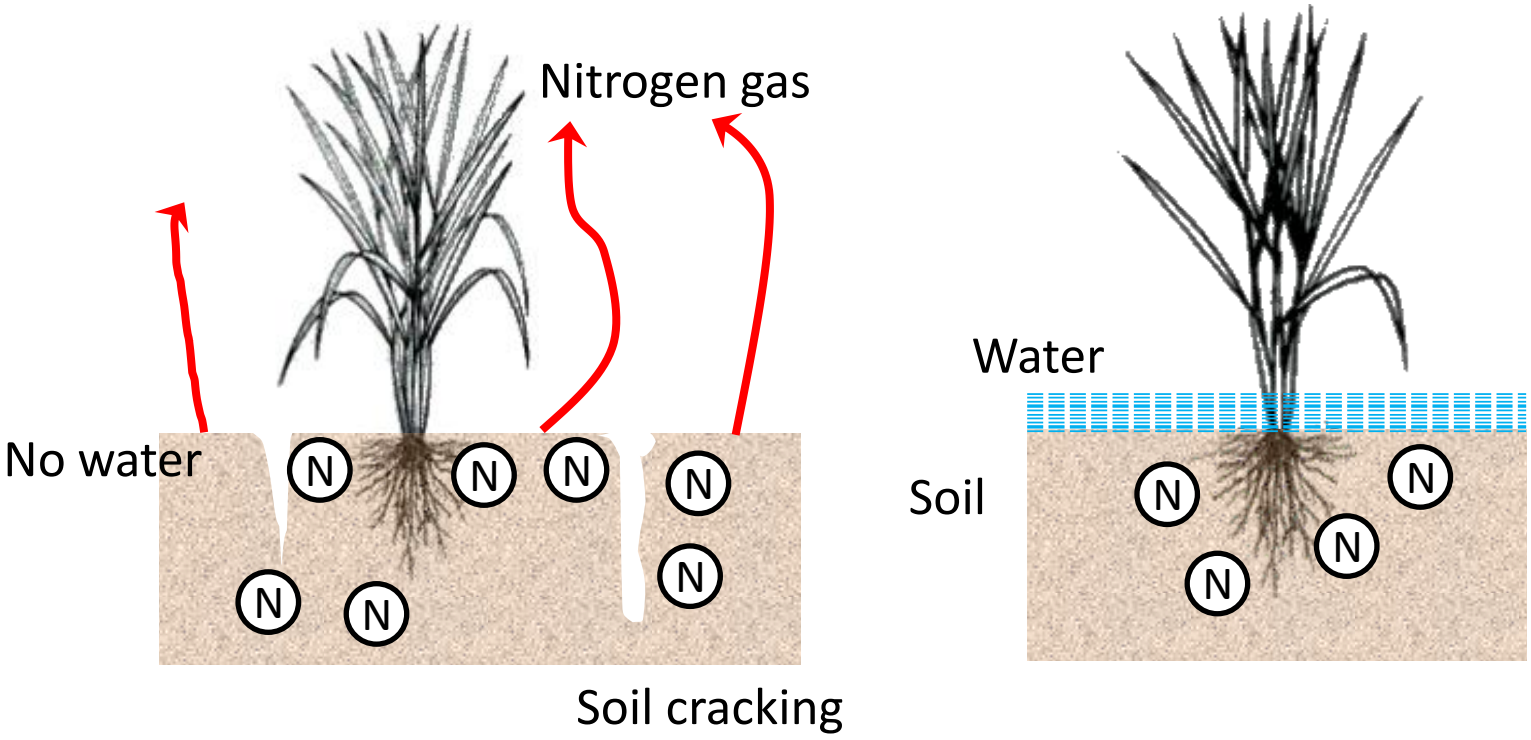
Application	Growth stage	Yield Component
1st Application	Tillering Stage	Panicle Number
2nd Application	Tillering Stage	Panicle Number
3rd Application	Panicle formation Stage	Number of Grain per Panicle

Ensure the field free from weeds

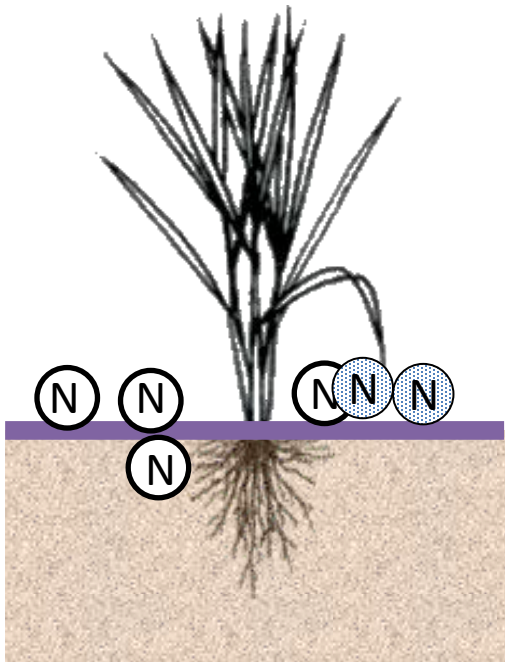




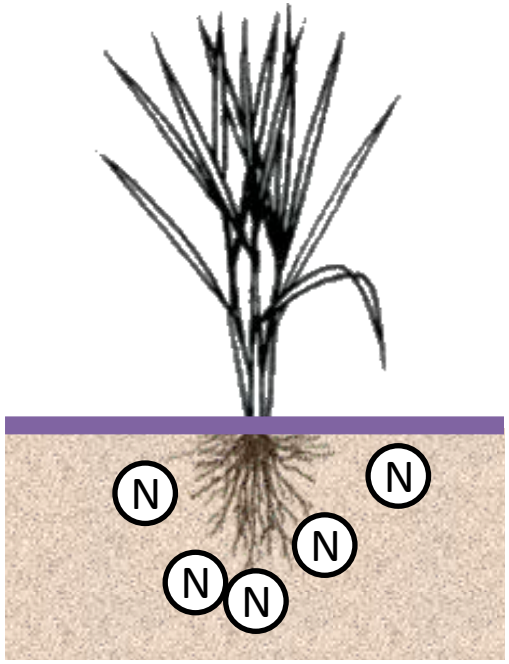
Prevent the field from drying out



Mix the fertilizer into the soil

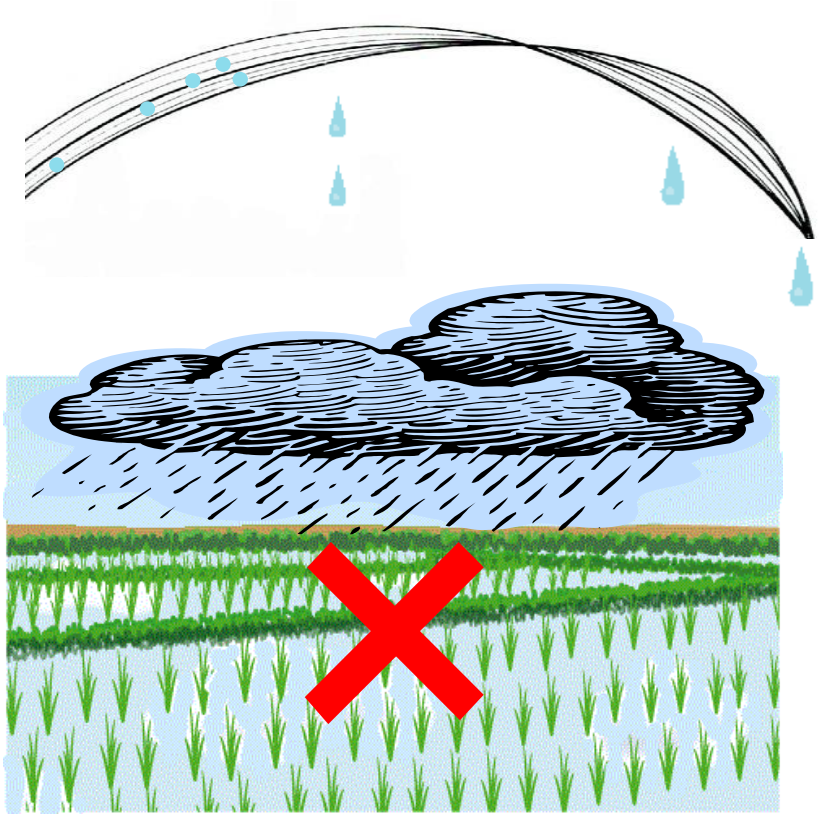


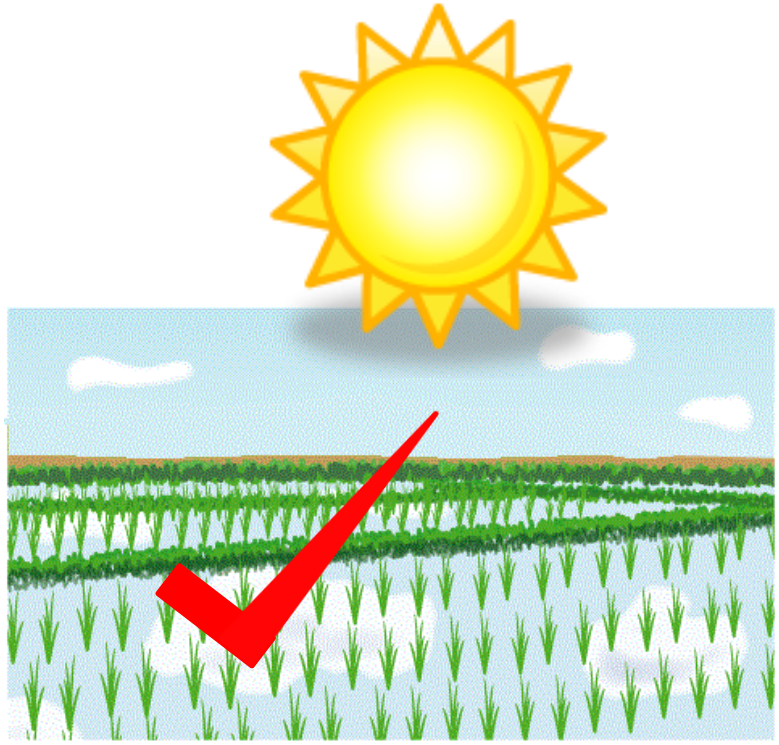
Fertilizer applied on top of the soil



Fertilizer mixed into the soil

Do not apply fertilizers when leaves are wet





How to increase the efficiency of nitrogen fertilizer

- Apply the right amount of fertilizer
- Use improved variety
- Apply fertilizer at correct growth stage
- Keep the field free from weeds
- Prevent the field from drying out
- Mix the fertilizer into the soil
- Do not topdress when leaves are wet

Apply the right amount of fertilizer

The right amount of fertilizer will depend on

- Soil fertility
- Yield potential of the variety
- Fertilizer price
- Time and method of application

Fertilizer Calculation

Objective

To be able to compute the correct amount of fertilizer material (FM) to be applied to a given area at the recommended rate.

1. Introduction

Fertilizer is an important but expensive input for rice, hence for production of rice; farmers must judiciously use fertilizers.

2. Important Definitions

- Fertilizer calculation: is the conversion of the recommended rate (RR) into correct amounts of fertilizer material (FM).
- Fertilizer recommended rate (RR): is the amount of fertilizer nutrient to be applied to the field to achieve the expected yield.

3. Recommended Rate

- On the numbering system:

  60-30-30 or 60+30+30 which means that 60kg **N**, 30kg **P** and 30kg **K** should be applied in 1ha .

4. Single Fertilizer

- Material containing only one fertilizer element

  - Example

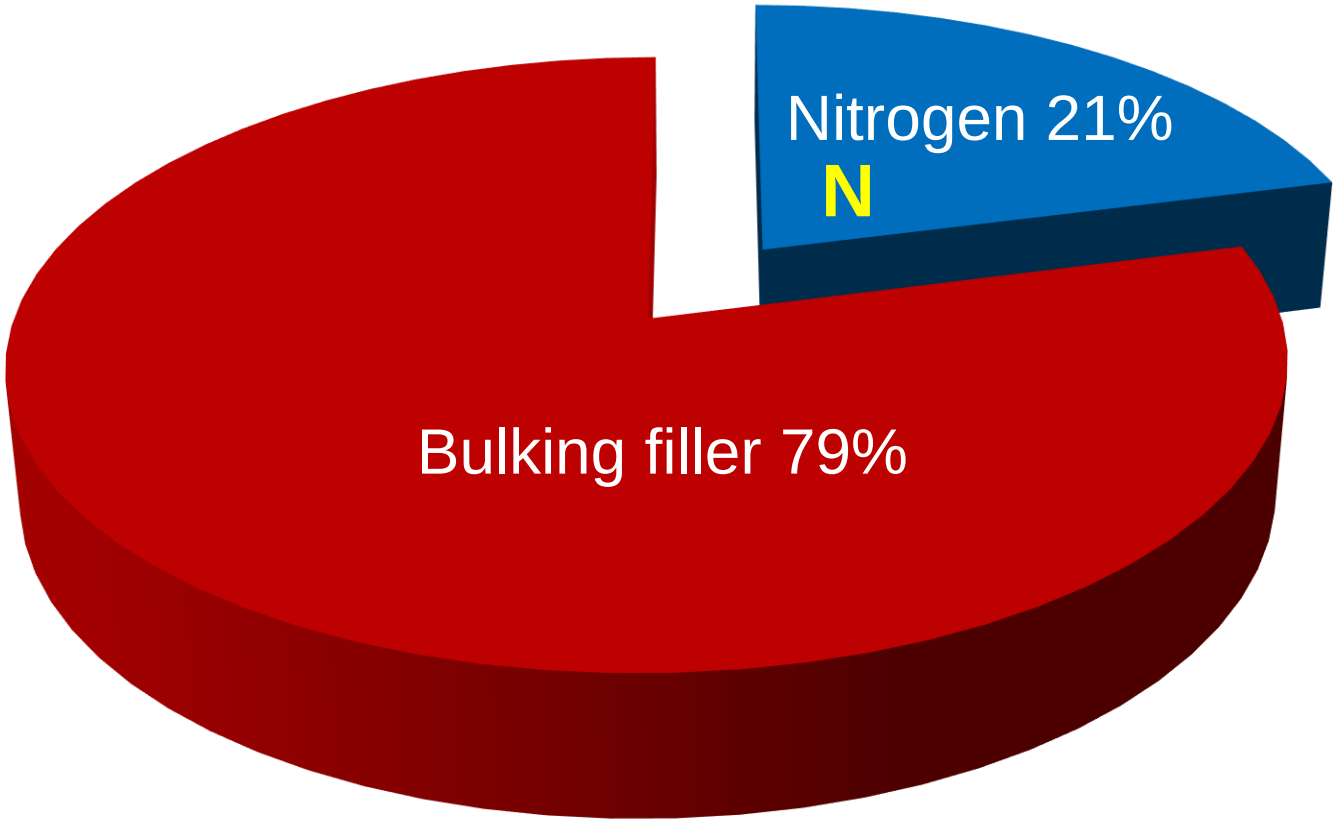
    Ammonium Sulfate $[(NH4)_2\ SO_4]$ contains

    21% **N**

4. Single Fertilizer

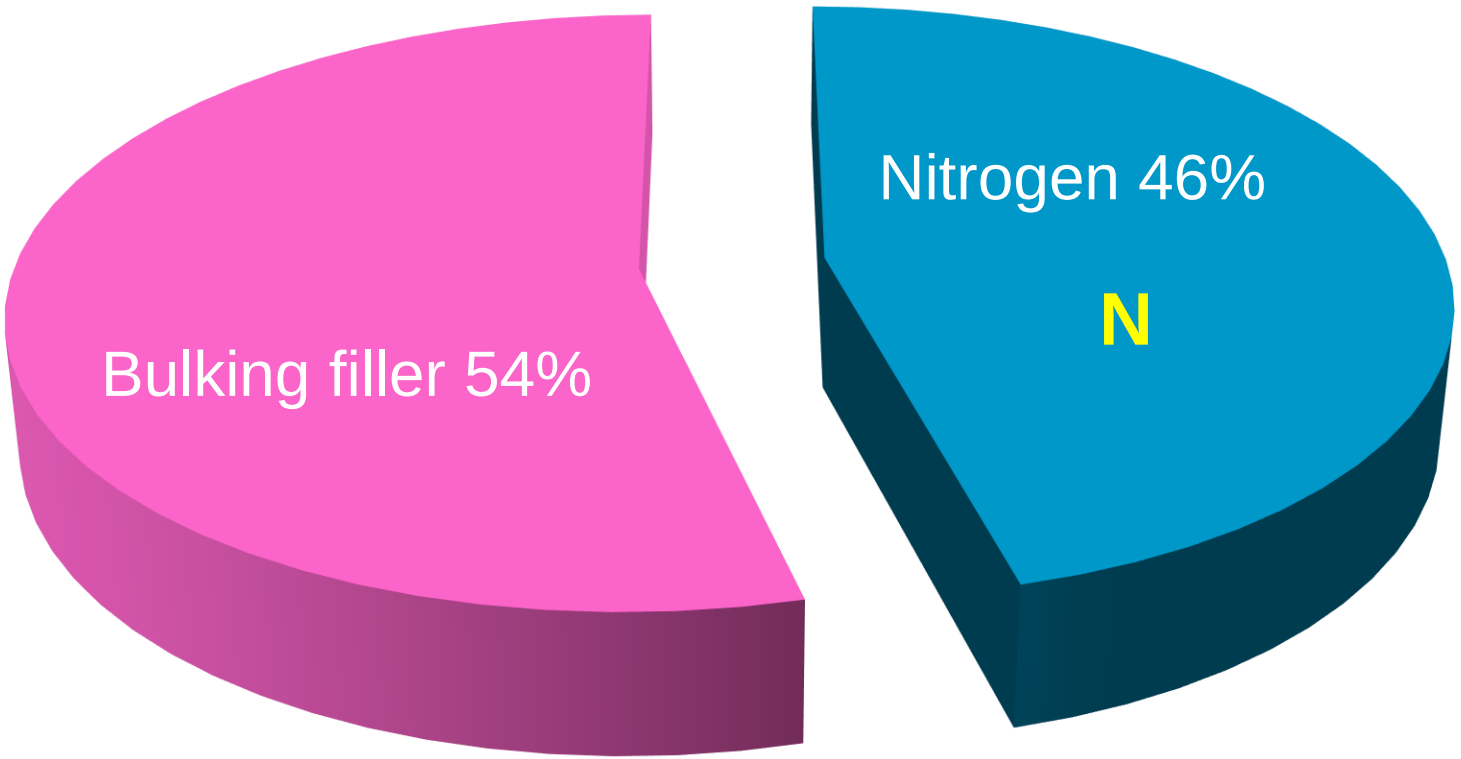
Ingredients of chemical fertilizer

SoA $[(NH_4)_2SO_4]$ (N21%)



4. Single Fertilizer

Ingredients of chemical fertilizer Urea (N 46%)



5. Compound Fertilizer

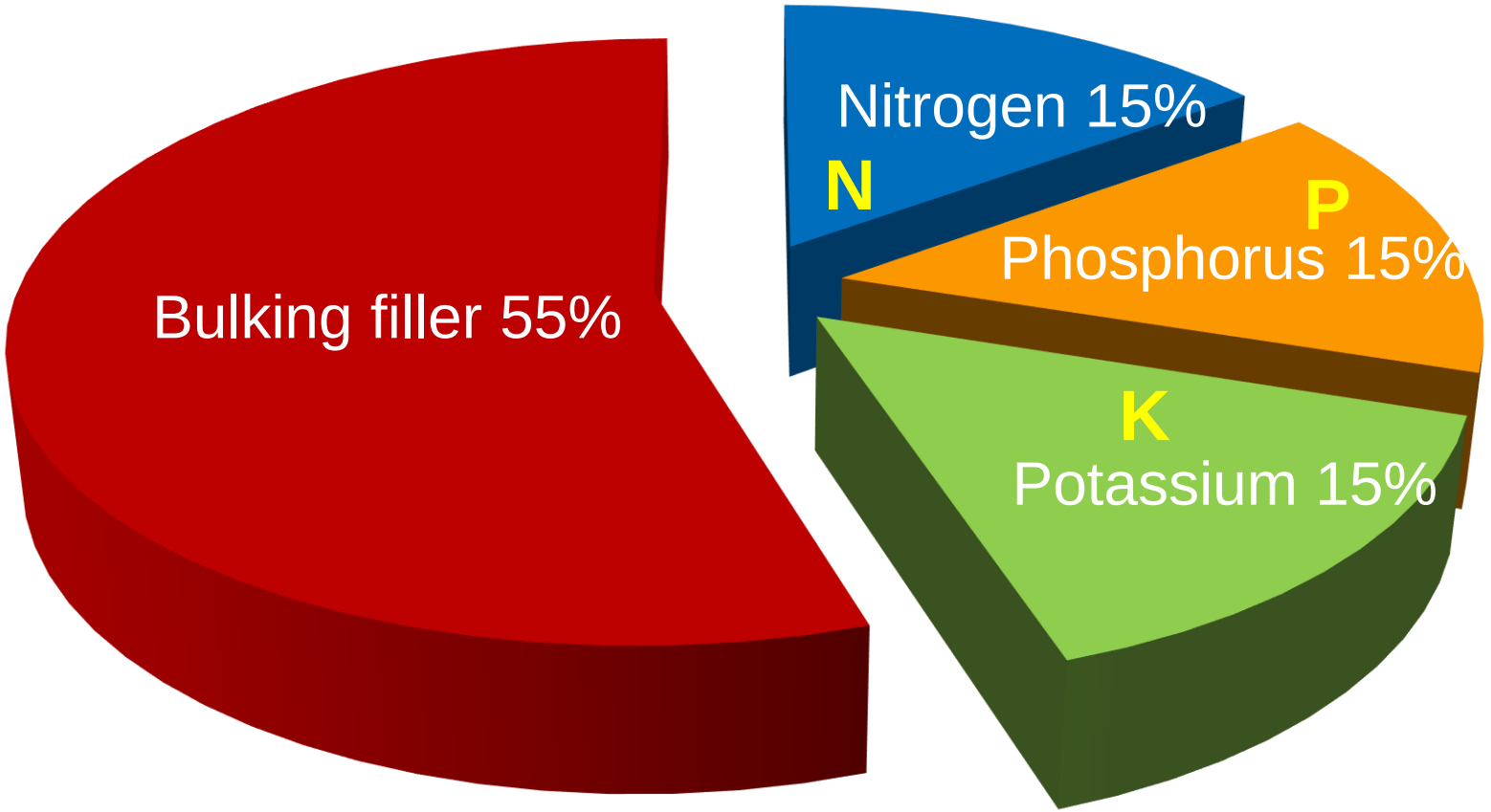
- It contains two or more major elements **N**, **P** and **K**.

  - Example

    15-15-15, 16-16-16 or 23-10-5

5. Compound Fertilizer

Ingredients of chemical fertilizer N-P-K (15-15-15)



Amount of applied fertilizer for **1 ha** (10,000m^2) (60 - 30 - 30)

Frequency	Type of fertilizer (%)	Amount of application (kg/ha)	Application level of Nitrogen (kg/ha)
1st	N-P-K (15-15-15)	200	30
2nd	Ammonium sulphate (N:21%)	71	15
3rd		71	15
Total			60

Amount of applied fertilizer for **1 ha** (10,000m^2) (60 - 30 - 30)

Frequency	Type of fertilizer (%)	Amount of application (kg/ha)	Application level of Nitrogen (kg/ha)
1st	N-P-K (15-15-15)	200	30
2nd	Urea (N:46%)	33	15
3rd		33	15
Total			60

Amount of applied fertilizer **1 acre** (4,000m^2) (60 - 30 - 30)

Frequency	Type of fertilizer (%)	Amount of application (kg/acre)	Application level of Nitrogen (kg/ha)
1st	N-P-K (15-15-15)	80	30
2nd	Ammonium sulphate (N:21%)	29	15
3rd		29	15
Total			60

Amount of applied fertilizer **1 acre** (4,000m^2) (60 - 30 - 30)

Frequency	Type of fertilizer (%)	Amount of application (kg/acre)	Application level of Nitrogen (kg/ha)
1st	N-P-K (15-15-15)	80	30
2nd	Urea (N:46%)	13	15
3rd		13	15
Total			60

Amount of applied fertilizer for **1/4 acre** (1,000m^2) (60 - 30 - 30)

Frequency	Type of fertilizer (%)	Amount of application (kg/ 1/4acre)	Application level of Nitrogen (kg/ha)
1st	N-P-K (15-15-15)	20	30
2nd	Ammonium sulphate (N:21%)	7	15
3rd		7	15
Total			60

Amount of applied fertilizer for **1/4 acre** (1,000m^2) (60 - 30 - 30)

Frequency	Type of fertilizer (%)	Amount of application (kg/ 1/4acre)	Application level of Nitrogen (kg/ha)
1st	N-P-K (15-15-15)	20	30
2nd	Urea (N:46%)	3	15
3rd		3	15
Total			60

Calculation of applied fertilizer

- Area size (m^2) ---------- a
- Application level (kg/ha) ----- b
- Percentage of N (%) ---------- c
- Amount of application (kg) -- d

Calculation Formula:

$$d\ (kg) = \frac{b}{c} \times 100 \times \frac{a}{10{,}000}$$

My field size is 1/2 acre.

And the recommended rate of the Nitrogen application is 30kg/ ha.

LET'S PRACTICE !

Practice 1

a) Area size : 1/2 acre → _____m^2

b) Application level of N : 30 kg / ha

c) Percentage of N (%) : Urea → _____%

d) How much kg of Urea to apply?

Calculation

$$\mathrm{d\ (kg)} = \frac{\mathrm{b}}{\mathrm{c}} \times 100 \times \frac{\mathrm{a}}{10{,}000}$$

OK, the amount of <u>applied Nitrogen</u> to my field is 20kg/ha.

I have 1 acre of field.

I apply SoA.

How much fertilizer do I need?

LET'S PRACTICE !

Practice 2

a) Area size : 1 acre → _____m^2

b) Application level of N : 20 kg / ha

c) Percentage of N (%) : SoA → _____%

d) How much kg of SoA to apply?

Calculation

$$\mathrm{d\ (kg)} = \frac{\mathrm{b}}{\mathrm{c}} \times 100 \times \frac{\mathrm{a}}{10{,}000}$$

WORK FOR 5 MINUTES

Calculation of applied fertilizer

ANSWER

Practice 1

- Area size (m^2) ---------- a 2,000 m^2
- Application level (kg/ha) ------ b 30 kg / ha
- Percentage of N (%) ---------- c 46 %
- Amount of application (kg) --- d

Calculation:

$$\text{d (kg)} = \frac{\text{(b) } 30}{\text{(c) } 46} \times 100 \times \frac{\text{(a) } 2{,}000}{10{,}000}$$

$$= 13 \text{ kg}$$

Calculation of applied fertilizer

ANSWER

Practice 2

- Area size (m^2) ---------- a 4,000 m^2
- Application level (kg/ha) ------ b 20 kg / ha
- Percentage of N (%) ---------- c 21 %
- Amount of application (kg) -- d

Calculation:

$$d\ (kg) = \frac{(b)\ 20}{(c)\ 21} \times 100 \times \frac{(a)\ 4{,}000}{10{,}000}$$

$$= 38\ kg$$

20 kg

Rubber bucket

1.5 kg

Tin of tomato paste
Size: 2.2kg

200 kg

50kg 50kg 50kg 50kg

80 kg

50kg 50kg - 20kg

71 kg

50kg 20kg 1kg

20 kg

Rubber bucket

1.5 kg

Tin of tomato paste
Size: 2.2kg

33 kg

50kg - 20kg 3kg

29 kg (≈30kg)

50kg - 20kg

29 kg

20kg 9kg

1.5 kg

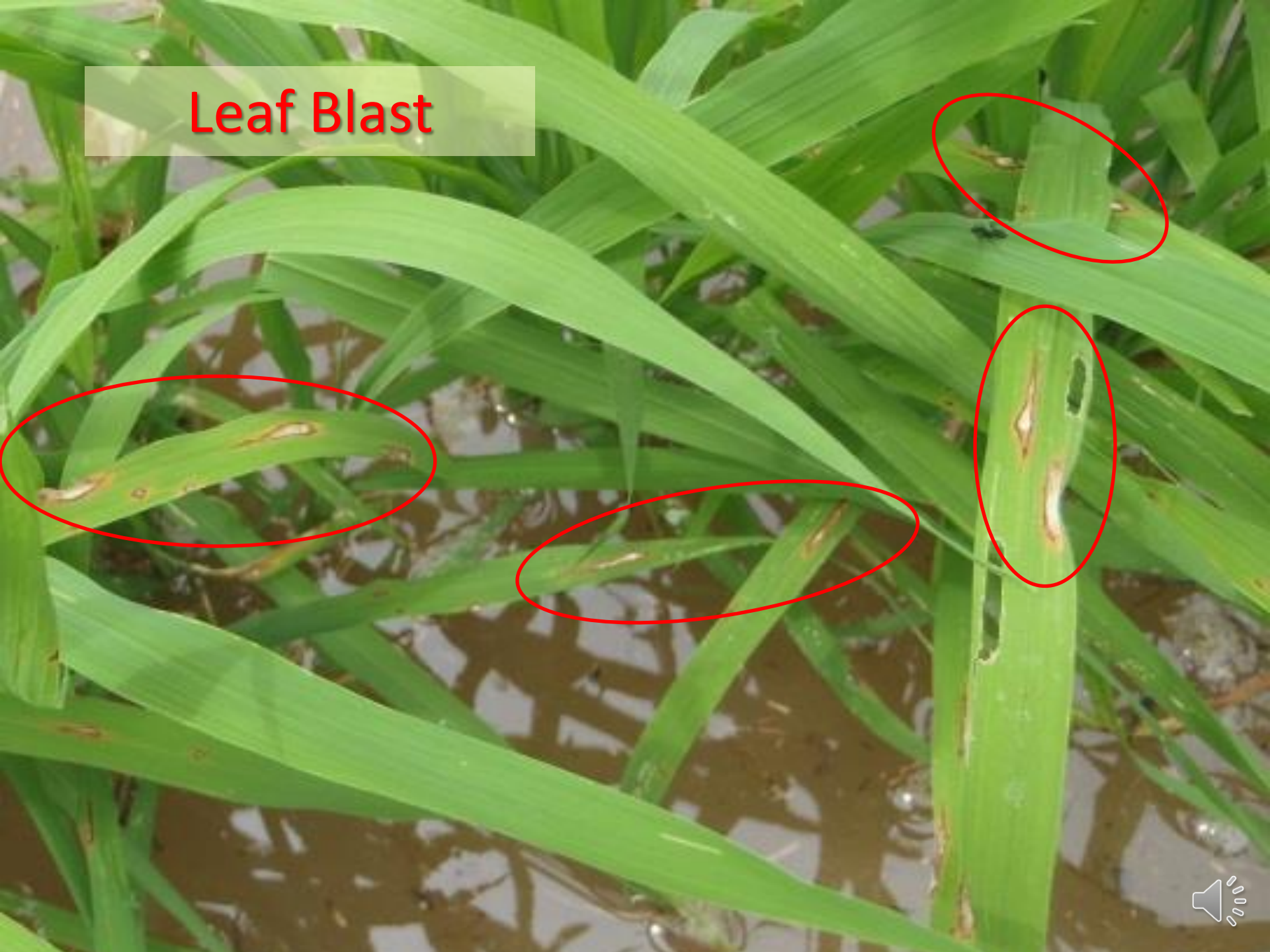
Tin of tomato paste
Size: 2.2kg

13 kg

6 kg

3 kg

Disease Control


Leaf Blast


Leaf Blast

Panicle Blast


Blast spread in the field


Blast spread in the field

Conditions suitable for the development of “Blast”

- Low-temperature (below 18 °C)
- High-temperature (25 – 28 ° C)
- High-humidity
- Less sunlight (Cloudy, Rainy)
- Excessive fertilizer application

Non-chemical Control for "Blast"

- Select disease tolerant Variety

  Jasmine 85 is not disease tolerant
  AGRA is disease tolerant

- Avoid the use of diseased seed
- Proper seed selection

  Hot water treatment

- Avoid excessive fertilizer application

Chemical Control (Fungicide) by Seed treatment for “Blast”

- At a time of <u>seed soaking</u>

TOPS-M 70% WP 300-fold, 24 hours
(THIOPSIN 70% WP)

Active ingredients*: Thiophanete methyl*

or

BENDAZIM 50WP 400-fold, 24 hours

Active ingredients ; *Carbendazim*

Chemical Control (Fungicide) by Seed treatment for “Blast”

- TOPS-M 70% WP 300-fold, 24 hours
（THIPSIN 70% WP）

TOPS-M 70% WP
(THIPSON 70% WP)
33 g

Water
10 L

Seed

Seed
Selection

1st day of seed soaking
(24 hours)

Water

Seed

Seed soaking in water
(2 - 3 days)

Chemical Control (Fungicide) by Seed treatment for “Blast”

- BENDAZIM 50WP 400-fold, 24 hours

BENDAZIM 50WP
25 g

Water
10 L

Seed

Seed
Selection

1st day of seed soaking
(24 hours)

Water

Seed

Seed soaking in water
(2 - 3 days)

Effective Active Ingredients for Seed Treatment for “Blast”

- Benomyl
- Carbendazim
- Fludioxionil
- Ipconazole
- Pefurazoate
- Prochlorazle
- Thiophanete methyl
- Thirum
- Triflumizole

Chemical Control for Nursery for “Blast”

- Nursery Application *# if symptoms appear*

TOPS-M 70% WP 1,000-fold, 5 L / 50 m^2
（THIPOSIN 70% WP)

Active ingredients*: Thiophanete methyl*

or

BENDAZIM 50WP 1,500-fold, 4 L / 50 m^2

Active ingredients ; *Carbendazim*


Virus Disease
by insect transmitted virus


Virus Disease
by insect transmitted virus


Virus Disease
by insect transmitted virus

Virus Disease

by insect transmitted virus

The yellowing of leaves starts from the tip of lower leaves.

Plants become stunted and the number of tillers is reduced.

Virus Disease

by insect transmitted virus

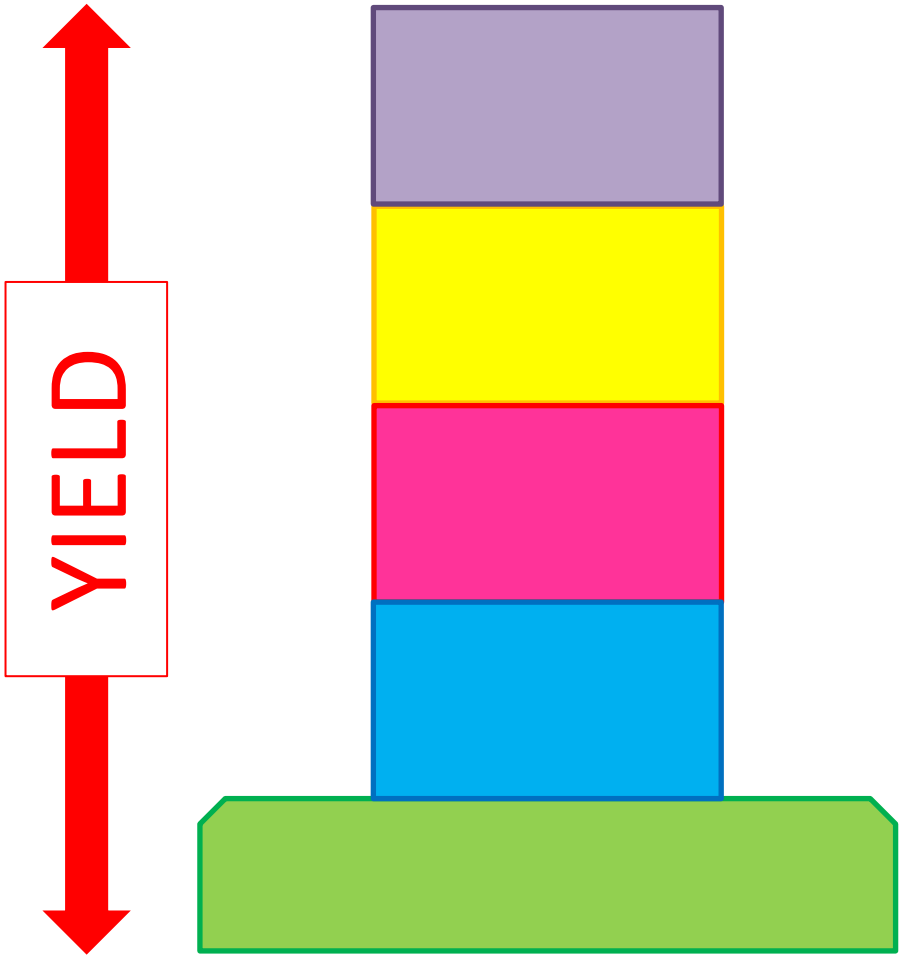
This type of diseases are transmitted by *hoppers or beetles*.

If symptoms appear, apply insecticide.

Although damaged plants cannot recover again, further spreading of diseases can be prevented.

Weed Control

IMAGE OF YIELD



Line Planting/Sowing

High Quality Seed

Fertilizer Application

Water Management

Weed control

Face

Weed Control

Transplanting

Trans planting

1st Weeding

2nd Weeding

2 weeks

2 weeks

Weed Control

Weeding by Push Weeder

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

Weed Control

Direct sowing

Sowing

1st Weeding

2nd Weeding

3 weeks

2 weeks

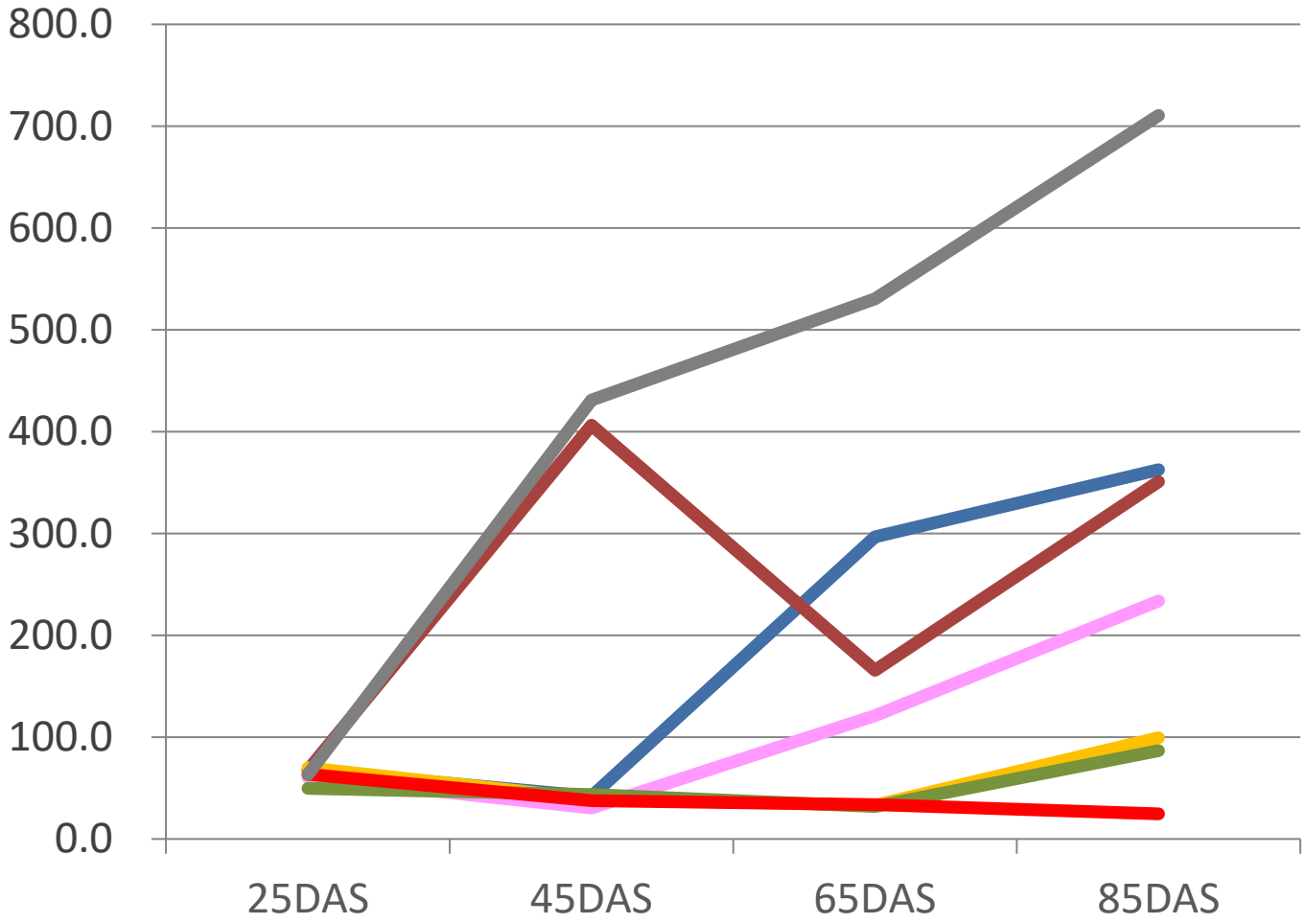
Weed Control
(Direct sowing)

In case of direct sowing;

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

Weed control must be ensured every cropping season.

Weed Dry Matter (Biomass) (g/m²)



HW: Hoe weeding
DAS: Days after sowing
Fb: Followed by

- HW at 25 DAS
- HW at 45 DAS
- Orizo plus at 25DAS
- HW at 25 and 45 DAS
- HW at 25 DAS Fb Orizo plus at 45 DAS
- HW at 25, 45 and 65 DAS
- No weeding

American Journal of Experimental Agriculture
1(4): 174-186, 2011

SCIENCEDOMAIN *international*
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Weeding
(Direct sowing)

- At least 2 times
  3 weeks and 5 weeks after sowing

- First weeding must be done in time.
  within 3weeks after sowing

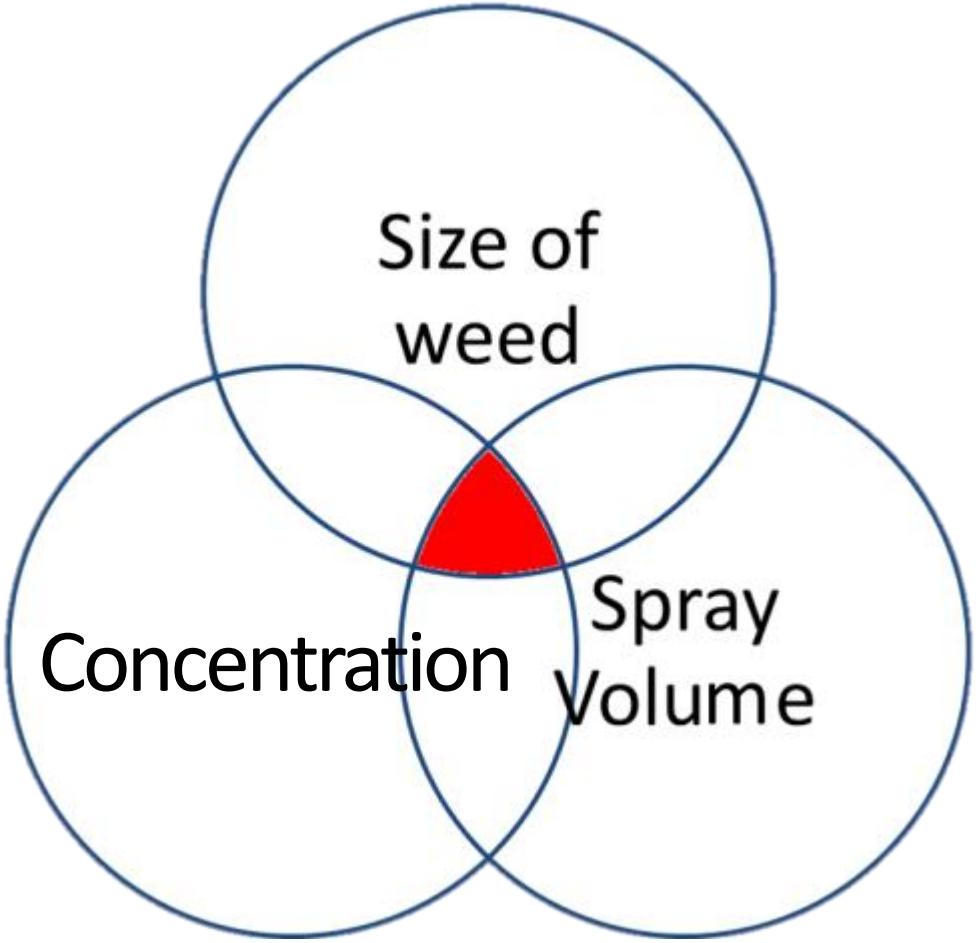
- Hoe weeding in 1st weeding and herbicide in 2nd weeding can be integrated in direct sowing method.

- Pre-emergence type herbicide is effective in the field in which soil moisture is higher but water is not standing.

- Regardless of the above, weeding must be done as necessary.

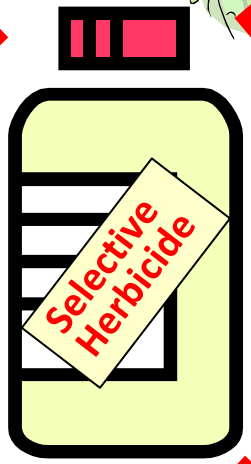
Weed Control

3 indispensable conditions that herbicides work well



Not Effective

Effective partially



Effective

Effective

Table1: Quick reference matrix of amount of applied Nitrogen (kg)

Application level of Nitrogen (kg/ha)	Area size (m^2)											
	100	200	500	**1,000**	2,000	3,000	**4,000**	5,000	6,000	8,000	**10,000**	20,000
1	0.01	0.02	0.05	**0.1**	0.2	0.3	**0.4**	0.5	0.6	0.8	**1**	2
2	0.02	0.04	0.10	**0.2**	0.4	0.6	**0.8**	1.0	1.2	1.6	**2**	4
3	0.03	0.06	0.15	**0.3**	0.6	0.9	**1.2**	1.5	1.8	2.4	**3**	6
4	0.04	0.08	0.20	**0.4**	0.8	1.2	**1.6**	2.0	2.4	3.2	**4**	8
5	0.05	0.10	0.25	**0.5**	1.0	1.5	**2.0**	2.5	3.0	4.0	**5**	10
6	0.06	0.12	0.30	**0.6**	1.2	1.8	**2.4**	3.0	3.6	4.8	**6**	12
7	0.07	0.14	0.35	**0.7**	1.4	2.1	**2.8**	3.5	4.2	5.6	**7**	14
8	0.08	0.16	0.40	**0.8**	1.6	2.4	**3.2**	4.0	4.8	6.4	**8**	16
9	0.09	0.18	0.45	**0.9**	1.8	2.7	**3.6**	4.5	5.4	7.2	**9**	18
10	0.10	0.20	0.50	**1.0**	2.0	3.0	**4.0**	5.0	6.0	8.0	**10**	20
11	0.11	0.22	0.55	**1.1**	2.2	3.3	**4.4**	5.5	6.6	8.8	**11**	22
12	0.12	0.24	0.60	**1.2**	2.4	3.6	**4.8**	6.0	7.2	9.6	**12**	24
13	0.13	0.26	0.65	**1.3**	2.6	3.9	**5.2**	6.5	7.8	10.4	**13**	26
14	0.14	0.28	0.70	**1.4**	2.8	4.2	**5.6**	7.0	8.4	11.2	**14**	28
15	0.15	0.30	0.75	**1.5**	3.0	4.5	**6.0**	7.5	9.0	12.0	**15**	30
16	0.16	0.32	0.80	**1.6**	3.2	4.8	**6.4**	8.0	9.6	12.8	**16**	32
17	0.17	0.34	0.85	**1.7**	3.4	5.1	**6.8**	8.5	10.2	13.6	**17**	34
18	0.18	0.36	0.90	**1.8**	3.6	5.4	**7.2**	9.0	10.8	14.4	**18**	36
19	0.19	0.38	0.95	**1.9**	3.8	5.7	**7.6**	9.5	11.4	15.2	**19**	38
20	0.20	0.40	1.00	**2.0**	4.0	6.0	**8.0**	10.0	12.0	16.0	**20**	40
21	0.21	0.42	1.05	**2.1**	4.2	6.3	**8.4**	10.5	12.6	16.8	**21**	42
22	0.22	0.44	1.10	**2.2**	4.4	6.6	**8.8**	11.0	13.2	17.6	**22**	44
23	0.23	0.46	1.15	**2.3**	4.6	6.9	**9.2**	11.5	13.8	18.4	**23**	46
24	0.24	0.48	1.20	**2.4**	4.8	7.2	**9.6**	12.0	14.4	19.2	**24**	48
25	0.25	0.50	1.25	**2.5**	5.0	7.5	**10.0**	12.5	15.0	20.0	**25**	50
26	0.26	0.52	1.30	**2.6**	5.2	7.8	**10.4**	13.0	15.6	20.8	**26**	52
27	0.27	0.54	1.35	**2.7**	5.4	8.1	**10.8**	13.5	16.2	21.6	**27**	54
28	0.28	0.56	1.40	**2.8**	5.6	8.4	**11.2**	14.0	16.8	22.4	**28**	56
29	0.29	0.58	1.45	**2.9**	5.8	8.7	**11.6**	14.5	17.4	23.2	**29**	58
30	0.30	0.60	1.50	**3.0**	6.0	9.0	**12.0**	15.0	18.0	24.0	**30**	60
31	0.31	0.62	1.55	**3.1**	6.2	9.3	**12.4**	15.5	18.6	24.8	**31**	62
32	0.32	0.64	1.60	**3.2**	6.4	9.6	**12.8**	16.0	19.2	25.6	**32**	64
33	0.33	0.66	1.65	**3.3**	6.6	9.9	**13.2**	16.5	19.8	26.4	**33**	66
34	0.34	0.68	1.70	**3.4**	6.8	10.2	**13.6**	17.0	20.4	27.2	**34**	68
35	0.35	0.70	1.75	**3.5**	7.0	10.5	**14.0**	17.5	21.0	28.0	**35**	70
36	0.36	0.72	1.80	**3.6**	7.2	10.8	**14.4**	18.0	21.6	28.8	**36**	72
37	0.37	0.74	1.85	**3.7**	7.4	11.1	**14.8**	18.5	22.2	29.6	**37**	74
38	0.38	0.76	1.90	**3.8**	7.6	11.4	**15.2**	19.0	22.8	30.4	**38**	76
39	0.39	0.78	1.95	**3.9**	7.8	11.7	**15.6**	19.5	23.4	31.2	**39**	78
40	0.40	0.80	2.00	**4.0**	8.0	12.0	**16.0**	20.0	24.0	32.0	**40**	80
41	0.41	0.82	2.05	**4.1**	8.2	12.3	**16.4**	20.5	24.6	32.8	**41**	82
42	0.42	0.84	2.10	**4.2**	8.4	12.6	**16.8**	21.0	25.2	33.6	**42**	84
43	0.43	0.86	2.15	**4.3**	8.6	12.9	**17.2**	21.5	25.8	34.4	**43**	86
44	0.44	0.88	2.20	**4.4**	8.8	13.2	**17.6**	22.0	26.4	35.2	**44**	88
45	0.45	0.90	2.25	**4.5**	9.0	13.5	**18.0**	22.5	27.0	36.0	**45**	90
46	0.46	0.92	2.30	**4.6**	9.2	13.8	**18.4**	23.0	27.6	36.8	**46**	92
47	0.47	0.94	2.35	**4.7**	9.4	14.1	**18.8**	23.5	28.2	37.6	**47**	94
48	0.48	0.96	2.40	**4.8**	9.6	14.4	**19.2**	24.0	28.8	38.4	**48**	96
49	0.49	0.98	2.45	**4.9**	9.8	14.7	**19.6**	24.5	29.4	39.2	**49**	98
50	0.50	1.00	2.50	**5.0**	10.0	15.0	**20.0**	25.0	30.0	40.0	**50**	100
51	0.51	1.02	2.55	**5.1**	10.2	15.3	**20.4**	25.5	30.6	40.8	**51**	102
52	0.52	1.04	2.60	**5.2**	10.4	15.6	**20.8**	26.0	31.2	41.6	**52**	104
53	0.53	1.06	2.65	**5.3**	10.6	15.9	**21.2**	26.5	31.8	42.4	**53**	106
54	0.54	1.08	2.70	**5.4**	10.8	16.2	**21.6**	27.0	32.4	43.2	**54**	108
55	0.55	1.10	2.75	**5.5**	11.0	16.5	**22.0**	27.5	33.0	44.0	**55**	110
56	0.56	1.12	2.80	**5.6**	11.2	16.8	**22.4**	28.0	33.6	44.8	**56**	112
57	0.57	1.14	2.85	**5.7**	11.4	17.1	**22.8**	28.5	34.2	45.6	**57**	114
58	0.58	1.16	2.90	**5.8**	11.6	17.4	**23.2**	29.0	34.8	46.4	**58**	116
59	0.59	1.18	2.95	**5.9**	11.8	17.7	**23.6**	29.5	35.4	47.2	**59**	118
60	0.60	1.20	3.00	**6.0**	12.0	18.0	**24.0**	30.0	36.0	48.0	**60**	120

Table1: Quick reference matrix of amount of applied Nitrogen (kg)

Application level of Nitrogen (kg/ha)	Area size (m^2)											
	100	200	500	**1,000**	2,000	3,000	**4,000**	5,000	6,000	8,000	**10,000**	20,000
61	0.61	1.22	3.05	**6.1**	12.2	18.3	**24.4**	30.5	36.6	48.8	**61**	122
62	0.62	1.24	3.10	**6.2**	12.4	18.6	**24.8**	31.0	37.2	49.6	**62**	124
63	0.63	1.26	3.15	**6.3**	12.6	18.9	**25.2**	31.5	37.8	50.4	**63**	126
64	0.64	1.28	3.20	**6.4**	12.8	19.2	**25.6**	32.0	38.4	51.2	**64**	128
65	0.65	1.30	3.25	**6.5**	13.0	19.5	**26.0**	32.5	39.0	52.0	**65**	130
66	0.66	1.32	3.30	**6.6**	13.2	19.8	**26.4**	33.0	39.6	52.8	**66**	132
67	0.67	1.34	3.35	**6.7**	13.4	20.1	**26.8**	33.5	40.2	53.6	**67**	134
68	0.68	1.36	3.40	**6.8**	13.6	20.4	**27.2**	34.0	40.8	54.4	**68**	136
69	0.69	1.38	3.45	**6.9**	13.8	20.7	**27.6**	34.5	41.4	55.2	**69**	138
70	0.70	1.40	3.50	**7.0**	14.0	21.0	**28.0**	35.0	42.0	56.0	**70**	140
71	0.71	1.42	3.55	**7.1**	14.2	21.3	**28.4**	35.5	42.6	56.8	**71**	142
72	0.72	1.44	3.60	**7.2**	14.4	21.6	**28.8**	36.0	43.2	57.6	**72**	144
73	0.73	1.46	3.65	**7.3**	14.6	21.9	**29.2**	36.5	43.8	58.4	**73**	146
74	0.74	1.48	3.70	**7.4**	14.8	22.2	**29.6**	37.0	44.4	59.2	**74**	148
75	0.75	1.50	3.75	**7.5**	15.0	22.5	**30.0**	37.5	45.0	60.0	**75**	150
76	0.76	1.52	3.80	**7.6**	15.2	22.8	**30.4**	38.0	45.6	60.8	**76**	152
77	0.77	1.54	3.85	**7.7**	15.4	23.1	**30.8**	38.5	46.2	61.6	**77**	154
78	0.78	1.56	3.90	**7.8**	15.6	23.4	**31.2**	39.0	46.8	62.4	**78**	156
79	0.79	1.58	3.95	**7.9**	15.8	23.7	**31.6**	39.5	47.4	63.2	**79**	158
80	0.80	1.60	4.00	**8.0**	16.0	24.0	**32.0**	40.0	48.0	64.0	**80**	160
81	0.81	1.62	4.05	**8.1**	16.2	24.3	**32.4**	40.5	48.6	64.8	**81**	162
82	0.82	1.64	4.10	**8.2**	16.4	24.6	**32.8**	41.0	49.2	65.6	**82**	164
83	0.83	1.66	4.15	**8.3**	16.6	24.9	**33.2**	41.5	49.8	66.4	**83**	166
84	0.84	1.68	4.20	**8.4**	16.8	25.2	**33.6**	42.0	50.4	67.2	**84**	168
85	0.85	1.70	4.25	**8.5**	17.0	25.5	**34.0**	42.5	51.0	68.0	**85**	170
86	0.86	1.72	4.30	**8.6**	17.2	25.8	**34.4**	43.0	51.6	68.8	**86**	172
87	0.87	1.74	4.35	**8.7**	17.4	26.1	**34.8**	43.5	52.2	69.6	**87**	174
88	0.88	1.76	4.40	**8.8**	17.6	26.4	**35.2**	44.0	52.8	70.4	**88**	176
89	0.89	1.78	4.45	**8.9**	17.8	26.7	**35.6**	44.5	53.4	71.2	**89**	178
90	0.90	1.80	4.50	**9.0**	18.0	27.0	**36.0**	45.0	54.0	72.0	**90**	180
91	0.91	1.82	4.55	**9.1**	18.2	27.3	**36.4**	45.5	54.6	72.8	**91**	182
92	0.92	1.84	4.60	**9.2**	18.4	27.6	**36.8**	46.0	55.2	73.6	**92**	184
93	0.93	1.86	4.65	**9.3**	18.6	27.9	**37.2**	46.5	55.8	74.4	**93**	186
94	0.94	1.88	4.70	**9.4**	18.8	28.2	**37.6**	47.0	56.4	75.2	**94**	188
95	0.95	1.90	4.75	**9.5**	19.0	28.5	**38.0**	47.5	57.0	76.0	**95**	190
96	0.96	1.92	4.80	**9.6**	19.2	28.8	**38.4**	48.0	57.6	76.8	**96**	192
97	0.97	1.94	4.85	**9.7**	19.4	29.1	**38.8**	48.5	58.2	77.6	**97**	194
98	0.98	1.96	4.90	**9.8**	19.6	29.4	**39.2**	49.0	58.8	78.4	**98**	196
99	0.99	1.98	4.95	**9.9**	19.8	29.7	**39.6**	49.5	59.4	79.2	**99**	198
100	1.00	2.00	5.00	**10.0**	20.0	30.0	**40.0**	50.0	60.0	80.0	**100**	200
101	1.01	2.02	5.05	**10.1**	20.2	30.3	**40.4**	50.5	60.6	80.8	**101**	202
102	1.02	2.04	5.10	**10.2**	20.4	30.6	**40.8**	51.0	61.2	81.6	**102**	204
103	1.03	2.06	5.15	**10.3**	20.6	30.9	**41.2**	51.5	61.8	82.4	**103**	206
104	1.04	2.08	5.20	**10.4**	20.8	31.2	**41.6**	52.0	62.4	83.2	**104**	208
105	1.05	2.10	5.25	**10.5**	21.0	31.5	**42.0**	52.5	63.0	84.0	**105**	210
106	1.06	2.12	5.30	**10.6**	21.2	31.8	**42.4**	53.0	63.6	84.8	**106**	212
107	1.07	2.14	5.35	**10.7**	21.4	32.1	**42.8**	53.5	64.2	85.6	**107**	214
108	1.08	2.16	5.40	**10.8**	21.6	32.4	**43.2**	54.0	64.8	86.4	**108**	216
109	1.09	2.18	5.45	**10.9**	21.8	32.7	**43.6**	54.5	65.4	87.2	**109**	218
110	1.10	2.20	5.50	**11.0**	22.0	33.0	**44.0**	55.0	66.0	88.0	**110**	220
111	1.11	2.22	5.55	**11.1**	22.2	33.3	**44.4**	55.5	66.6	88.8	**111**	222
112	1.12	2.24	5.60	**11.2**	22.4	33.6	**44.8**	56.0	67.2	89.6	**112**	224
113	1.13	2.26	5.65	**11.3**	22.6	33.9	**45.2**	56.5	67.8	90.4	**113**	226
114	1.14	2.28	5.70	**11.4**	22.8	34.2	**45.6**	57.0	68.4	91.2	**114**	228
115	1.15	2.30	5.75	**11.5**	23.0	34.5	**46.0**	57.5	69.0	92.0	**115**	230
116	1.16	2.32	5.80	**11.6**	23.2	34.8	**46.4**	58.0	69.6	92.8	**116**	232
117	1.17	2.34	5.85	**11.7**	23.4	35.1	**46.8**	58.5	70.2	93.6	**117**	234
118	1.18	2.36	5.90	**11.8**	23.6	35.4	**47.2**	59.0	70.8	94.4	**118**	236
119	1.19	2.38	5.95	**11.9**	23.8	35.7	**47.6**	59.5	71.4	95.2	**119**	238
120	1.20	2.40	6.00	**12.0**	24.0	36.0	**48.0**	60.0	72.0	96.0	**120**	240

Farm Management and Support System

1st TOT

Contents

1. Introduction to Farm Management and Support System
2. Farm planning
3. Farm management
4. Tractor access improvement
5. Gender viewpoint

1st TOT and On-site training

Please prepare these materials at 1st TOT to learn how to instruct to farmers

1. **Introduction to Farm Management and Support System**

Farm management is fun!!

– To learn how to manage Demo-plot and members' own plots as business venture

2. **Farm planning**

- *Group action plan format*
- *Rice cropping calendar*

– To learn group action planning following the rice cropping calendar to be used at the Demo-plots and further appllied for the individual plots

1st TOT and On-site training

Please prepare these materials at 1st TOT to learn how to instruct to farmers

3. Farm management

Farm record keeping book

- To learn record keeping for sustainable rice production and financial management (for literate farmers)

At on-site training, do an exercise with the farmers on page 1

Farm record keeping sheet

- To learn simple cost/benefit calculation of rice production (for illiterate farmers)

4. Tractor access improvement

"Tractor access improvement"

- To learn how to facilitate the group approach for tractor access improvement

Farm management is fun!!

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

Discuss with the farmers:

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

Page 1(Back)


1. Let’s get information!
2. Let’s set a target!
3. Let’s make a plan!
4. Let’s implement!
5. Let’s review!

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 w

  keep improving your

  Farm management ski

Page 2(Back)

1. Let's get information!

Which type of rice is most liked by buyers?

Discuss with the farmers

- Do you know the demand in the market?

  Aromatic? Non-aromatic?

Page 3(Back)

1. Let’s get information!

Which variety is convenient in terms of cultivation period?

How many weeks?

Discuss with the farmers

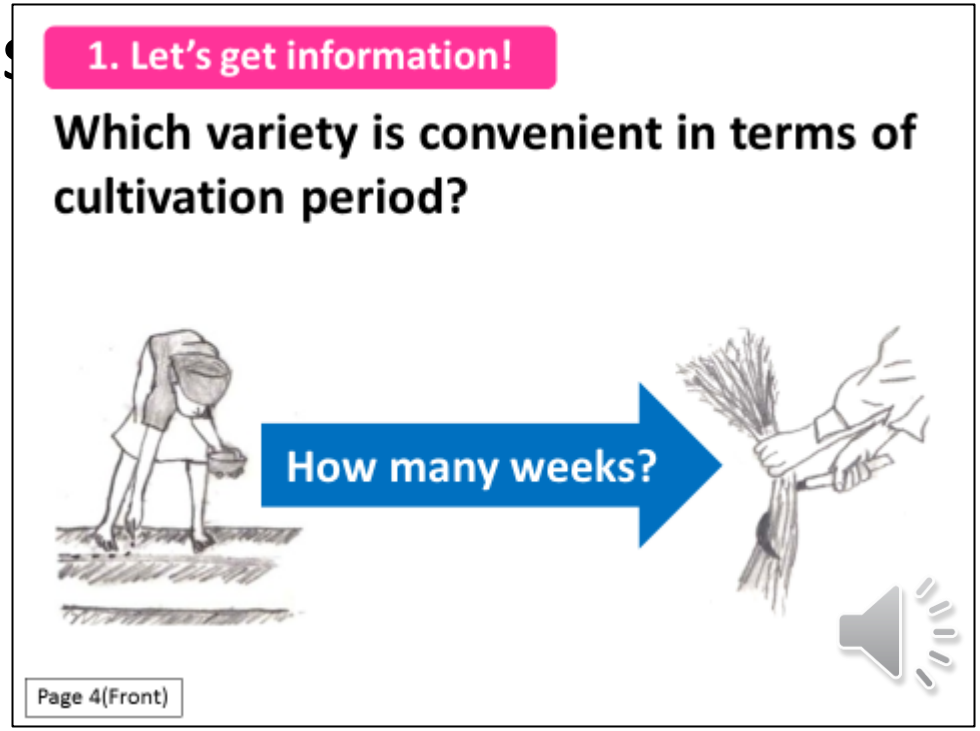
- Do you know how long it takes for the variety you are growing to come to maturity?

Example: Jasmine 85,

120-130 days (18 weeks

from sowing to

harvesting.

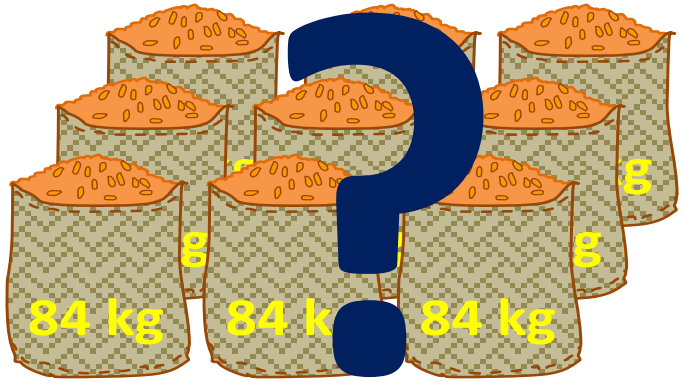


Page 4(Back)

1. Let's get information!

How many bags can you produce?

How much money can you earn?



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?

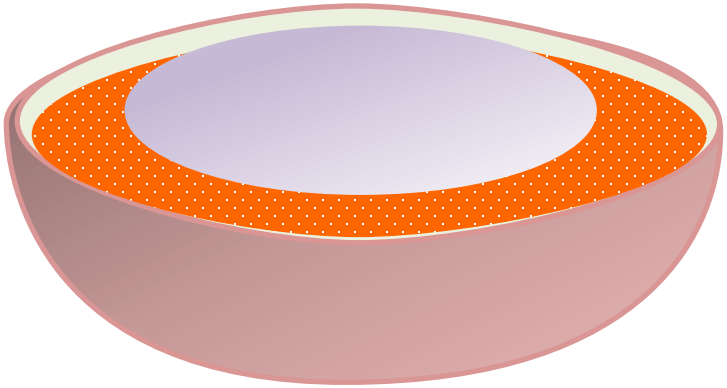
Yes or no, if you don't know, try to find the answers.

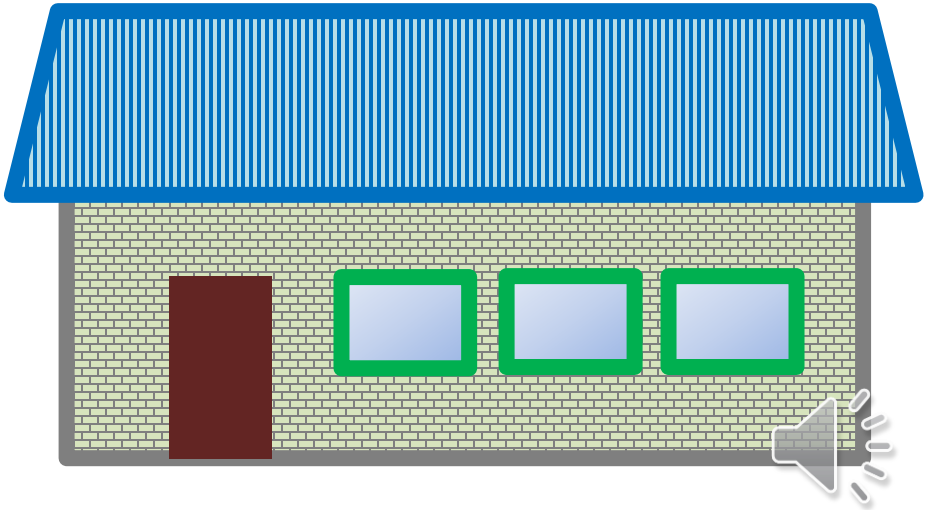
With all such information (market preference, characteristics of the varieties you want to grow, expected income), you can compare several varieties and take a decision!

Page 5(Back)

2. Let’s set a target!

What is your dream?





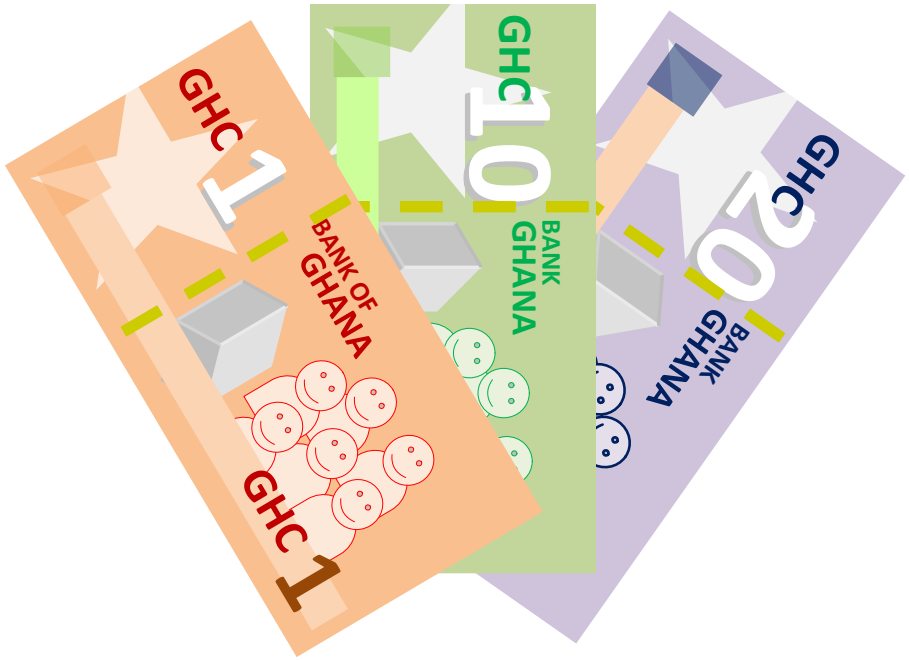
Discuss with the farmers:

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

Page 6(Back)

2. Let's set a target!

How much do you need?



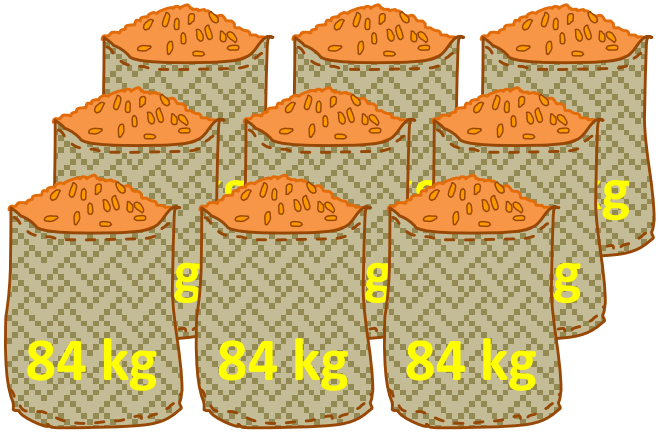
Discuss with the farmers:

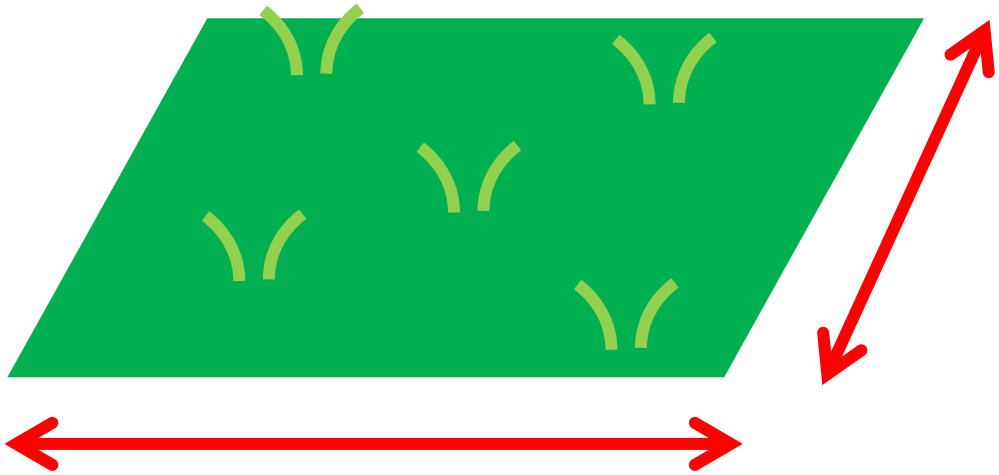
- To make your dream come true, how much do you need?

Page 7(Back)

2. Let's set a target!

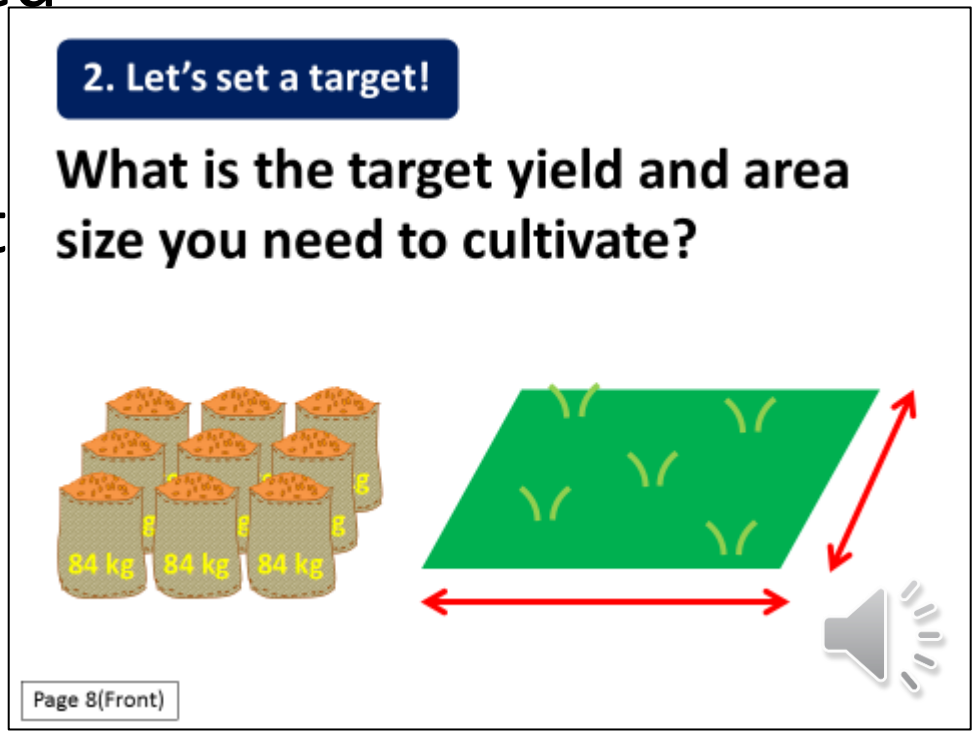
What is the target yield and area size you need to cultivate?





Discuss with the farmers:

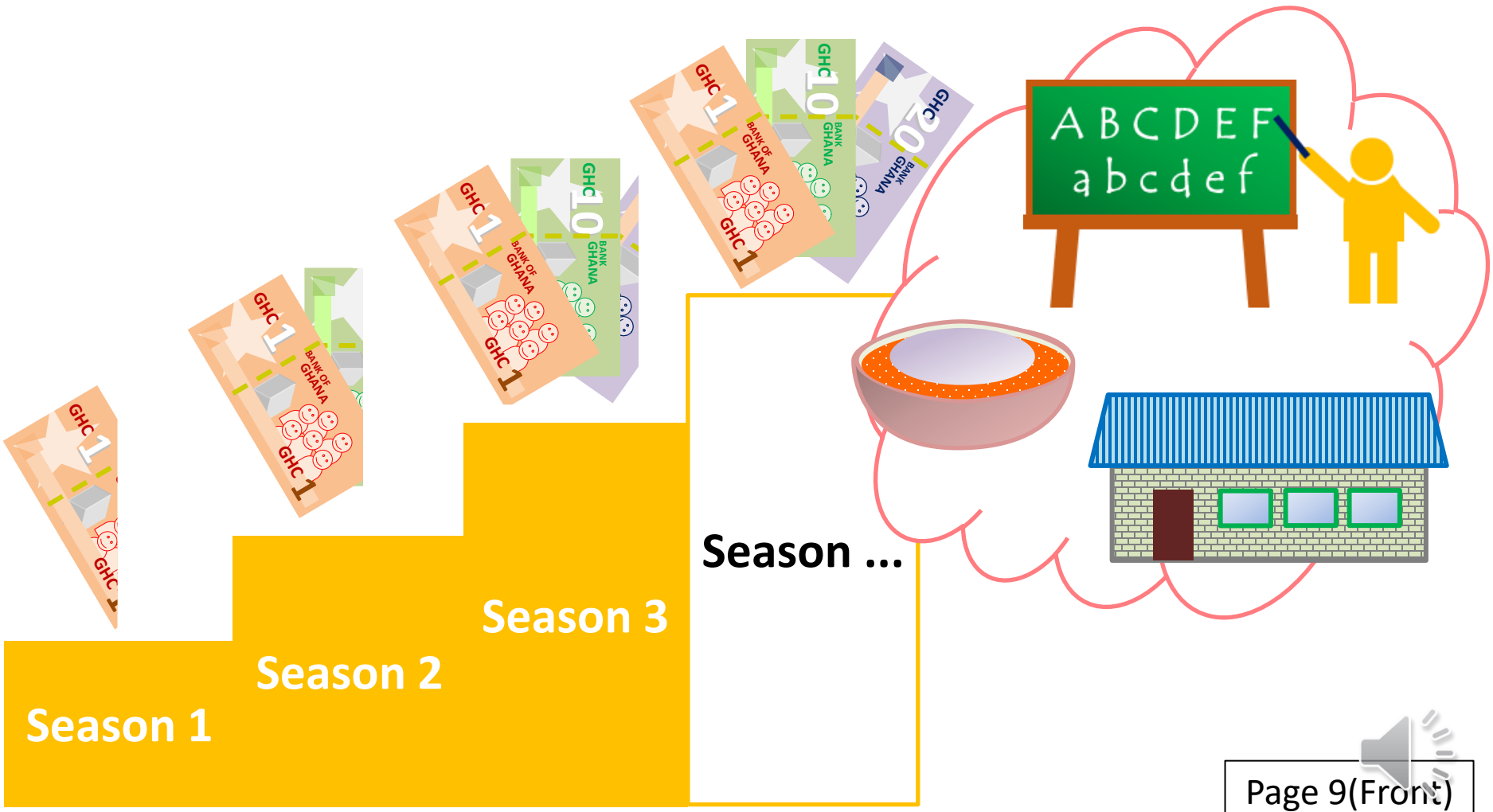
- To earn the money for your dream, how much do you need to produce?
- To produce the targeted yield, how many acres do you need to cultivat



Page 8(Back)

2. Let's set a target!

How long will it take to attain your dream?



Discuss with the farmers:

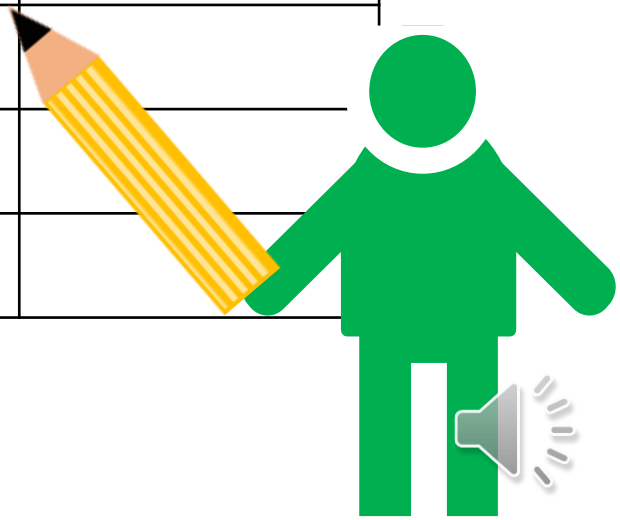
- How long will it take to make the dream come true?
- How many seasons/year can you cultivate rice?
- How much can you earn in each cropping season?

Page 9(Back)

3. Let’s make a plan!

Let’s budget what you want to do!

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

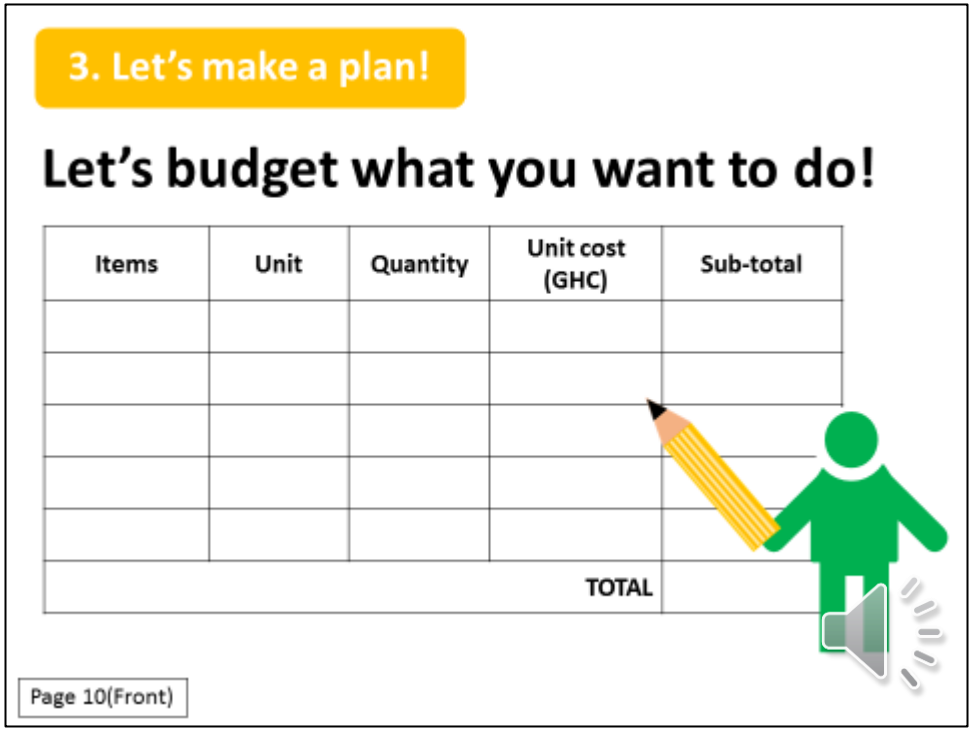


Discuss with the farmers:

- What are the necessary inputs needed to cultivate unit area?
- Encourage farmers to

cost each inputs and

calculate the total



Page 10(Back)

3. Let's make a plan!

But our resources are limited…

Discuss with the farmers:

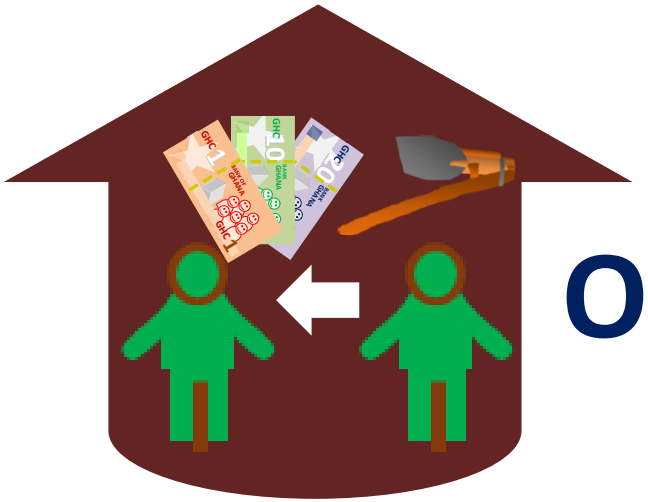
- What do you have, what you don't have?
- How do you make up for what you don't have?

Page 11(Back)

3. Let's make a plan!

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

1



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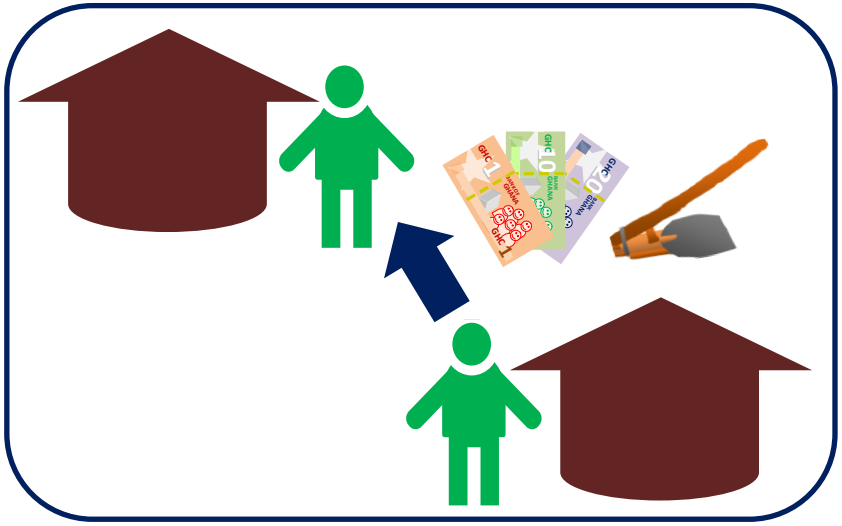


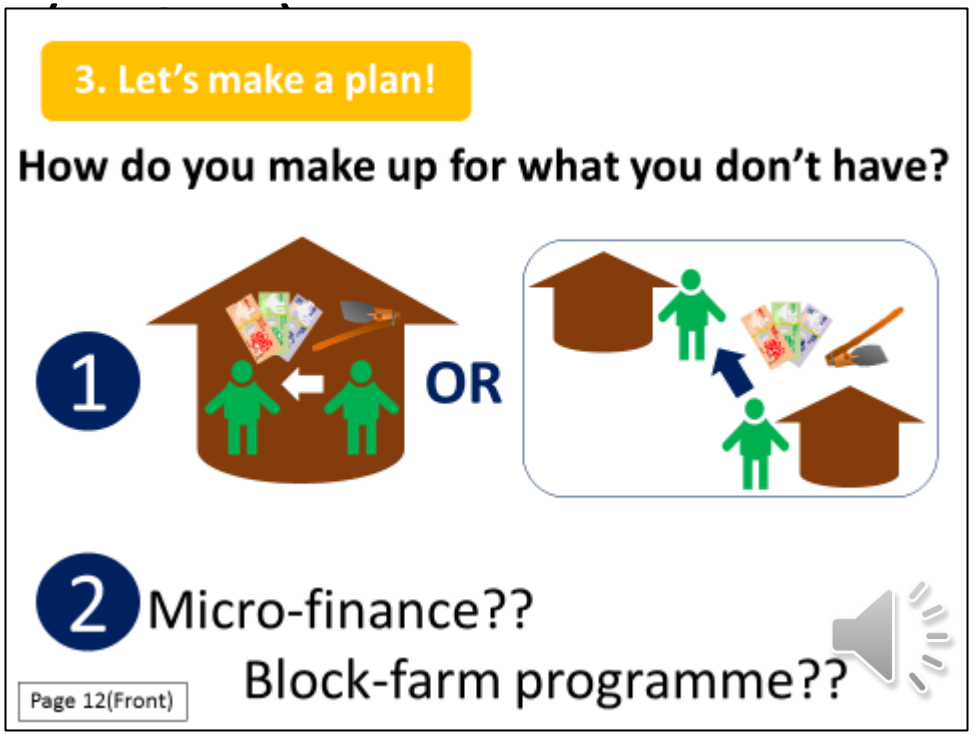
2 Micro-finance??

Block-farm programme??

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



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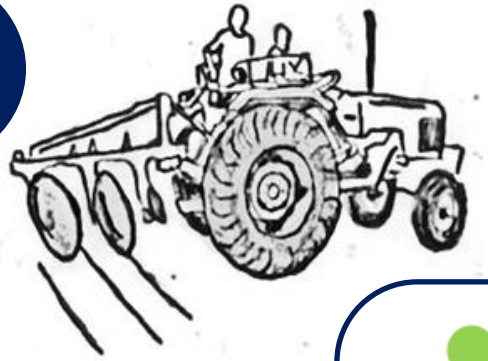
3. Let's make a plan!

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

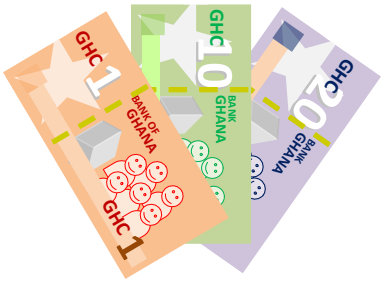
3



Tractor access

Demo-plot management

Input procurement



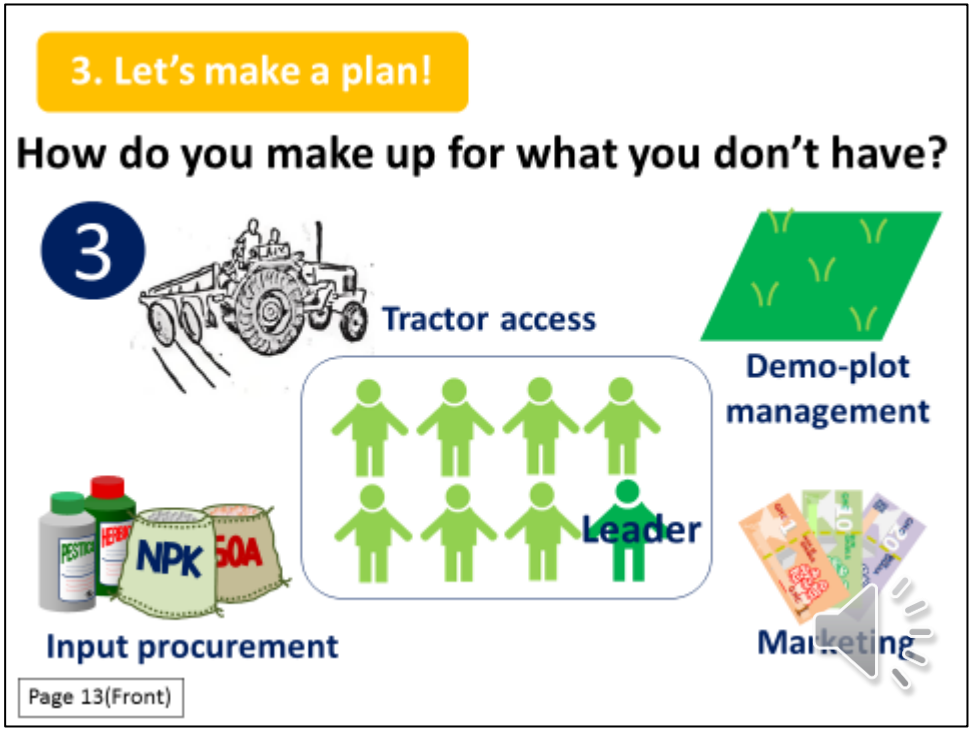
Marketing

Discuss with the farmers:

- **<u>What are advantages of working in a group ("Noaboa system" in Ashanti, "Lagm-gbai, lagm-gbiba" in Northern)?</u>**

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.)

- **<u>Ideal number should be 8-15 members per group</u>**



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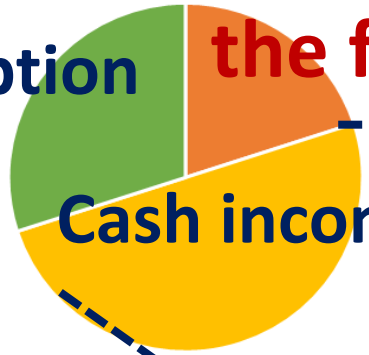
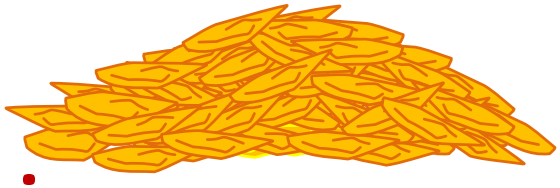
3. Let's make a plan!

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

Production (grain)





Seeds for the following season

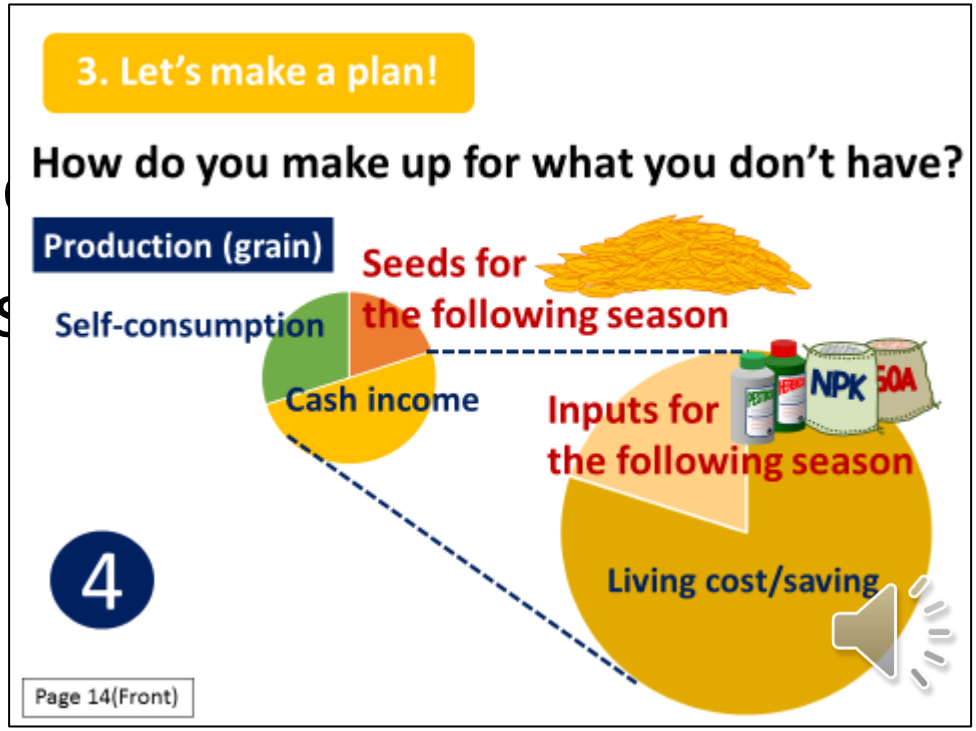
Inputs for the following season

Living cost/saving

4

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 cop with yearly price increas



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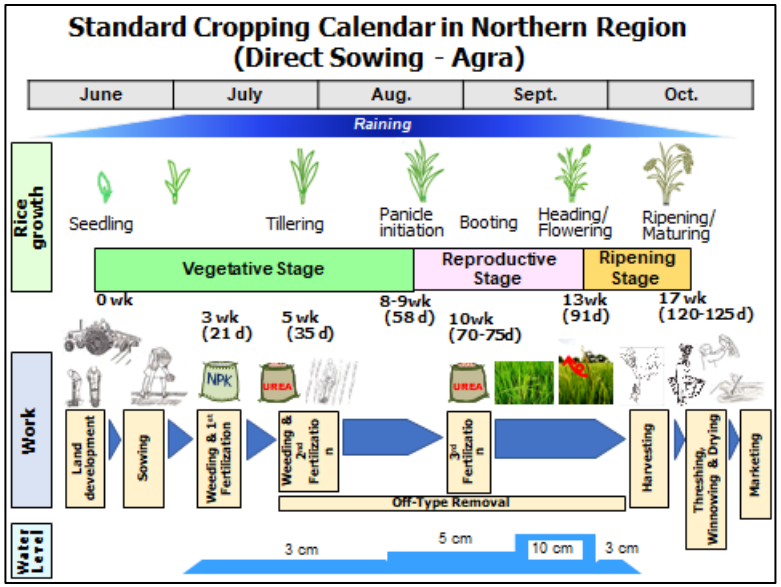
3. Let's make a plan!

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



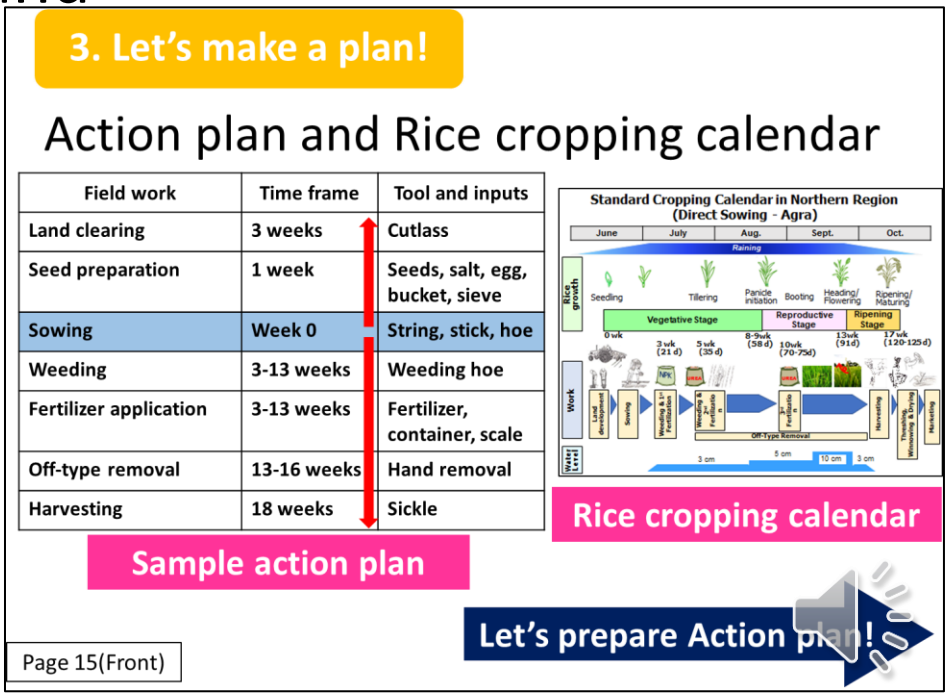
Rice cropping calendar

Let's prepare Action plan!

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



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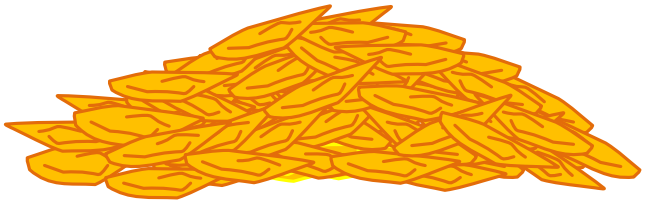
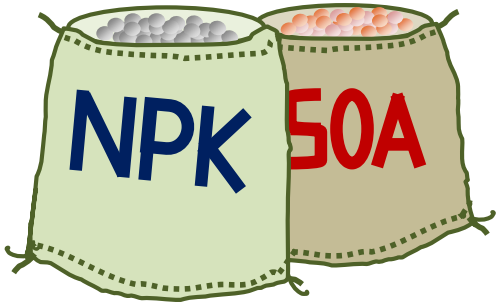
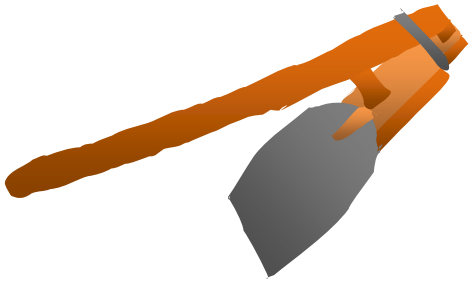
Page 15(Front)

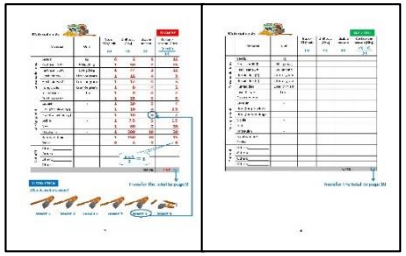
4. Let's implement!

Start recording your expenditure









Page 16(Front)

Farm record keeping book or sheet

Discuss with the farmers:

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

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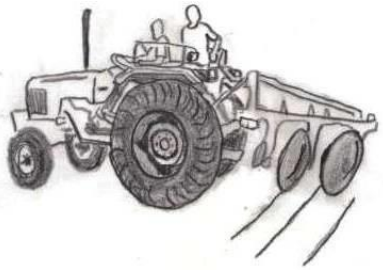
4. Let's implement!

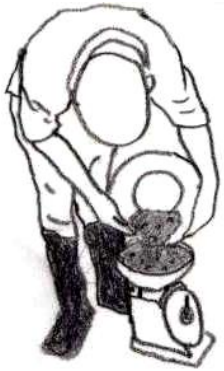
Start cultivation

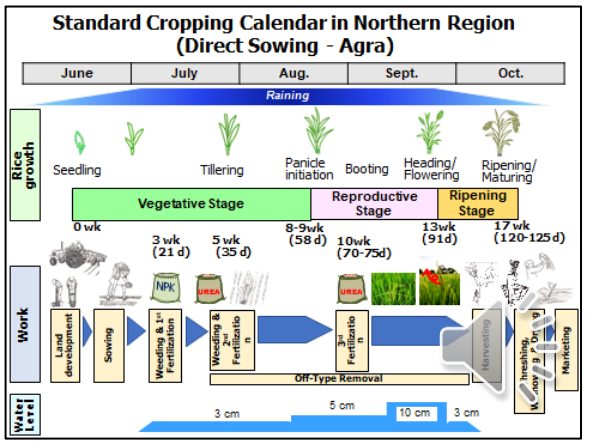








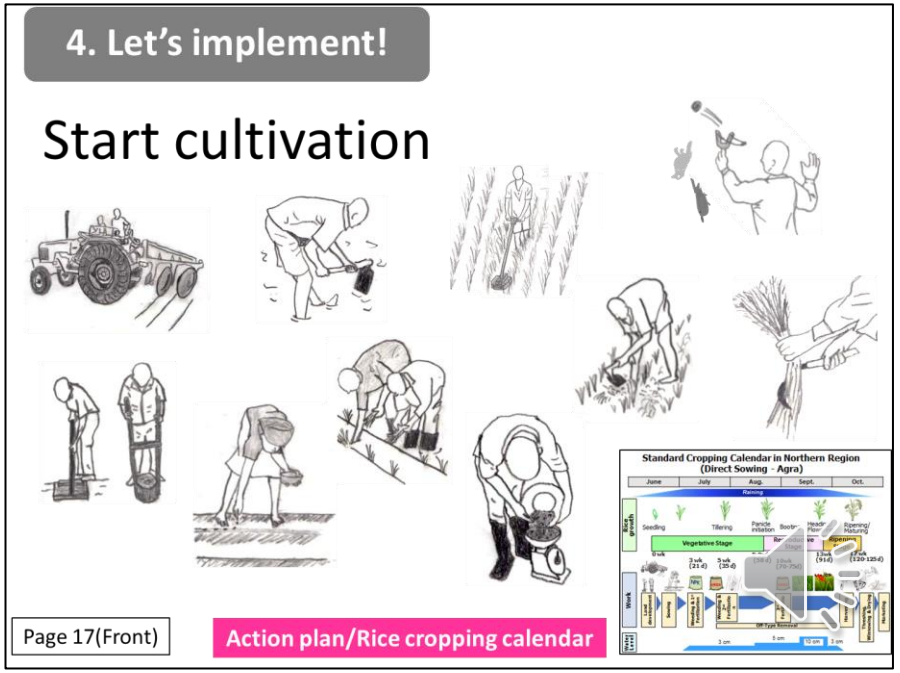


Page 17(Front)

Action plan/Rice cropping calendar

Discuss with the farmers:

- Start cultivation, following Action plan and Rice cropping calendar



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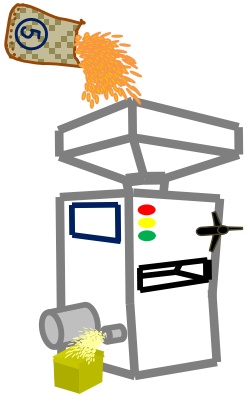
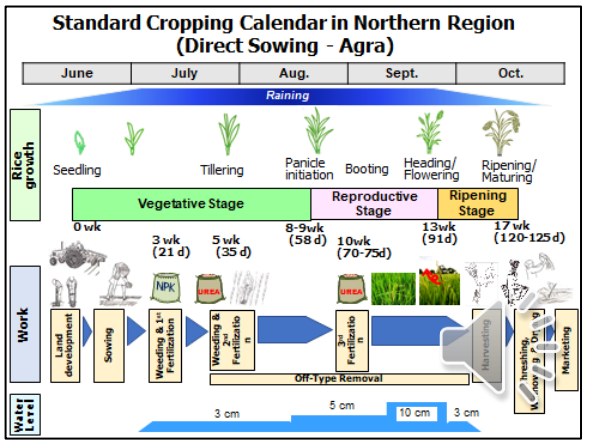
4. Let's implement!

Apply post-harvest techniques



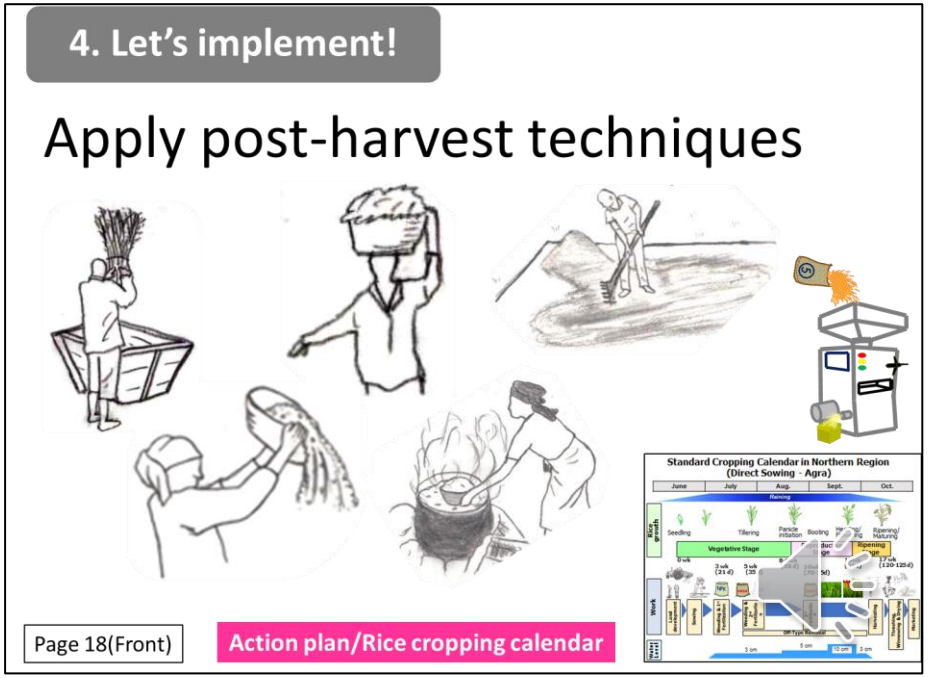


Page 18(Front)

Action plan/Rice cropping calendar

Discuss with the farmers:

- Continue to follow Action plan and Rice cropping calendar



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4. Let's implement!

Do marketing

To food vendors?

To processors?

To retailers?

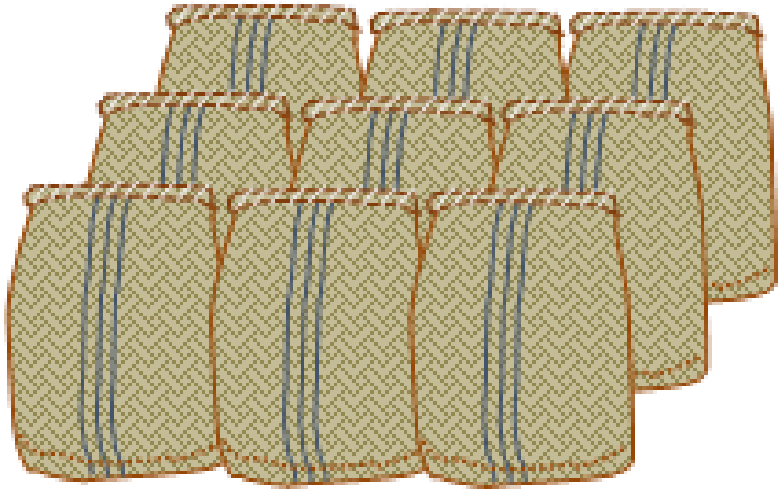
Discuss with the farmers:

- 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 time 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

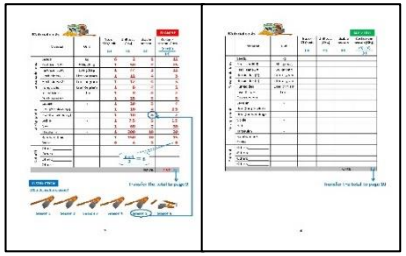
4. Let's implement!

Record your sales

GH¢ ?



GH¢ ?



Page 20(Front)

Farm record keeping book or sheet

Discuss with the farmers:

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

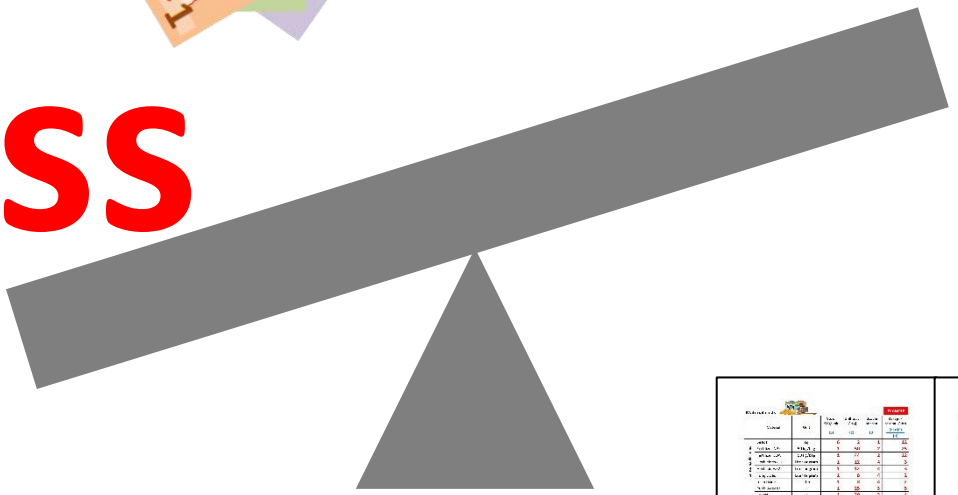
Page 20(Back)

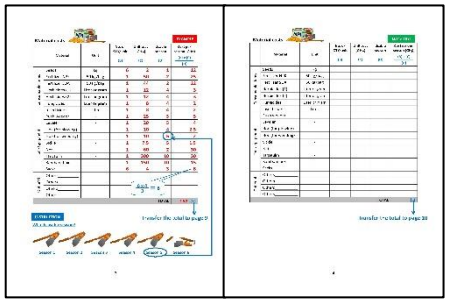
5. Let's review!

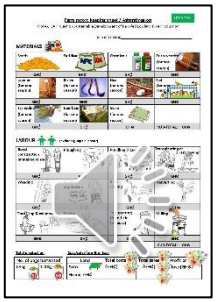
Confirm the profit or loss

Profit

Loss







Page 21(Front)

Farm record keeping book or sheet

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 c

find the difference

(= profit or loss)

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5. Let's review!

Did you attain your planned target?

Discuss with the farmers:

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

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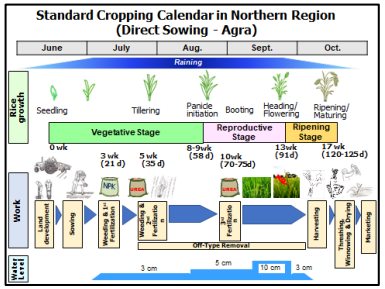
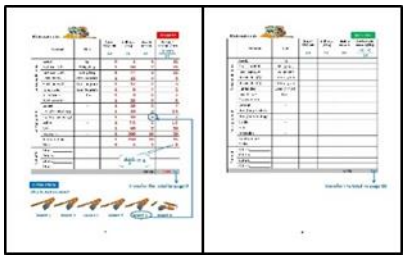
5. Let's review!

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:

1: Go back to the Action plan

-Was the application of each activity carried out timely?

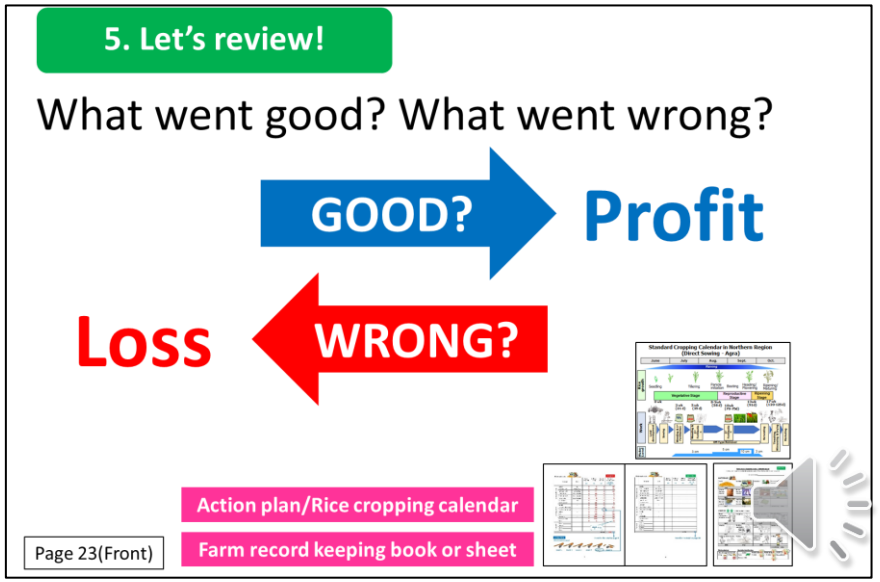
-Did you follow all the recommended activities?

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!

Plan for the following season

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)…

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Rice Cropping Calendar and Demo-Plot Action Plan

- Cropping calendar pictorially shows the major farm works and necessary water level for rice plant based on its growth stage
- Demo-Plot Action Plan format is for AEAs and Key Farmers to plan group activities at the Demo-plots with Group Farmers. All farm works will be planned according to the rice cropping calendar
- Plan will guide AEAs, Key Farmers and Group Farmers on the timing and type of works to do at Demo-Plot

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

June	July	Aug.	Sept.	Oct.

Raining

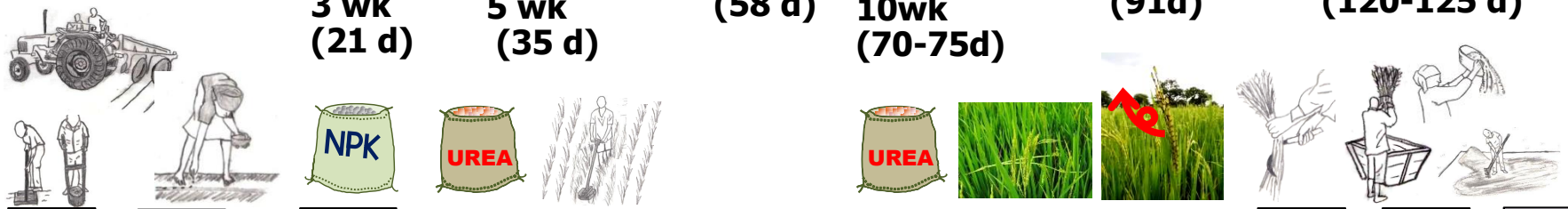
Rice growth

Seedling | Tillering | Panicle initiation | Booting | Heading/ Flowering | Ripening/ Maturing

Vegetative Stage | **Reproductive Stage** | **Ripening Stage**

0 wk | **3 wk (21 d)** | **5 wk (35 d)** | **8-9wk (58 d)** | **10wk (70-75d)** | **13wk (91d)** | **17 wk (120-125 d)**

Work



Land development → **Sowing** → **Weeding & 1st Fertilization** → **Weeding & 2nd Fertilization** → **3rd Fertilization** → **Harvesting** → **Threshing, Winnowing & Drying** → **Marketing**

Off-Type Removal

Water Level

3 cm | 5 cm | 10 cm | 3 cm

Demo-Plot Action Plan

VERSION 3, March 2019

Form 2-1c: Demo Plot Action Plan & Monitoring Sheet (3) Direct Sowing Northern Region

Name of AEA:	Number of Group Farmers: M: F:	Community:
Phone No. of AEA:	(Youth: Aged: PLWDs:)	Size of Demo Plot: acre
Operational Area:	Name of Key Farmer:	Rice Variety:
District:	Phone No. of Key Farmer:	

No.	Field work	Action Plan			Monitoring			
		Week-based Time frame	Date-based Time frame (from to)	Recommended tool & inputs	Date Implemented	No. of farmers participated	- Describe each activity in detail, - Evaluate each work whether it is implemented along with the guideline	Remarks on the field and crop condition, if any
1	Land clearing	3 weeks (or more) before sowing		Cutlass		M: F:		
2	Ploughing	1 week before sowing		Tractor		M: F:		
3	Bund construction	1 week before sowing	②	Hoe, spade, compactor, slapper, garden line		M: F:		
4	Harrowing	1 week before sowing		Tractor, Harrow		M: F:		
5	Seed preparation	1 week before sowing		Rice seeds, salt, egg, bucket, sieve, firewood, pot, seed net		M: F:		
6	**Sowing**	**Week 0**	①	Hoe, line drawer		M: F:	Quantity of seeds: kg Sowing method: Row distance: cm	
7	1st Weeding	3 weeks after sowing		Weeding hoe		M: F:		
8	1st Fertilizer application	3 weeks after sowing	③	Fertilizer, weighing scale, containers		M: F:	Type of fertilizer applied: Quantity applied: kg	
9	2nd Weeding	5 weeks after sowing		Weeding hoe		M: F:		
10	2nd Fertilizer application	5 weeks after sowing	④	Fertilizer, weighing scale, containers		M: F:	Type of fertilizer applied: Quantity applied: kg	
11	Off-type removal (for seed production)	from 5 weeks after sowing to the day of harvesting		No tool (hand removal)		M: F:		
12	3rd Weeding	10 weeks after sowing		Weeding hoe		M: F:		

Demo-Plot Action Plan cont..

VERSION 3, March 2019

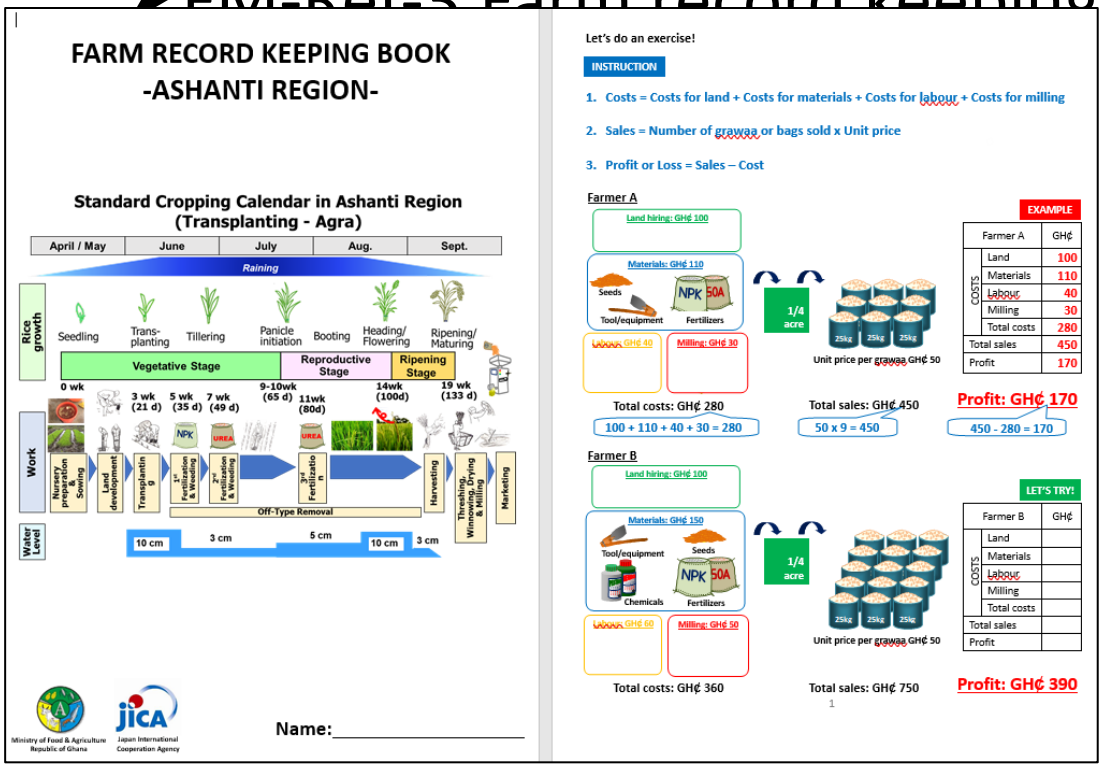
No.	Field work	Action Plan			Monitoring			
		Week-based Time frame	Date-based Time frame (from to)	Recommended tool & inputs	Date implemented	No. of farmers participated	- Describe each activity in detail, - Evaluate each work whether it is implemented along with the guideline	Remarks on the field and crop condition, if any
13	3rd Fertilizer application	10 weeks after sowing	⑤	Fertilizer, weighing scale, containers		M: F:	Type of fertilizer applied: Quantity applied: kg	
14	**Heading**	**Heading more than 50% rice plants**						
15	Bird scaring	13 - 17 weeks after sowing		Fishing net		M: F:		
16	**Maturing**	**Accumulated temperature 950℃ from heading date**						
	Harvesting	17 weeks after sowing (determined by observation)		Sickle		M: F:	Moisture content: %	
	Threshing			Tarpaulin, Bambam box, sacks, head carriage		M: F:		
17	Winnowing	17 weeks after sowing	⑥	Tarpaulin, sacks		M: F:		
	Drying					M: F:	Moisture content: % Number of bags:	Bag size:
18	Storing	17 weeks after sowing ~		Storage facility, wooden pallets		M: F:		
19	Milling	17 weeks after sowing ~		Sacks		M: F:		
20	Selling	17 weeks after sowing ~		Sacks		M: F:		

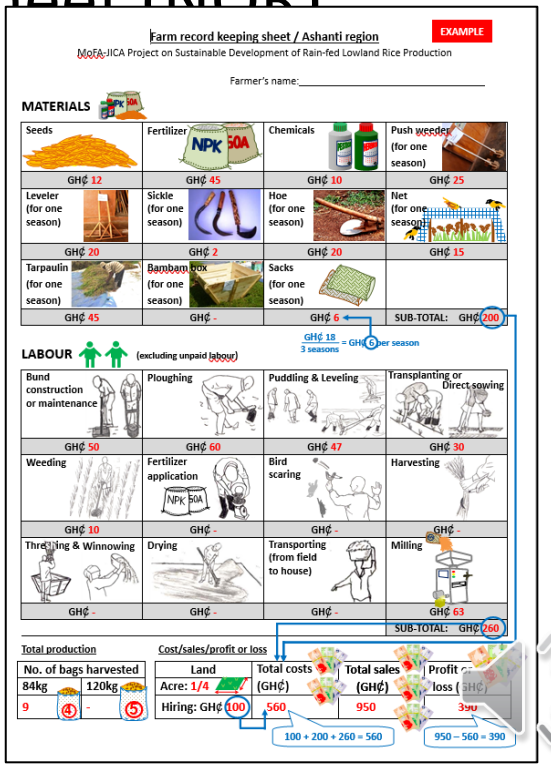
Onsite Training (OST) Record

1st OST	2nd OST	3rd OST	4th OST	5th OST
Date:	Date:	Date:	Date:	Date:
Participants: M F	Participants: M F	Participants: M F	Participants: M F	Participants: M F
(Youth, Aged, PLWDs)	(Youth, Aged, PLWDs)	(Youth, Aged, PLWDs)	(Youth, Aged, PLWDs)	(Youth, Aged, PLWDs)
Topics trained:	Topics trained:	Topics trained:	Topics trained:	Topics trained:

Farm Record Keeping Book/Sheet

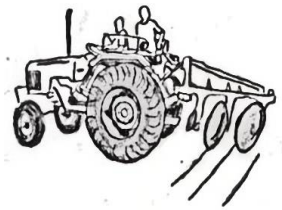
- Open the word file and go through
  - ➢FM-Ref-3 Farm record keeping book (NOR)
  - ➢FM-Ref-3 Farm record keeping sheet (NOR)





Tractor access improvement

How do you instruct farmers about group approach?



Why group approach?

	Individual	Group
Information source	Other farmers/tractor operators (limited and unreliable information)	AEA (reliable, sufficient, and rapid)
Planning	Irresponsible	Advanced, long-term, clear agreement on timing of operation
Contract	Uncertain deals only with operators (operators may take 100% share of contract payment in the case of negotiation without tractor owners)	Both tractor owners and operators can be included in a negotiation due to credibility to a group (owners should be included to prevent the members being in a weak bargaining position)

Why group approach? (contd')

	Individual	Group
Effectiveness	Discontinuous operation	Continuous and intensive operation (advantageous both for farmers and operators/owners)
Service fee	Not attractive for owners	Attractive for owners, which enables them provide timely tractor services in the target area because of a certain amount of payment ensured before operation
Unity	Individual action taking	Mutual technical improvement for group management can be expected

Good practices (1)

- Place: Wungu community (West Mamprusi District)
- Members: 45 (1 acre per member)
- Merit of group formation: Strengthened negotiation power (individual members would not manage the negotiation)
- Agreement: GHC 12 as deposit and payment in kind after harvest
- Story:

1. Members had initially failed to have peaceful agreement with another tractor owner because farmers thought he sounded too bossy during the negotiation (almost threatening them of police arrest if farmers fail to make the balance payment in kind).
2. Then, members agreed with another tractor owner in Walewale (deposit GHC 12 and payment in kind with 84 kg paddy rice even if they have to sell other crops to buy the 84 kg paddy rice and use it to pay the tractor owner). The new tractor owner understood well that no farmer could expect sufficient rice yield. Hence farmers appreciated this flexibility of payment in kind.

(as of August 6th ,2013)

LESSON: Find an owner who agreeS on flexible mode of payment

Good practices (2)

- Place: Nachimbiya (Tamale metro)
- Members: 30 (1 acre per member)
- Merit of group formation: Timely operation by the tractor owner who was attracted by a certain size of the area to plough and a certain amount of payment
- Agreement: GHC 10 as deposit and payment in kind after harvest
- Story:
  1. Members called the AEA at night of Day 1, when they had the good rainfall. Then, the AEA asked the tractor owner to come as soon as possible.
  2. The tractor owner came to the community at about 05:00 am to 06:00 am of Day 2.
  3. This is how the members could stick to the agreement with loyalty without engaging any other tractor owners.

(as of August 6th ,2013)

LESSON: Find an owner who can quickly act upon farmers' request.
Smooth contact between farmers/AEAs, and AEAs/owners, is also important.

Good practices (3)

- Place: Kpegu (Kumbungu)
- Members: over 30 farmers (100 acres plus ploughed)
- Merit of group formation: During the meeting between farmers, tractor owners and operator, the 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.
- Agreement: Farmers were to pay in cash as upon completion of ploughing.
- Story:
  1. Farmers contacted tractor owner when they had heavy rain. Tractor owner added new condition about purchase of one drum diesel in advance. Farmers agreed to this new condition even though it was not included.
  2. When tractor owner was later calling operators to withdraw from community, the operators stayed an additional one day due to good reception from the community.

(as of May ,2018)

LESSON: Farmers were able to accept new condition from tractor owner because they badly needed the service, and the condition was moderate.

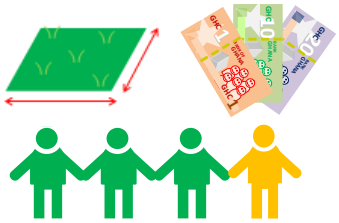
Steps to implement group approach

STEP 1

Identify farmers interested in group approach

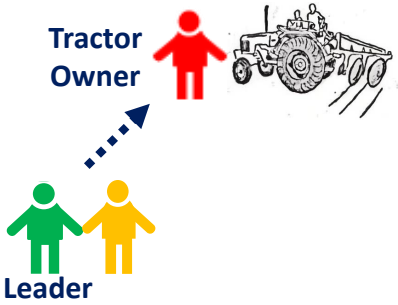
STEP 2

Determine the acreage and mode of payment, with the farmers



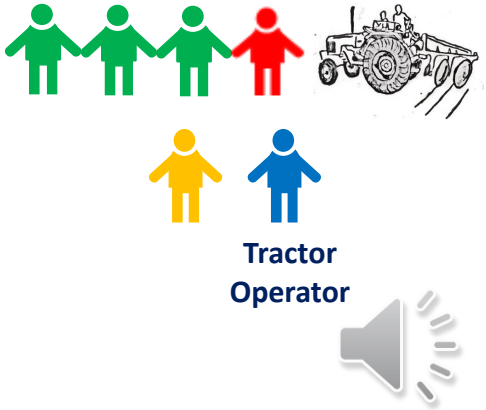
STEP 3

Visit tractor owners (AMSEC, SADA, individual, etc.) to confirm availability of their tractors for the coming season

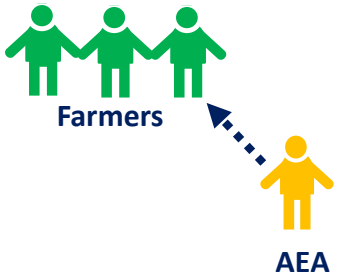


STEP 4

Link leaders of farmer groups and tractor owners, and agree on timing of cultivation/acreage /payment mode



STEP 1

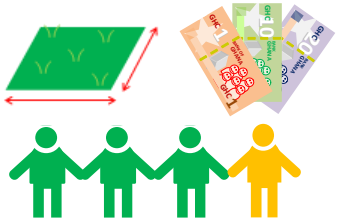


Identify farmers interested in group approach

Expected issues	Possible answers
Is there any farmer outside the project who is interested in becoming a member?	Any farmer can be included to enlarge the area to be ploughed
What is the role of the leader?	Leaders are supposed to work with AEAs for negotiation

- **Can you expect any other issue?**
- **How can it be solved?**

STEP 2

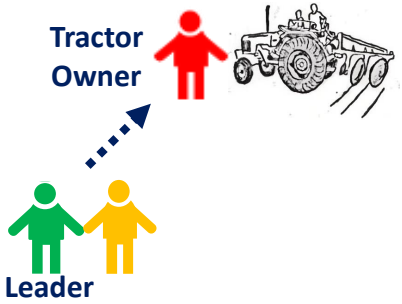


Determine the acreage and mode of payment, with the farmers

Useful format

No.	Name of farmer	Acreage to be cultivated	Plough	Harrow (optional)	Mode of payment	
					Deposit	Final payment
1	Baba Nindoo Abdulai	1	✓	✓	GHC 10	Cash (GHC40)
2	Albert Adombila	1	✓	-	GHC 0	Paddy 84kg
3						
4						
5						
6						
7						
8						

STEP 3



Visit tractor owners (AMSEC, SADA, individual, etc.) to confirm availability of their tractors for the coming season

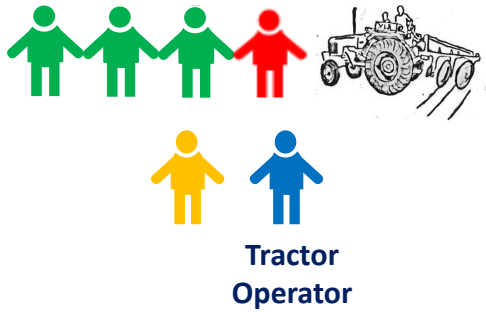
Sample resources

Organization	Services
AMSEC (Kurbandi farms)	• Provides services to farmers on out-grower scheme • Owns 7 tractors, 7 ploughs, and 2 harrows • Can provide services on credit
Goodman & Sons	Has 5 tractors but only 2 are available and the others are under repair
SADA	• Does not provide tractor services directly to farmers • Rents tractors to NGOs/private organizations which provide paid services to farmers

Do you know any other owners? If so, let's further develop the list for your operational areas!

(as of May, 2013)

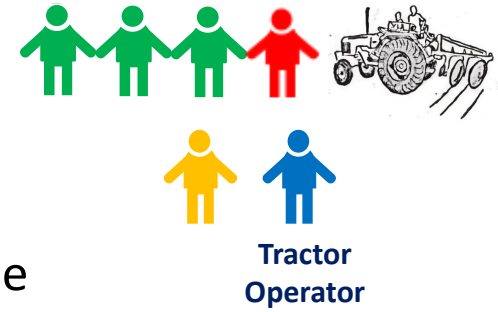
STEP 4



Link leaders of farmer groups and tractor owners and agree on timing of cultivation/acreage/payment mode

Expected troubles	Possible solutions
Tractor operator may not come even upon the group request	• Group should offer a certain amount of deposit payment (group members should be made to understand the importance of deposit)
Some members may fail to keep the agreement (change in the cultivation area)	• Group members should advise one another not to access other tractor owners' services while the first contract is still active • AEAs should take quick action in responding to members' request by asking tractor owners to send tractors to plough for them.

STEP 4 (contd')

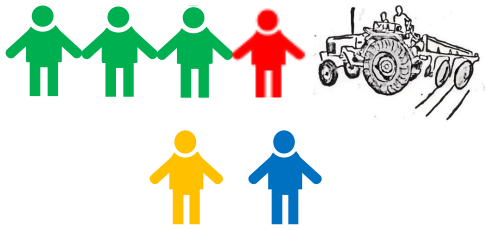


Link leaders of farmer groups and tractor owners and agree on timing of cultivation/acreage/payment mode

Expected troubles	Possible solutions
Tractor owner can request payment in kind even when the agreement says "pay with cash"	Use the format for agreement to avoid upset of the agreement (STEP 2)
May miss timing of agreement	• Grasp a full operation plan of a tractor owner (information sharing may not be sufficient only under direct request to operators) • Be sure of the maximum acreage to plough/tractor/day • Keep in mind that no tractor can be operated in the rain
Future unexpected increase in fuel price may cause increase in agreed prices of deposit payment.	Tractor owners should agree that if farmers pay deposit in advance, he will not request extra money even if fuel prices increase later. Eg. Case of first tractor owner in W. M. even though farmers were unable to work with him eventually.

- **Can you expect any other trouble?**
- **How can it be solved?**

STEP 4 (cont'd)



Link leaders of farmer groups and tractor owners and agree on timing of cultivation/acreage/payment mode (agree on the format prepared at STEP 2)

Useful format

No.	Name of farmer	Acreage to be cultivated	Plough	Harrow (optional)	Mode of payment	
					Deposit	Final payment
1	Baba Nindoo Abdulai	1	✓	✓	GHC 10	Cash (GHC40)
2	Albert Adombila	1	✓	-	GHC 0	Paddy 84kg
3						
4						
5						
6						
7						
8						

Gender Viewpoint

1st TOT

Why Gender Viewpoint is important?

- In general, female is involved a lot of farm works
- However in many case, female farmers have limited chance to receive extension services or attend trainings
- It is a big LOSS as a farm household if female doesn't know the improved technologies to be applied to the farm

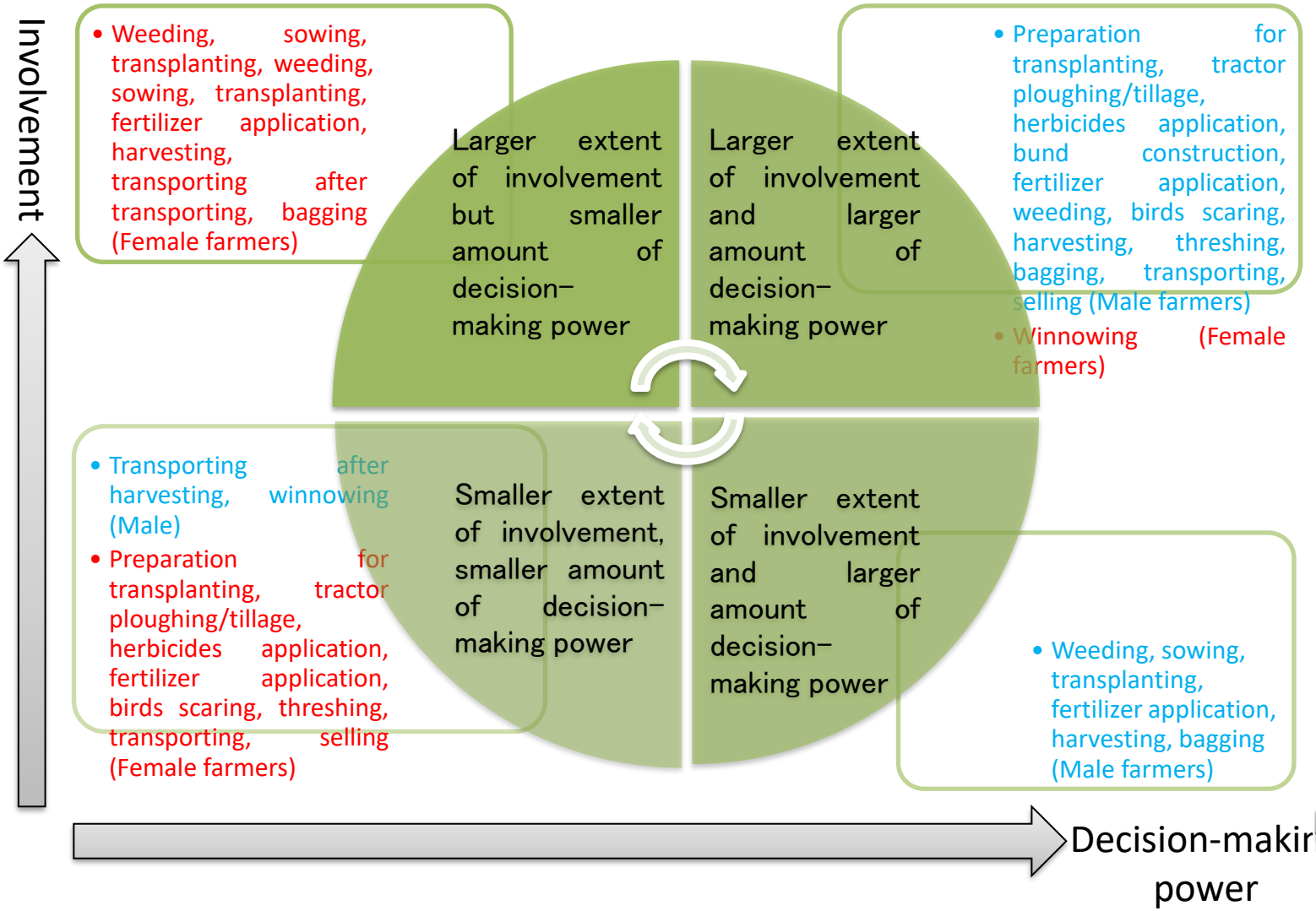
Female farmer's full participation is very important in increasing household income and livelihood of farmers

Factors in the Field…
(Survey in 2017)

- Mainly Muslims, family polygamy style is general.
- Basically, male family members manage household budget.
- Female farmers also rent and manage rice field.
- As it is difficult for a husband to help all his wives' for their farm activities equally in the case of polygamy, wives often hire workers, making labour cost higher.
- When money is needed for household, wives parboil paddy in stock and mill it at millers to sell at good price.

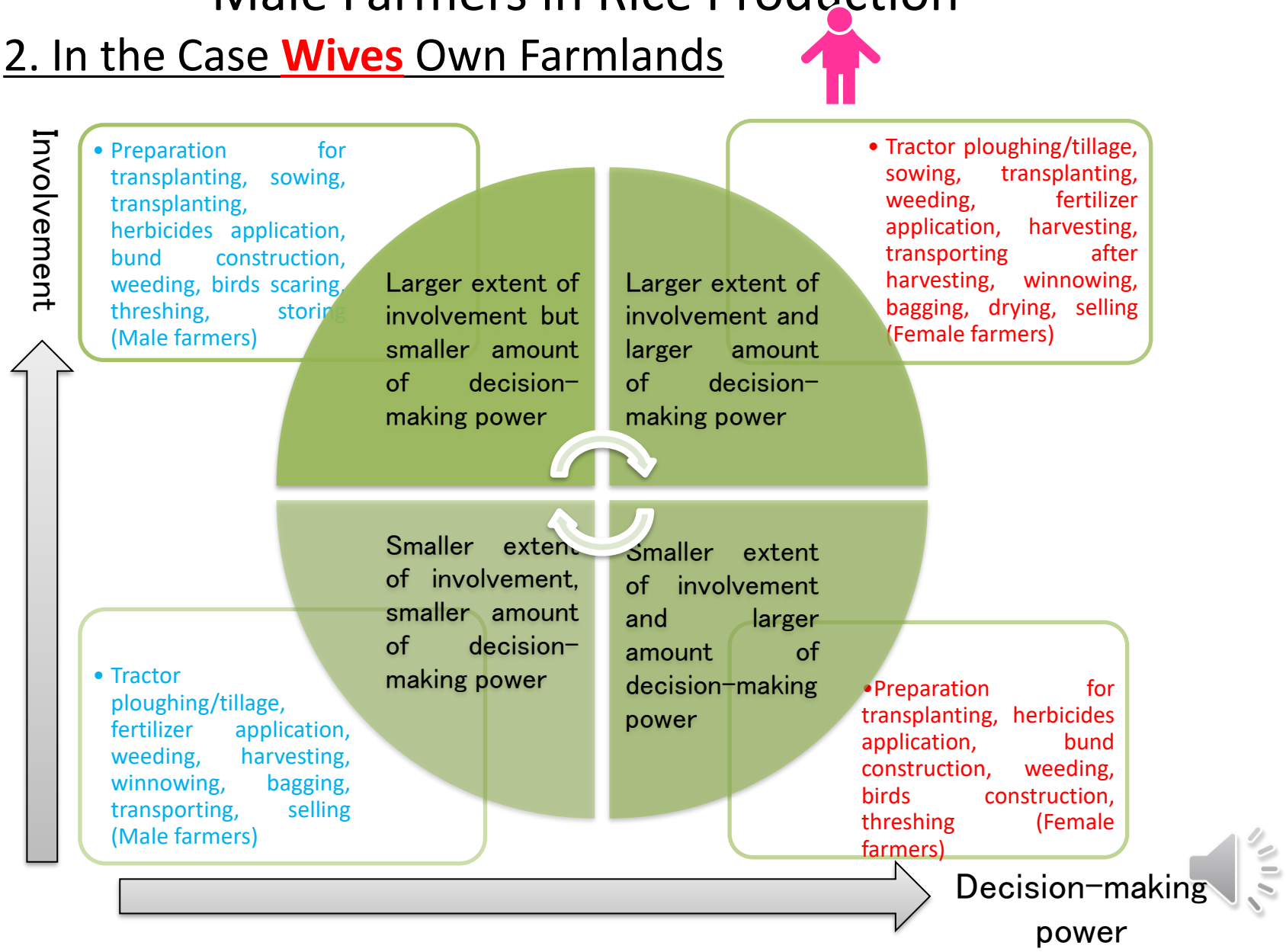
Roles, Decision Making and Involvement of Female and Male Farmers in Rice Production

1. In the Case **Husbands** Own Farmlands



Roles, Decision Making and Involvement of Female and Male Farmers in Rice Production

2. In the Case **Wives** Own Farmlands



Let's discuss!

Activities	Female	Male
Tractor ploughing/tillage		
Bund construction		
Land clearing		
Burning		
Herbicide application		
Seed preparation		
Sowing		
Fertilizer application		
Manual weeding		
Birds scaring		
Harvesting		
Threshing		
Parboiling		
Drying		
Bagging		
Storing		
Transporting		
Selling		
Record keeping		

What are roles of female and male farmers involved in rice production?
Put "✔" in the columns.

Good practices in the field

Maria of Kpalbe, East Gonja

I own land that I use to cultivate rice, groundnuts and watermelon by myself. Although my husband oversees the care and protection of the land, the land still belongs to me and I have the decision-making power to its use. In any farm activity, I decide what to do and my husband helps me if needed. At the time of selling rice, I decide the quantity to sell and where to sell.

I spend the income from rice for school fee, building a house and for myself (clothes, cosmetics, etc.), too. When my husband needs money, he requests me to share it. I have good relation and trust with my husband because of my tolerance and patience.

During the On-site training, I feel free to speak in front of male participants. If I am seriously concerned with issues discussed in the training, I never hesitate to speak out. A tip for it is, for example, to excuse herself before talking in front of male participants so that they may not feel offended.

Good practices in the field

Azara of Silinga, West Mamprusi

I own land that I use to cultivate rice, maize and soybean by myself whereas my husbands own other farmlands to cultivate maize, guinea corn and groundnuts by himself. Although we help to each other in both farmlands, we have separated wallets for his own and my own. I am the decision maker for any farm activity including use of income, which is spent for school fees, farm activities, and food, etc.

During the On-site training, I feel free to speak in front of male participants. As the organizer of a women's self-help group (30 members) in this area, I am responsible with representing all the female participants. In this way, we can easily collect our voices to speak out in front of men.

IF YOU KNOW ANY OTHER DIFFERENT STORY, PLEASE SHARE WITH US.

THEY CAN BE COMPILED IN THIS MATERIAL AS GOOD PRACTICES.

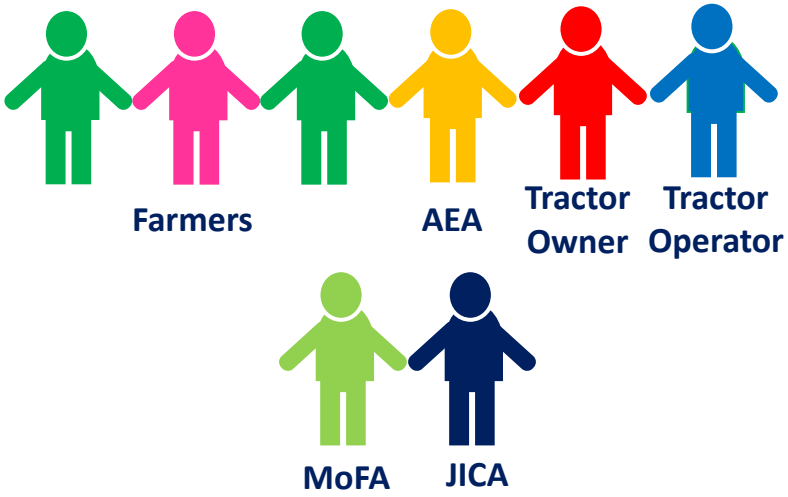
Tips for AEAs for better involvement of female farmers

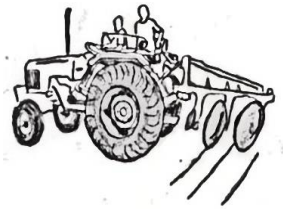
- When you invite farmers to the On-site training based on activity, please invite them based on gender. For example, in many cases, female farmers are main players in postharvest activities.
- Generally, female farmers who own land have more decision-making power in rice production. They can be invited to the On-site training as models for other female farmers.
- At the time of the On-site Training, female participants sometimes hesitate to give their opinions in front of male participants. Try to raise their opinions through following ways (examples):
  - Give specific questions which can be answered only by women.
  - Provide chances for discussion by gender.
  - Introduce the Good practices to both female and male participants.
- Women are especially busy on market days. Avoid such days to implement the On-site Training.

Tips for DAOs for better involvement of female farmers

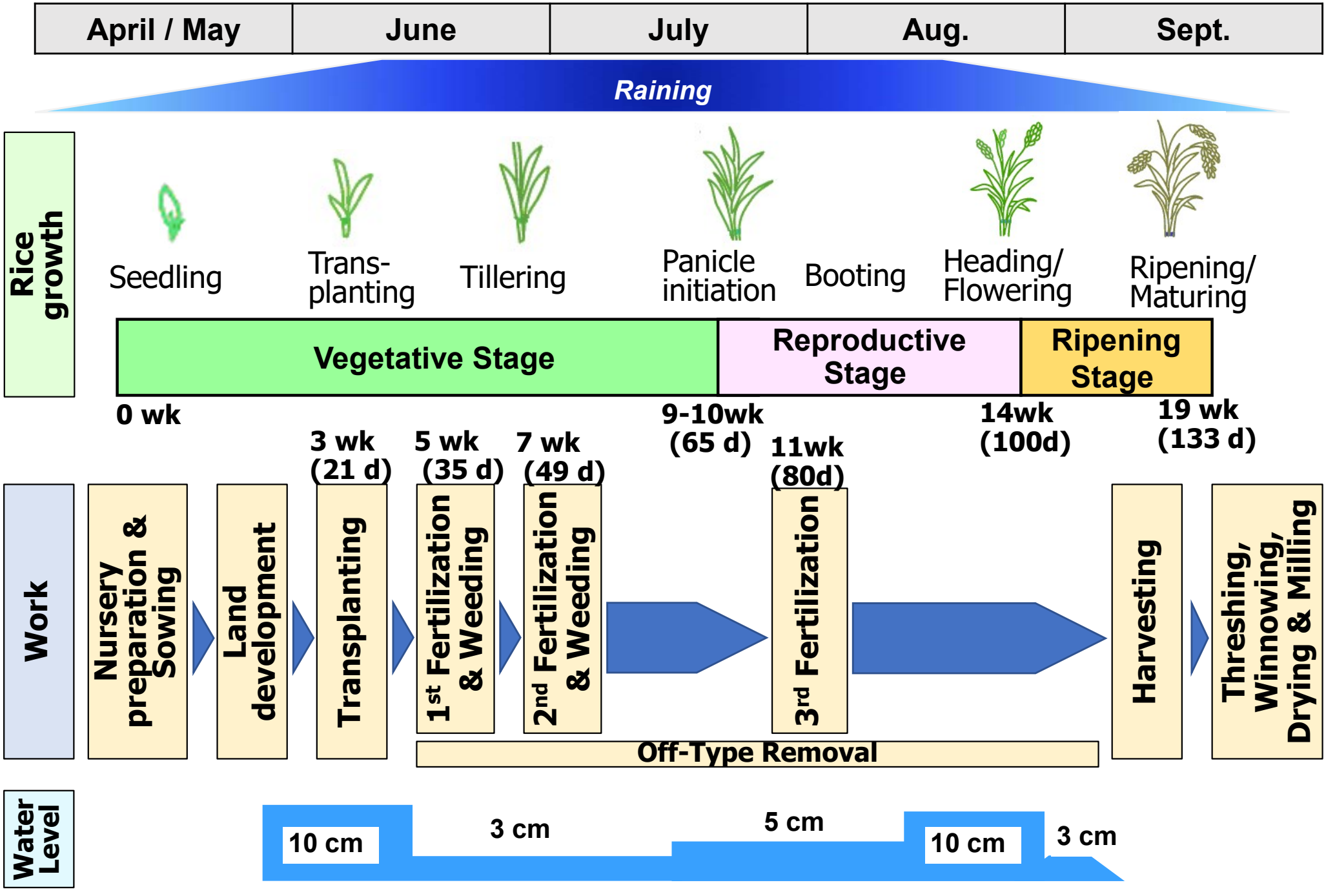
- WIAD officers should be involved from planning to implementation of rice extension plan
- WIAD officers should be invited to Joint Training and On-Site Trainings
- WIAD officers can motivate female farmers at OST so that female farmers can fully understand technical package and participate whole rice extension activities

N’puhi ya & Arigato!





Standard Cropping Calendar in Ashanti Region (Transplanting - Agra)



Standard Cropping Calendar in Ashanti Region (Transplanting - Agra)

April / May	June	July	Aug.	Sept.

Raining

Rice growth

Seedling | Trans-planting | Tillering | Panicle initiation | Booting | Heading/ Flowering | Ripening/ Maturing

Vegetative Stage	Reproductive Stage	Ripening Stage

0 wk | 3 wk (21 d) | 5 wk (35 d) | 7 wk (49 d) | 9-10wk (65 d) | 11wk (80d) | 14wk (100d) | 19 wk (133 d)

Work

Nursery preparation & Sowing → Land development → Transplanting → 1st Fertilization & Weeding → 2nd Fertilization & Weeding → 3rd Fertilization → Harvesting → Threshing, Winnowing, Drying & Milling → Marketing

Off-Type Removal

Water Level

10 cm | 3 cm | 5 cm | 10 cm | 3 cm

April / May	June	July	Aug.	Sept.

Raining

Rice growth

Seedling | Trans-planting | Tillering | Panicle initiation | Booting | Heading/ Flowering | Ripening/ Maturing

Vegetative Stage | Reproductive Stage | Ripening Stage

Work

0 wk | 3 wk (21 d) | 5 wk (35 d) | 7 wk (49 d) | 9-10wk (65 d) | 11wk (80d) | 14wk (100d) | 19 wk (133 d)













Nursery preparation & Sowing | Land development | Transplanting | 1st Fertilization & Weeding | 2nd Fertilization & Weeding | 3rd Fertilization | Harvesting | Threshing, Winnowing, Drying & Milling | Marketing

Off-Type Removal

Water Level

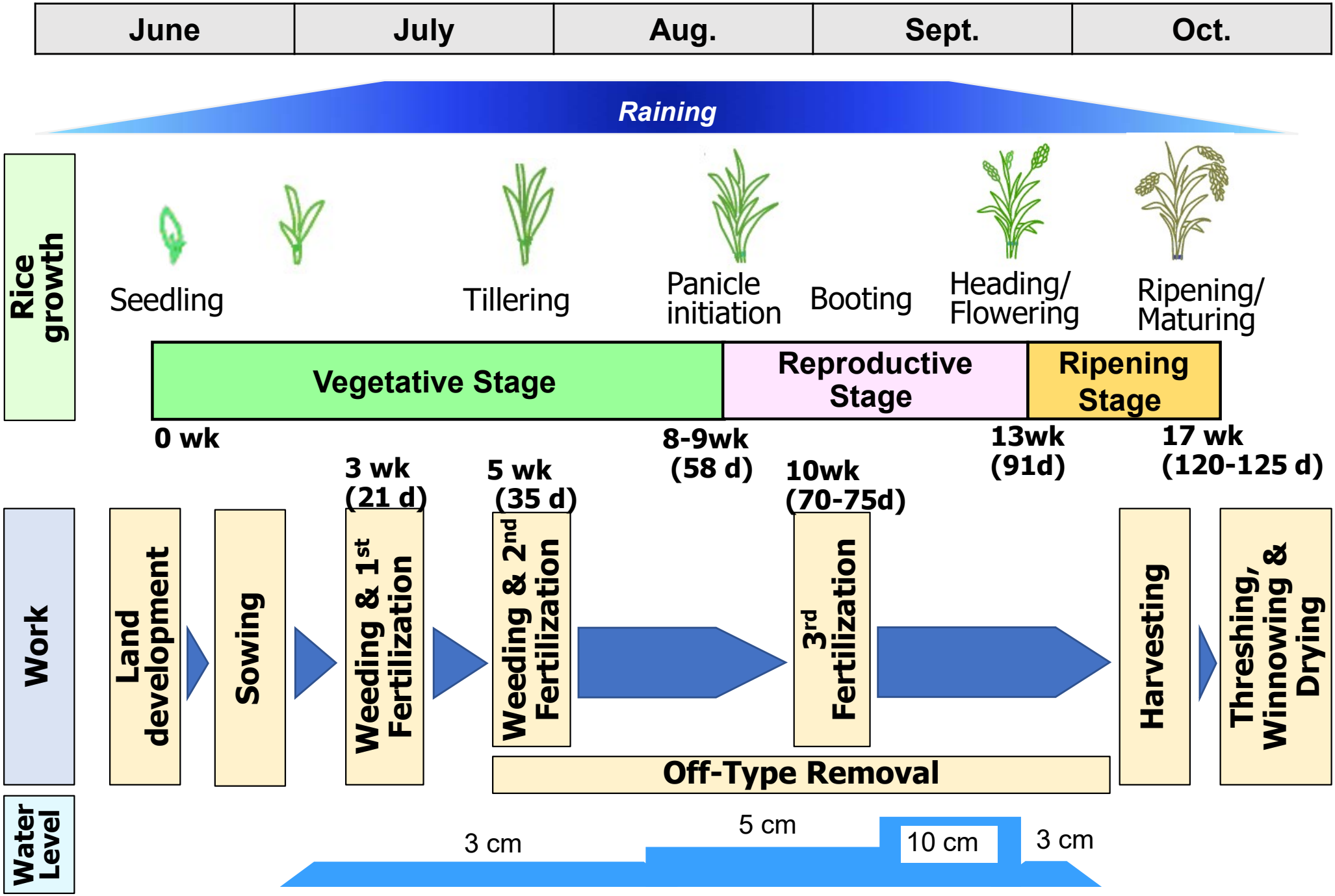
10 cm | 3 cm | 5 cm | 10 cm | 3 cm

Training

TOT/JT 1 | TOT/JT 2 | TOT/JT 3

OST | OST | OST | OST | OST

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



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

June	July	Aug.	Sept.	Oct.

Raining

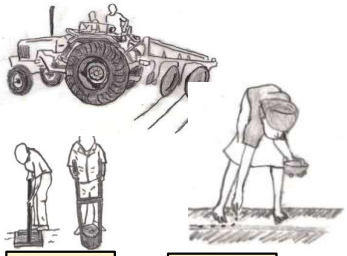
Rice growth

Seedling | Tillering | Panicle initiation | Booting | Heading/ Flowering | Ripening/ Maturing

Vegetative Stage	Reproductive Stage	Ripening Stage

0 wk | 3 wk (21 d) | 5 wk (35 d) | 8-9wk (58 d) | 10wk (70-75d) | 13wk (91d) | 17 wk (120-125 d)

Work





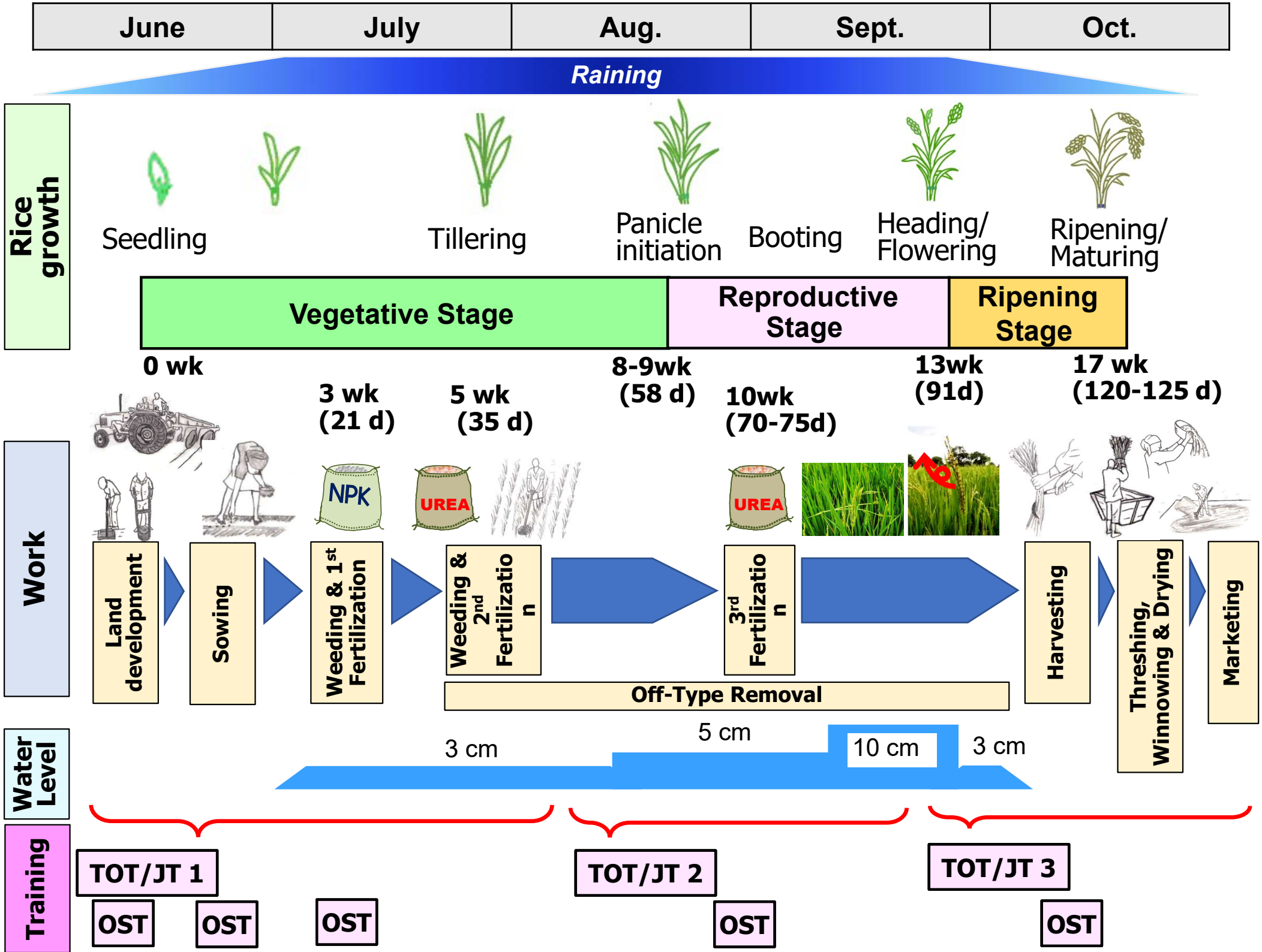


Land development | Sowing | Weeding & 1st Fertilization | Weeding & 2nd Fertilization | 3rd Fertilization | Harvesting | Threshing, Winnowing & Drying | Marketing

Off-Type Removal

Water Level

3 cm | 5 cm | 10 cm | 3 cm


June
July
Aug.
Sept.
Oct.
Raining
Rice growth
Seedling
Tillering
Panicle initiation
Booting
Heading/ Flowering
Ripening/ Maturing
Vegetative Stage
Reproductive Stage
Ripening Stage
0 wk
3 wk (21 d)
5 wk (35 d)
8-9wk (58 d)
10wk (70-75d)
13wk (91d)
17 wk (120-125 d)
Work
NPK
UREA
UREA
Land development
Sowing
Weeding & 1st Fertilization
Weeding & 2nd Fertilizatio n
3rd Fertilizatio n
Harvesting
Threshing, Winnowing & Drying
Marketing
Off-Type Removal
Water Level
3 cm
5 cm
10 cm
3 cm
Training
TOT/JT 1
TOT/JT 2
TOT/JT 3
OST
OST
OST
OST
OST

Form 2-1a: Demo-Plot Action Plan & Monitoring Sheet (3) Direct Sowing Northern Region

Name of AEA:	Number of Group Farmers: M: F:	Community:
Phone No. of AEA:	(Youth: Aged: PLWDs:)	Size of Demo Plot: acre
Operational Area:	Name of Key Farmer:	Rice Variety:
District:	Phone No. of Key Farmer:	

No.	Field work	Action Plan			Monitoring			
		Week-based Time frame	**Date-based Time frame (from to)**	**Recommended tool & inputs**	**Date Implemented**	**No. of farmers participated**	- Describe each activity in detail, - Evaluate each work whether it is implemented along with the guideline	**Remarks on the field and crop condition, if any**
1	Land clearing	3 weeks (or more) before sowing		Cutlass		M: F:		
2	Ploughing	1 week before sowing		Tractor		M: F:		
3	Bund construction	1 week before sowing		Hoe, spade, compactor, slapper, garden line		M: F:		
4	Harrowing	1 week before sowing		Tractor, Harrow		M: F:		
5	Seed preparation	1 week before sowing		Rice seeds, salt, egg, bucket, sieve, firewood, pot, seed net		M: F:		
6	**Sowing**	**Week 0**		Hoe, line drawer		M: F:	Quantity of seeds: kg Sowing method: Row distance: cm	
7	1st Weeding	3 weeks after sowing		Weeding hoe		M: F:		
8	1st Fertilizer application	3 weeks after sowing		Fertilizer, weighing scale, containers		M: F:	Type of fertilizer applied: Quantity applied: kg	
9	2nd Weeding	5 weeks after sowing		Weeding hoe		M: F:		
10	2nd Fertilizer application	5 weeks after sowing		Fertilizer, weighing scale, containers		M: F:	Type of fertilizer applied: Quantity applied: kg	
11	Off-type removal (for seed production)	from 5 weeks after sowing to the day of harvesting		No tool (hand removal)		M: F:		

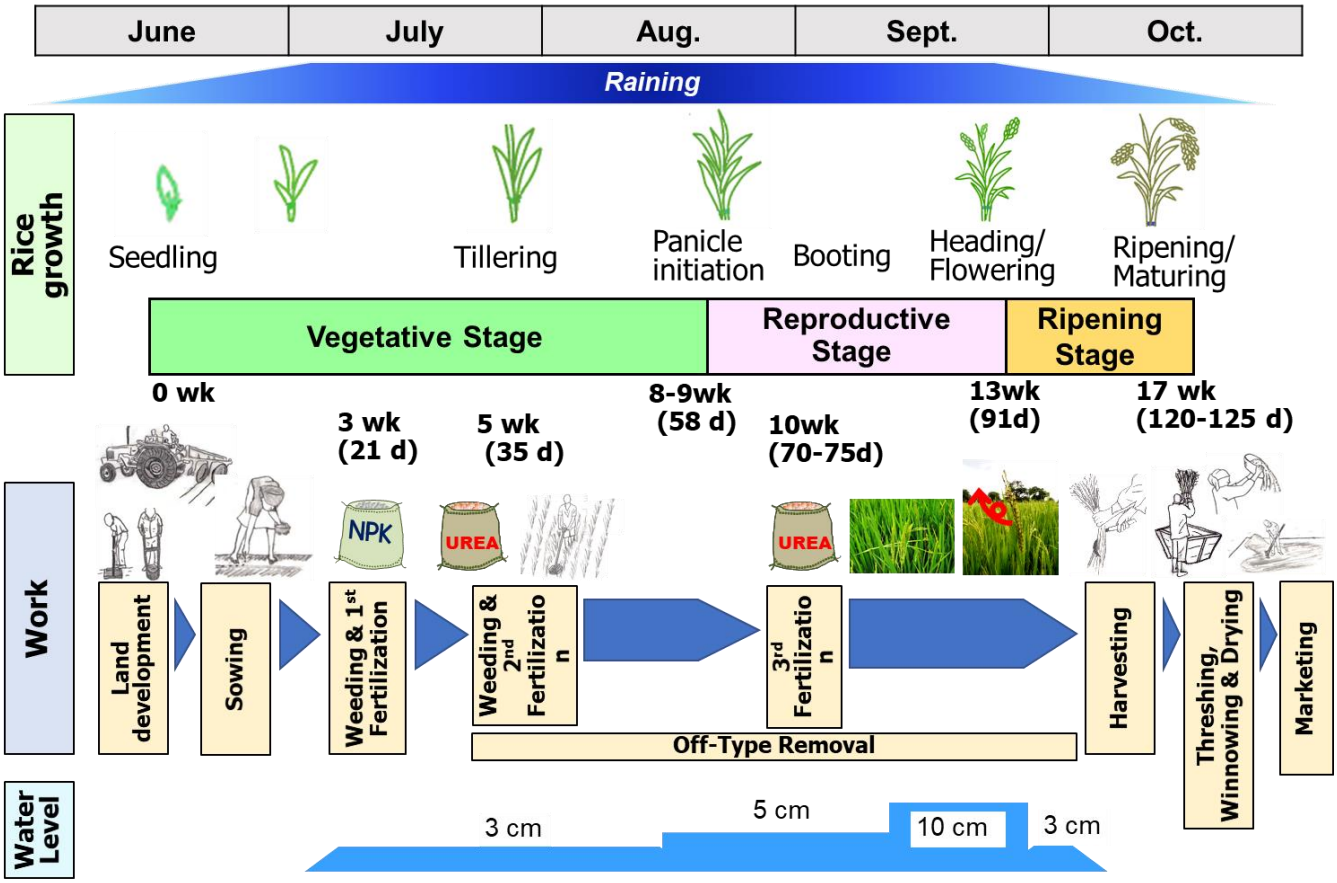
No.	Field work	Action Plan			Monitoring			
		Week-based Time frame	**Date-based Time frame (from to)**	**Recommended tool & inputs**	**Date Implemented**	**No. of farmers participated**	- Describe each activity in detail, - Evaluate each work whether it is implemented along with the guideline	**Remarks on the field and crop condition, if any**
12	3rd Weeding	10 weeks after sowing		Weeding hoe		M: F:		
13	3rd Fertilizer application	10 weeks after sowing		Fertilizer, weighing scale, containers		M: F:	Type of fertilizer applied: Quantity applied: kg	
14	**Heading**	**Heading more than 50% rice plants**						
15	Bird scaring	13 - 17 weeks after sowing		Fishing net		M: F:		
16	**Maturing**	**Accumulated temperature 950℃ from heading date**						
	Harvesting	17 weeks after sowing (determined by observation)		Sickle		M: F:	Moisture content: %	
	Threshing			Tarpaulin, Bambam box, sacks, head carriage		M: F:		
17	Winnowing	17 weeks after sowing		Tarpaulin, sacks		M: F:		
	Drying					M: F:	Moisture content: % Number of bags:	Bag size:
18	Storing	17 weeks after sowing ~		Storage facility, wooden pallets		M: F:		
19	Milling	17 weeks after sowing ~		Sacks		M: F:		
20	Selling	17 weeks after sowing ~		Sacks		M: F:		

Onsite Training (OST) Record

1st OST	2nd OST	3rd OST	4th OST	5th OST
Date:	Date:	Date:	Date:	Date:
Participants: M F	Participants: M F	Participants: M F	Participants: M F	Participants: M F
(Youth, Aged, PLWDs)	(Youth, Aged, PLWDs)	(Youth, Aged, PLWDs)	(Youth, Aged, PLWDs)	(Youth, Aged, PLWDs)
Topics trained:	Topics trained:	Topics trained:	Topics trained:	Topics trained:

FARM RECORD KEEPING BOOK
-Direct Sowing method-

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



Ministry of Food & Agriculture
Republic of Ghana

Japan International Cooperation Agency

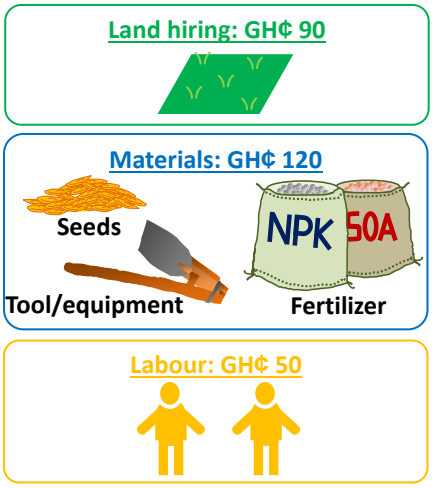
Name:_____

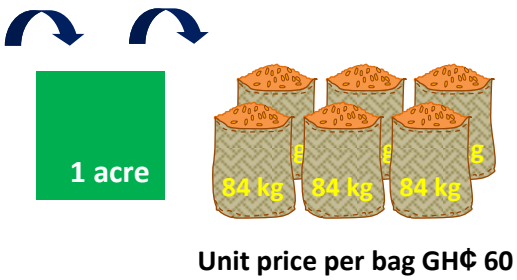
Let's do an exercise!

INSTRUCTION

1. **Costs = Costs for land + Costs for materials + Costs for labour**
2. **Sales = Number of bags sold x Unit price**
3. **Profit or Loss = Sales – Cost**

Farmer A





Unit price per bag GH¢ 60

Total costs: GH¢ 260

90 + 120 + 50 = 260

Total sales: GH¢ 360

60 x 6 = 360

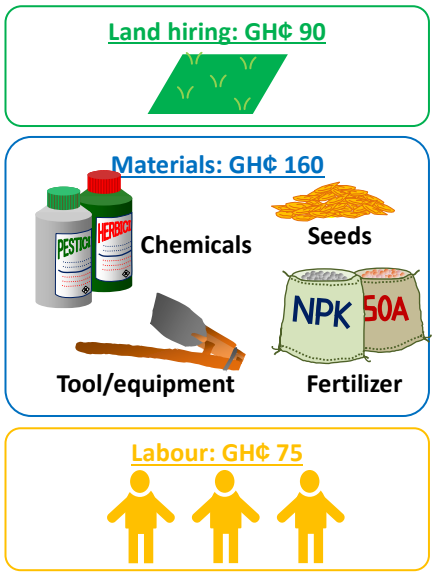
EXAMPLE

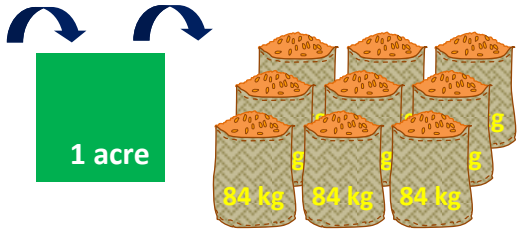
Farmer A		GH¢
COSTS	Land	90
	Materials	120
	Labour	50
	Total costs	260
Total sales		360
Profit		100

Profit: GH¢ 100

360 - 260 = 100

Farmer B





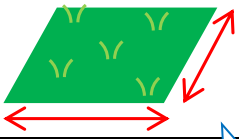
Unit price per bag GH¢ 60

LET'S TRY!

Farmer B		GH¢
COSTS	Land	
	Materials	
	Labour	
	Total costs	
Total sales		
Profit		

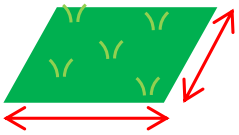
Total costs: GH¢ 325 **Total sales: GH¢ 540** **Profit: GH¢ 215**

EXAMPLE

Rice cropping year: 2014 ~ 2015
Area size: 1 acre 
Land hiring cost: GH¢ 90 **(A)** → Transfer the cost to page 7

If you have several rice plots, select one and record its size here. Then, keep recording costs and sales for the selected pot in the following pages.

LET'S TRY!

Rice cropping year:
Area size: 
Land hiring cost: GH¢ **(A)** → Transfer the cost to page 8

Material costs

EXAMPLE

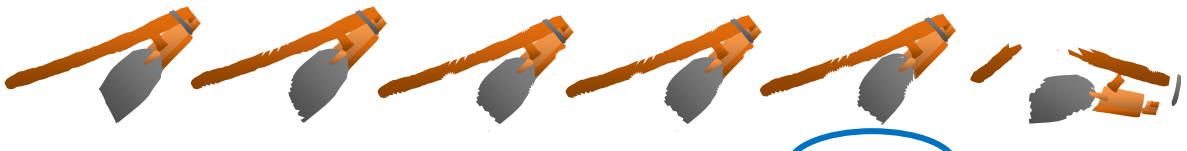
	Input	Unit	No. or QTY/unit (B)	Unit cost (GH¢) (C)	Usable year (D)	Cost per year (GH¢) (B) x (C) / (D)
Consumable items	Seeds	bag	1	24	1	24
	Fertilizer NPK	50 kg/bag	2	50	1	100
	Fertilizer SOA	50 kg/bag	2	44	1	88
	Herbicides (1)	Liter or gram	1	12	1	12
	Herbicides (2)	Liter or gram	1	12	1	12
	Fungicides	Liter or gram	1	8	1	8
	Insecticides	Liter	1	8	1	8
Tool/equipment	Leveler	-	1	20	5	4
	Hoe	-	1	10	5	2
	Sickle	-	1	10	5	2
	Net	-	1	40	4	10
	Tarpaulin	-	1	150	10	15
	Bambam box	-	1	150	10	15
	Sacks	-	6	4	3	8
	Others_____					
	Others_____					
	Others_____					
					TOTAL	308 (E)

$\frac{6 \times 4}{3} = 8$

Transfer the total to page 7

INSTRUCTION

What is usable year?



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

Material costs

LET'S TRY!

	Input	Unit	No. or QTY/unit	Unit cost (GH¢)	Usable year	Cost per year (GH¢)
			(B)	(C)	(D)	$\frac{(B) \times (C)}{(D)}$
Consumable items	Seeds	bag				
	Fertilizer NPK	50 kg/bag				
	Fertilizer SOA	50 kg/bag				
	Herbicides (1)	Liter or gram				
	Herbicides (2)	Liter or gram				
	Fungicides	Liter or gram				
	Insecticides	Liter				
Tool/equipment	Leveler	-				
	Hoe	-				
	Sickle	-				
	Net	-				
	Tarpaulin	-				
	Bambam box	-				
	Sacks	-				
	Others_____					
	Others_____					
	Others_____					
					TOTAL	(E)

Transfer the total to page 8

Labour costs

EXAMPLE

	Activity	Date (period)	No. of family/free labour	No. of paid labour (or acre)	Unit cost (GH¢)	Total costs (GH¢)
				(F)	(G)	(F) X (G)
Preparation period	Land clearing	3 June	2	-		
	De-stumping	17 June	2	-		
	Bund construction or maintenance	24 June	2	-		-
	Ploughing (Tractor)	24 June	-	1 acre	35	35
	Harrowing (Tractor)	30 June	-	1 acre	17	17
	Seed preparation	30 June	1	-	-	-
	Sowing	1 July	3	-	-	-
Cultivation period	Weeding: 1st	22 July	2	1	5	5
	Fertilizer application: 1st (NPK)	22 July	1	-	-	-
	Weeding: 2nd	5 August	2	1	5	5
	Fertilizer application: 2nd (SOA)	5 August	1	-	-	-
	Weeding: 3rd	2 September	2	-	-	-
	Fertilizer application: 3rd (SOA)	9 September	1	-	-	-
	Fertilizer application: 4th (SOA)	From 16 to 30 September	1	-	-	-
	Off-type removal: 1st	29 September	2	-	-	-
	Off-type removal: 2nd	7 October	2	-		-
	Off-type removal: 3rd	14 October	2	-		-
	Off-type removal: 4th	21 October	2	-	-	-
	Bird scaring	From 29 Sep. to 29 Oct.	3	-	-	-
	Harvesting	29 October	3	2	20	40
Post-harvest period	Threshing and winnowing	29 October	2	4	25	100
	Transporting (from field to house)	31 October	1	22	1	22
Optional	Chemical spraying	3 June	1	-	-	-
	Chemical spraying	2 July	1	-	-	-
	Chemical spraying	4 October	1	-	-	-
					TOTAL	224 (H)

Record Unit cost per acre

2 x 20 = 40

Transfer the total to page 7

Labour costs

LET'S TRY!

	Activity	Date (period)	No. of family/free labour	No. of paid labour (or acre)	Unit cost (GH¢)	Total costs (GH¢)
				(F)	(G)	(F) X (G)
Preparation period	Land clearing					
	De-stumping					
	Bund construction or maintenance					
	Ploughing (Tractor)			acre		
	Harrowing (Tractor)			acre		
	Seed preparation					
	Sowing					
Cultivation period	Weeding: 1st					
	Fertilizer application: 1st (NPK)					
	Weeding: 2nd					
	Fertilizer application: 2nd (SOA)					
	Weeding: 3rd					
	Fertilizer application: 3rd (SOA)					
	Fertilizer application: 4th (SOA)					
	Off-type removal: 1st					
	Off-type removal: 2nd					
	Off-type removal: 3rd					
	Off-type removal: 4th					
	Bird scaring					
	Harvesting					
Post-harvest period	Threshing and winnowing					
	Transporting (from field to house)					
Optional	Chemical spraying					
	Chemical spraying					
	Chemical spraying					
					TOTAL	(H)

Transfer the total to page 8

EXAMPLE

Total sales of paddy

	No. of sold bags	Unit price of bag (84kg)	Unit price of bag (120kg)	Sales (GH¢)
	(I)	**(J)**		**(I) x (J)**
October	4	70	-	280
November	3	65	-	195
December	2	65	-	130
January	-	-	-	-
February	-	-	-	-
March	-	-	-	-
April	2	55	-	110
May	1	50	-	50
June	2	50	-	100
Total sales per one season				925 **(K)**

2 x 65 = 130

Total costs/sales/profit or loss

Unit: GH¢

		INSTRUCTION	EXAMPLE
COSTS	Land hiring cost **(A)**	See page 2	90
	Material costs **(E)**	See page 3	308
	Labour costs **(H)**	See page 5	224
	Total costs **(L)**	(A) + (E) + (H)	622
Total sales per one season **(K)**		See above	925
Profit or Loss		(K) – (L)	303

925 – 622 = 303

Total production (supplementary record)

	Unit	INSTRUCTION	EXAMPLE
Size of bag **(M)**	kg		84
Total number of bags harvested **(N)**	-	-	12

Total production	kg	(M) x (N)	1,008

Total sales of paddy

LET'S TRY!

	No. of sold bags	Unit price of bag (84kg)	Unit price of bag (120kg)	Sales (GH¢)
	(I)	**(J)**		**(I) x (J)**
October				
November				
December				
January				
February				
March				
April				
May				
June				
Total sales per one season				**(K)**

Total costs/sales/profit or loss

Unit: GH¢

		INSTRUCTION	LET'S TRY!
COSTS	Land hiring cost **(A)**	See page 2	
	Material costs **(E)**	See page 4	
	Labour costs **(H)**	See page 6	
	Total costs **(L)**	(A) + (E) + (H)	
Total sales per one season **(K)**		See above	
Profit or Loss		(K) – (L)	

Total production (supplementary record)

	Unit	INSTRUCTION	LET'S TRY!
Size of bag **(M)**	kg	-	
Total number of bags harvested **(N)**	-	-	

Total production	kg	(M) x (N)	

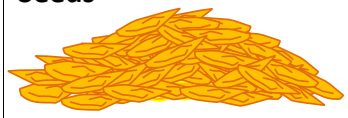
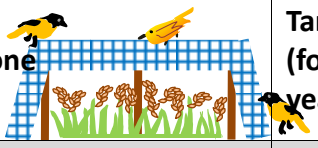
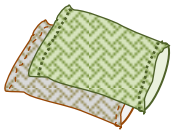
EXAMPLE

Farm record keeping sheet / Direct Sowing method

MoFA-JICA Project on Sustainable Development of Rain-fed Lowland Rice Production

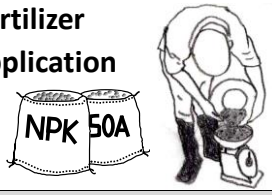
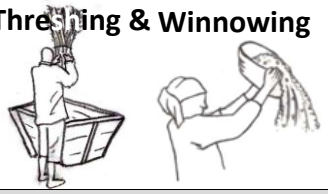
Farmer's name:_____

MATERIALS

Seeds 	Fertilizer 	Chemicals 	Leveler (for one year) 
GH₵ 24	GH₵ 105	GH₵ 32	GH₵ 4
Sickle (for one year) 	Hoe (for one year) 	Net (for one year) 	Tarpaulin (for one year) 
GH₵ 2	GH₵ 2	GH₵ 10	GH₵ 15
Bambambox (for one year) 	Sacks (for one year) 	Others	Others
GH₵ 15	GH₵ 8	GH₵ -	GH₵ -
			SUB-TOTAL: GH₵ 217

GH₵ 16 / 2 seasons = GH₵ 8 per year

LABOUR (excluding unpaid labour)

Bund construction or maintenance 	Ploughing 	Harrowing 	Sowing 
GH₵ 50	GH₵ 60	GH₵ 47	GH₵ 30
Weeding 	Fertilizer application 	Bird scaring 	Harvesting 
GH₵ 10	GH₵ -	GH₵ -	GH₵ -
Threshing & Winnowing 	Drying 	Transporting (from field to house) 	Others
GH₵ -	GH₵ -	GH₵ -	GH₵ -
			SUB-TOTAL: GH₵ 197

Total production

No. of bags harvested	
84 kg 	120 kg 
14 ④	- ⑤

Cost/sales/profit or loss

Land	Total costs (GH₵)	Total sales (GH₵)	Profit or loss (GH₵)
Acre: 1 			
Rent: GH₵ 100	414	950	536



100 + 217 + 197 = 414

950 – 414 = 536

Farm record keeping sheet / Direct Sowing method

LET'S TRY!

MoFA-JICA Project on Sustainable Development of Rain-fed Lowland Rice Production

Farmer's name:_____

MATERIALS

Seeds	Fertilizer	Chemicals	Leveler (for one year)
GH₵	GH₵	GH₵	GH₵
Sickle (for one year)	Hoe (for one year)	Net (for one year)	Tarpaulin (for one year)
GH₵	GH₵	GH₵	GH₵
Bambambox (for one year)	Sacks (for one year)	Others	Others
GH₵	GH₵	GH₵	GH₵
			SUB-TOTAL: GH₵

LABOUR (excluding unpaid labour)

Bund construction or maintenance	Ploughing	Harrowing	Sowing
GH₵	GH₵	GH₵	GH₵
Weeding	Fertilizer application	Bird scaring	Harvesting
GH₵	GH₵	GH₵	GH₵
Threshing & Winnowing	Drying	Transporting (from field to house)	Others
GH₵	GH₵	GH₵	GH₵
			SUB-TOTAL: GH₵

Total production

No. of bags harvested	
84 kg	120 kg

Cost/sales/profit or loss

Land	Total costs (GH₵)	Total sales (GH₵)	Profit or loss (GH₵)
Acre:			
Rent: GH₵			