



MOFA/JICA TENSUI RICE

# Sample Program (1 Day) and Detailed Timeframe/ Points to be Emphasized

## For Training of Trainers at Districts

Rice  
Cultivation

Farming  
Management

Land  
Development

Extension

Other



# Programme and Allocation of time of TOT (Example)

|                         |                          |
|-------------------------|--------------------------|
|                         |                          |
| 8:00-9:00 (1 hour)      | Introduction & Extension |
| 9:00-11:00 (2 hours)    | Land Development         |
| 11:00- 13:00 (2 hours)  | Rice Cultivation         |
| 13:00-13:30 (0.5 hour)  | Lunch                    |
| 13:30-15:00 (1.5 hours) | FMSS                     |
| 15:00-16:00<br>(1 hour) | M&E & the way forward    |



# TIPS for managing presentations

## [Preparation of Assigned DAOs]

- Assigned DAOs should recall what they learnt in regional TOT and how to proceed their presentations **WITHIN TIME ALLOCATED** as suggested in this document.

## [On the day of TOT]

- Be punctual. Start on time.
- Consider time management of program using this detailed timeframe.
- Make presentations within time allocated.
- The number of Q&A should be limited by 2-3 from AEA's who will be in charge of OST in demo plots this year.

# Detailed Time Allocation and Points to be Emphasized (1)

## Introduction and Rice Extension



| Contents                           | Mode of Training             | Points to be Emphasized   | Time Allocation |
|------------------------------------|------------------------------|---|-----------------|
| Introduction                       | Explanation by an Instructor | <ul style="list-style-type: none"> <li>- Purpose of the training are                             <ol style="list-style-type: none"> <li>(1) to let all district officials be conversant with the Guideline.</li> <li>(2) To enable district officers and AEAs to train farmers in demo plot.</li> </ol> </li> <li>- MMDAs has prepared and are going to implement Rice Extension Plan and its budget item in the composite budget.</li> </ul> | 10 min.         |
| Rice Extension Plan and its budget | Explanation by an Instructor | <ul style="list-style-type: none"> <li>- Yield targets and expected number of farmers trained</li> <li>- The number of demo plots to be established.</li> </ul>   | 5 min.          |
| Extension Guideline                |                              | <ul style="list-style-type: none"> <li>- Understand contents of Rice Extension Guideline.</li> <li>- Understand what steps districts should take.</li> <li>- Understand how to use dissemination kit.</li> </ul>  | 45 min.         |



# Detailed Time Allocation and Points to be Emphasized (2)

## Land Development (1)



| Contents                                | Mode of Training             | Points to be Emphasized  | Time Allocation |
|---|------------------------------|--|-----------------|
| Rain-fed Model                          | Explanation by Trainer       | <p>Officers should understand that;</p> <ul style="list-style-type: none"> <li>- Rain-fed model is for the small scale rice farmer.</li> <li>- It is not mechanized but simple tools are used for development</li> </ul>     | 5 mins.         |
| Site Selection and Guidelines           | Explanation by Trainer       | <ul style="list-style-type: none"> <li>- Criteria to look out for when selecting valleys</li> <li>- Criteria to avoid when selecting valleys</li> </ul>  | 15 mins.        |
| Land Demarcation and Field Measurements | Explanation by Trainer       | <ul style="list-style-type: none"> <li>- Importance of field measurement and tools used</li> <li>- Steps to divide field into triangles</li> <li>- Formulae for area calculation with emphasis on Heron's formula</li> </ul> | 20 mins.        |
|   | Exercise by all Participants | <ul style="list-style-type: none"> <li>- Participants do an exercise to enable them to know how to use the Heron's formula to determine field area.</li> </ul>   | 15 mins.        |
|   |                              | <ul style="list-style-type: none"> <li>- Trainer takes participants through the steps of the solution on slides 13 and 14</li> </ul>   | 5mins.          |

# Detailed Time Allocation and Points to be Emphasized

## Land Development (2)



| Contents                             | Mode of Training       | Points to be Emphasized   | Time Allocation |
|--------------------------------------|------------------------|---|-----------------|
| Bunds Construction                   | Explanation by Trainer | <ul style="list-style-type: none"> <li>- Functions of bunds</li> <li>- Guidelines on Bunds construction</li> <li>- Compaction and reshaping of bunds</li> <li>- Maintenance of bunds</li> </ul> | 20 mins         |
| Ploughing, land levelling & puddling | Explanation by Trainer | <ul style="list-style-type: none"> <li>- Ploughing cycle</li> <li>- Steps involved in puddling</li> <li>- Land Levelling</li> </ul>   | 30 mins         |
| Water use and management             | Explanation by Trainer | <ul style="list-style-type: none"> <li>- Water management and control systems</li> </ul>  | 10 mins         |



# Detailed Time Allocation and Points to be Emphasized(3)

## Rice Cultivation (1)

| Contents                       | Mode of Training | Points to be Emphasized  | Time Allocation |
|--------------------------------|------------------|--|-----------------|
| Seed Preparation               | Lecture          | <ul style="list-style-type: none"> <li>Learn how to select seed by salt water method.</li> <li>Wash the seed with fresh water thoroughly</li> <li>In hot water treatment , water temperature should be 60 degrees sharp for 10 minutes.</li> </ul> | 15 min.         |
| Nursery Preparation and Sowing | Lecture          | <ul style="list-style-type: none"> <li>Land preparation process: Ploughing, paddling, nursery making, and levelling</li> <li>Sowing and seed rates</li> <li>Growth of seedlings and Nursery period</li> </ul>                                      | 15 min.         |
| Transplanting                  | Lecture          | <ul style="list-style-type: none"> <li>Do not damage roots when seedlings are uprooted.</li> <li>Spacing: 30cmx10cm or 30cmx15cm</li> <li>Planting depth: 2-3cm</li> </ul>   | 10 min.         |

# Deatiled Time Allocation and Points to be Emphasized (3)

## Rice Cultivation (2)



| Contents                 | Mode of Training     | Points to be Emphasized  | Time Allocation |
|--------------------------|----------------------|--|-----------------|
| Direct Sowing            | Lecture              | <ul style="list-style-type: none"> <li>• Spacing: row distance 30cm</li> <li>• Sowing method: drilling</li> <li>• Sowing depth: 2-3cm</li> <li>• Use of drawer</li> <li>• Importance of levelling</li> </ul>           | 10 min.         |
| On-farm Water Management | Lecture              | <ul style="list-style-type: none"> <li>• Water level at each growth stage</li> </ul>   | 10 min.         |
| Fertilizer Management    | Lecture              | <ul style="list-style-type: none"> <li>• Fertilizer application of 3 splits</li> <li>• Factors to decide right amount of fertilizer</li> </ul>   | 10 min.         |
| Fertilizer Calculation   | Lecture and Practice | <ul style="list-style-type: none"> <li>• Ingredients of fertilizers</li> <li>• Amount of applied fertilizer</li> <li>• Learn the formula of fertilizer calculation</li> </ul>  | 10 min.         |
| Disease Control          | Lecture              | <ul style="list-style-type: none"> <li>• Introduction of rice blast</li> </ul>   | 5 min.          |
| Weed Control             | Lecture              | <ul style="list-style-type: none"> <li>• How to use herbicide</li> </ul>   | 5 min.          |
| Seed Preparation         | Demonstration        | <ul style="list-style-type: none"> <li>• Process of Salt Water Seed Selection and Hot Water Seed Treatment</li> <li>• Preparation of how water in a cleaned drum should start ONE HOUR before this section.</li> </ul> | 30 min.         |



# Detailed Time Allocation and Points to be Emphasized (4)

## FMSS (Ashanti)\_1

| Contents  | Mode of Training  | Points to Emphasize  | Time Allocation |
|---|---|--|-----------------|
| <b>Introduction</b>   | Explanation by an Instructor  | -  | 5 min.          |
| <b>Action planning based on Cropping calendar</b> (refer Form 2-1: Demo-Plot Action Plan in the M&E tool) | Explanation by an Instructor  | <ul style="list-style-type: none"> <li>•Dates for every action should be determined following the week-base timeframe (first, determine dates for sowing)</li> </ul> | 10 min.         |
|   | <b><u>Group Exercise by All the Participants</u></b><br>(participants should be separated into groups. AEA in charge of demo-plot should work on own demo-plot action plan) |  | 20 min          |
| <b>Gender Viewpoint</b>   | Explanation by an Instructor  | <ul style="list-style-type: none"> <li>•Tips for AEAs for better involvement of female farmers</li> </ul>  | 5 min           |

# Detailed Time Allocation and Points to be Emphasized (4)

## FMSS (Ashanti)\_2



| Contents  | Mode of Training   | Points to be Emphasized  | Time Allocation |
|---|--|--|-----------------|
| <p><b>Record keeping</b><br/>(refer FM-Ref-3 Farm record keeping sheet (ASH))</p> | <p>Explanation by an Instructor</p>  | <ul style="list-style-type: none"> <li>• Profit/loss can be calculated by subtracting cost from income</li> <li>• Depreciate equipment over expected useful life-span in seasons and record cost per season</li> </ul> | <p>10 min.</p>  |
|   | <p><b><u>Group Exercise by All the Participants</u></b><br/>(participants should be separated into groups. Each group should work on one record keeping sheet)</p>                               |  | <p>15 min.</p>  |
| <p><b>Farm management</b><br/>(Use flipchart OST material for practice)</p>       | <p><b><u>Group Exercise by All the Participants</u></b><br/>(participants should be separated into 3 groups. AEAs in charge of the demo-plots should do an exercise by using the flipcharts)</p> | <p>Use the flipchart proper (front sides for farmers and back sides for instructors)</p>   | <p>25 min.</p>  |



# Detailed Time Allocation and Points to be Emphasized (5)

## M&E and Wrap up



| Contents        | Mode of Training                       | Points to be Emphasized   | Time Allocation |
|-----------------|--|---|-----------------|
| M&E             | Explanation by an Instructor           | <ul style="list-style-type: none"> <li>- General understanding of M&amp;E</li> <li>- Understand how to use forms 2-1 and 2-2 to collect and report information from farmers and from demonstration plots.</li> </ul>          | 20 min.         |
|                 | Group work on how to fill the formats. | <ul style="list-style-type: none"> <li>- Let AEAs to fully understand how to use forms 2-1 and 2-2.</li> </ul>  | 25 min          |
| The Way Forward |  | <ul style="list-style-type: none"> <li>- Let AEAs start prepare Action Plan in their demo plots in charge for setting date for OST in selected site (Training Plot)</li> <li>- Confirmation of materials provided.</li> </ul> | 15 min          |



# Sample Program (2-day) and Detailed Timeframe/ Points to be Emphasized

For 1<sup>st</sup> Training of Trainers at districts

## PROPOSED TIME FRAME FOR 1st TRAINING OF TRAINERS

| <b>DAY 1</b>                             |   |
|--|---|
| <b>Time</b>                              | <b>Contents</b>   |
| <b>08:00</b>                             | Opening   |
| <b>08:10-08:30<br/>(20 minutes)</b>      | Introduction<br>Purpose of Training                               |
| <b>08:30-10:00<br/>(1hour30 minutes)</b> | Extension<br>General                      Extension<br>Activities |
| <b>10:00-10:30<br/>(30 minutes)</b>      | Break   |
| <b>10:30-12:30<br/>(2 hours)</b>         | Land Development  |
| <b>12:30-13:30<br/>(1 hour)</b>          | Lunch   |
| <b>13:30-16:30<br/>(3 hours)</b>         | Rice Cultivation  |
| <b>16:30</b>                             | Closing   |

| <b>DAY 2</b>                        |   |
|-------------------------------------|---|
| <b>Time</b>                         | <b>Contents</b>   |
| <b>08:00-10:00<br/>(2 hours)</b>    | Farming      Management<br>and Support System                 |
| <b>10:00-10:30<br/>(30 minutes)</b> | Break   |
| <b>10:30-12:30<br/>(2 hours)</b>    | M&E Tools   |
| <b>12:30-13:30<br/>(1 hour)</b>     | Lunch   |
| <b>13:30-14:00<br/>(30 minutes)</b> | Way Forward   |
| <b>14:00-15:00<br/>(1 hour)</b>     | Evaluation      Test      (30<br>minutes)<br>Check the answer |
| <b>15:00-</b>                       | Closing   |

# TIPS for managing presentations

## [Preparation of Assigned DAOs]

- Assigned DAOs should recall what they learnt in regional TOT and how to proceed their presentations **WITHIN TIME ALLOCATED** as suggested in this document.

## [On the day of TOT]

- Be punctual. Start on time.
- Consider time management of program using this detailed timeframe.
- Make presentations within time allocated.
- The number of Q&A should be limited by 2-3 from AEAs who will be in charge of OST in demo plots this year.

# Detailed Time Allocation and Points to be Emphasized (1)

## Introduction and Rice Extension

| Contents                           | Mode of Training             | Points to be Emphasized   | Time Allocation |
|------------------------------------|------------------------------|---|-----------------|
| Introduction                       | Explanation by an Instructor | <ul style="list-style-type: none"> <li>- Purpose of the training are<br/>(1) to let all district officials be conversant with the Guideline.<br/>(2) To enable district officers and AEAs to train farmers in demo plot.</li> <li>- MMDAs has prepared and are going to implement Rice Extension Plan and its budget item in the composite budget.</li> </ul> | 10 min.         |
| Rice Extension Plan and its budget | Explanation by an Instructor | <ul style="list-style-type: none"> <li>- Yield targets and expected number of farmers trained</li> <li>- The number of demo plots to be established.</li> </ul>   | 10 min.         |
| Extension Guideline                |                              | <ul style="list-style-type: none"> <li>- Understand contents of Rice Extension Guideline.</li> <li>- Understand what steps districts should take.</li> <li>- Understand how to use dissemination kit.</li> </ul>  | 1.5 hour        |

# Detailed Time Allocation and Points to be Emphasized (2)

## Land Development (1)

| Contents                                | Mode of Training             | Points to be Emphasized  | Time Allocation |
|---|------------------------------|--|-----------------|
| Site Selection and Guidelines           | Explanation by Trainer       | <ul style="list-style-type: none"> <li>- Criteria to look out for when selecting valleys</li> <li>- Criteria to avoid when selecting valleys</li> </ul>  | 5 min.          |
| Land Demarcation and Field Measurements | Explanation by Trainer       | <ul style="list-style-type: none"> <li>- Importance of field measurement and tools used</li> <li>- Steps to divide field into triangles</li> <li>- Formulae for area calculation with emphasis on Heron's formula</li> </ul> | 15 min.         |
|   | Exercise by all Participants | - Participants do an exercise to enable them to know how to use the Heron's formula to determine field area.   | 1 hour          |
|   |                              | - Trainer takes participants through the steps of the solution on slides 13 and 14   | 15 min.         |



# Detailed Time Allocation and Points to be Emphasized (2)

## Land Development (2)

| Contents                             | Mode of Training       | Points to be Emphasized   | Time Allocation |
|--------------------------------------|------------------------|---|-----------------|
| Bunds Construction                   | Explanation by Trainer | <ul style="list-style-type: none"> <li>- Functions of bunds</li> <li>- Guidelines on Bunds construction</li> <li>- Compaction and reshaping of bunds</li> <li>- Maintenance of bunds</li> </ul> | 15 min.         |
| Ploughing, land levelling & puddling | Explanation by Trainer | <ul style="list-style-type: none"> <li>- Ploughing cycle</li> <li>- Steps involved in puddling</li> <li>- Land Levelling</li> </ul>   | 5 min.          |
| Water use and management             | Explanation by Trainer | <ul style="list-style-type: none"> <li>- Water management and control systems</li> </ul>  | 5 min.          |

# Detailed Time Allocation and Points to be Emphasized(3)

## Rice Cultivation (1)

| Contents                       | Mode of Training | Points to be Emphasized  | Time Allocation |
|--------------------------------|------------------|--|-----------------|
| Seed Preparation               | Lecture          | <ul style="list-style-type: none"><li>• Learn how to select seed by salt water method.</li><li>• Wash the seed with fresh water thoroughly</li><li>• In hot water treatment , water temperature should be 60 degrees sharp for 10 minutes.</li></ul> | 10 min.         |
| Nursery Preparation and Sowing | Lecture          | <ul style="list-style-type: none"><li>• Land preparation process: Ploughing, paddling, nursery making, and levelling</li><li>• Sowing and seed rates</li><li>• Growth of seedlings and Nursery period</li></ul>                                      | 10 min.         |
| Transplanting                  | Lecture          | <ul style="list-style-type: none"><li>• Do not damage roots when seedlings are uprooted.</li><li>• Spacing: 30cmx10cm or 30cmx15cm</li><li>• Planting depth: 2-3cm</li></ul>   | 5 min.          |

# Deatiled Time Allocation and Points to be Emphasized (3)

## Rice Cultivation (2)

| Contents               | Mode of Training     | Points to be Emphasized   | Time Allocation |
|------------------------|----------------------|---|-----------------|
| Direct Sowing          | Lecture              | <ul style="list-style-type: none"><li>• Spacing: row distance 30cm</li><li>• Sowing method: drilling</li><li>• Sowing depth: 2-3cm</li><li>• Use of drawer</li><li>• Importance of levelling</li></ul>              | 5min.           |
| Fertilizer Management  | Lecture              | <ul style="list-style-type: none"><li>• Fertilizer application of 3 splits</li><li>• Factors to decide right amount of fertilizer</li></ul>   | 20min.          |
| Fertilizer Calculation | Lecture and Practice | <ul style="list-style-type: none"><li>• Ingredients of fertilizers</li><li>• Amount of applied fertilizer</li><li>• Learn the formula of fertilizer calculation</li></ul>   | 45 min.         |
| Disease Control        | Lecture              | <ul style="list-style-type: none"><li>• Introduction of rice blast</li></ul>  | 5 min.          |
| Weed Control           | Lecture              | <ul style="list-style-type: none"><li>• How to use herbicide</li></ul>  | 10 min.         |
| Seed Preparation       | Demonstration        | <ul style="list-style-type: none"><li>• Process of Salt Water Seed Selection and Hot Water Seed Treatment</li><li>• Preparation of hot water in a cleaned drum should start ONE HOUR before this section.</li></ul> | 1 hour          |

# Detailed Time Allocation and Points to be Emphasized (4)

## FMSS (Ashanti)\_1

| Contents   | Mode of Training  | Points to Emphasize   | Time Allocation |
|--|---|---|-----------------|
| <b>Introduction</b>  | Explanation by an Instructor  | -   | 5 min.          |
| <b>Action planning based on Cropping calendar</b><br>(refer Form 2-1: Demo-Plot Action Plan in the M&E tool) | Explanation by an Instructor  | <ul style="list-style-type: none"> <li>Dates for every action should be determined following the week-base timeframe (first, determine dates for sowing)</li> </ul> | 15 min.         |
|  | <b><u>Group Exercise by All the Participants</u></b><br>(participants should be separated into groups. AEA in charge of demo-plot should work on own demo-plot action plan) |   | 25 min          |
| <b>Gender Viewpoint</b>  | Explanation by an Instructor  | <ul style="list-style-type: none"> <li>Tips for AEAs for better involvement of female farmers</li> </ul>  | 5 min           |

# Detailed Time Allocation and Points to be Emphasized (4)

## FMSS (Ashanti)\_2

| Contents  | Mode of Training   | Points to be Emphasized  | Time Allocation |
|---|--|--|-----------------|
| <b>Record keeping</b><br>(refer FM-Ref-3 Farm record keeping sheet (ASH)) | Explanation by an Instructor   | <ul style="list-style-type: none"> <li>•Profit/loss can be calculated by subtracting cost from income</li> <li>•Depreciate equipment over expected useful life-span in seasons and record cost per season</li> </ul> | 10 min.         |
|   | <b><u>Group Exercise by All the Participants</u></b><br>(participants should be separated into groups. Each group should work on one record keeping sheet)                               |  | 30 min.         |
| <b>Farm management</b><br>(Use flipchart OST material for practice)       | <b><u>Group Exercise by All the Participants</u></b><br>(participants should be separated into 3 groups. AEAs in charge of the demo-plots should do an exercise by using the flipcharts) | Use the flipchart proper (front sides for farmers and back sides for instructors)  | 40 min.         |

# Detailed Time Allocation and Points to be Emphasized (5)

## M&E and Wrap up

| Contents        | Mode of Training  | Points to be Emphasized   | Time Allocation |
|-----------------|---|---|-----------------|
| M&E             | Explanation by an Instructor  | <ul style="list-style-type: none"> <li>- General understanding of M&amp;E</li> <li>- Understand how to use forms 2-1 and 2-2 to collect and report information from farmers and from demonstration plots.</li> </ul>            | 20 mins         |
|                 | <p>Group work on how to fill the formats.</p> <ul style="list-style-type: none"> <li>- Form groups of 5 members and try to input Form 2-1 and 2-2.</li> </ul> <p>[Form 2-2]</p> <ul style="list-style-type: none"> <li>- For Form 2-2 following is recommended. 1 of them will be interviewed as a farmer.</li> <li>- The other person will record data in the form 2-2.</li> </ul> <p>After that the two persons will swap roles and repeat the process.</p> <p>Continue a turn 3 times.</p> | <ul style="list-style-type: none"> <li>- Let AEAs to fully understand how to use forms 2-1 and 2-2.</li> </ul>  | 1.5 hour        |
| The Way Forward |   | <ul style="list-style-type: none"> <li>- Let AEAs start preparing Action Plan in their demo plots in charge for setting date for OST in selected site (Training Plot)</li> <li>- Confirmation of materials provided.</li> </ul> | 15 mins         |



MOFA/JICA TENSUI RICE

# General Extension Activities of Rice Extension Guideline

## 1<sup>st</sup> Training of Trainers



# Rice Extension Guideline

- The Guideline shows how to implement the “Model” of rainfed 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.



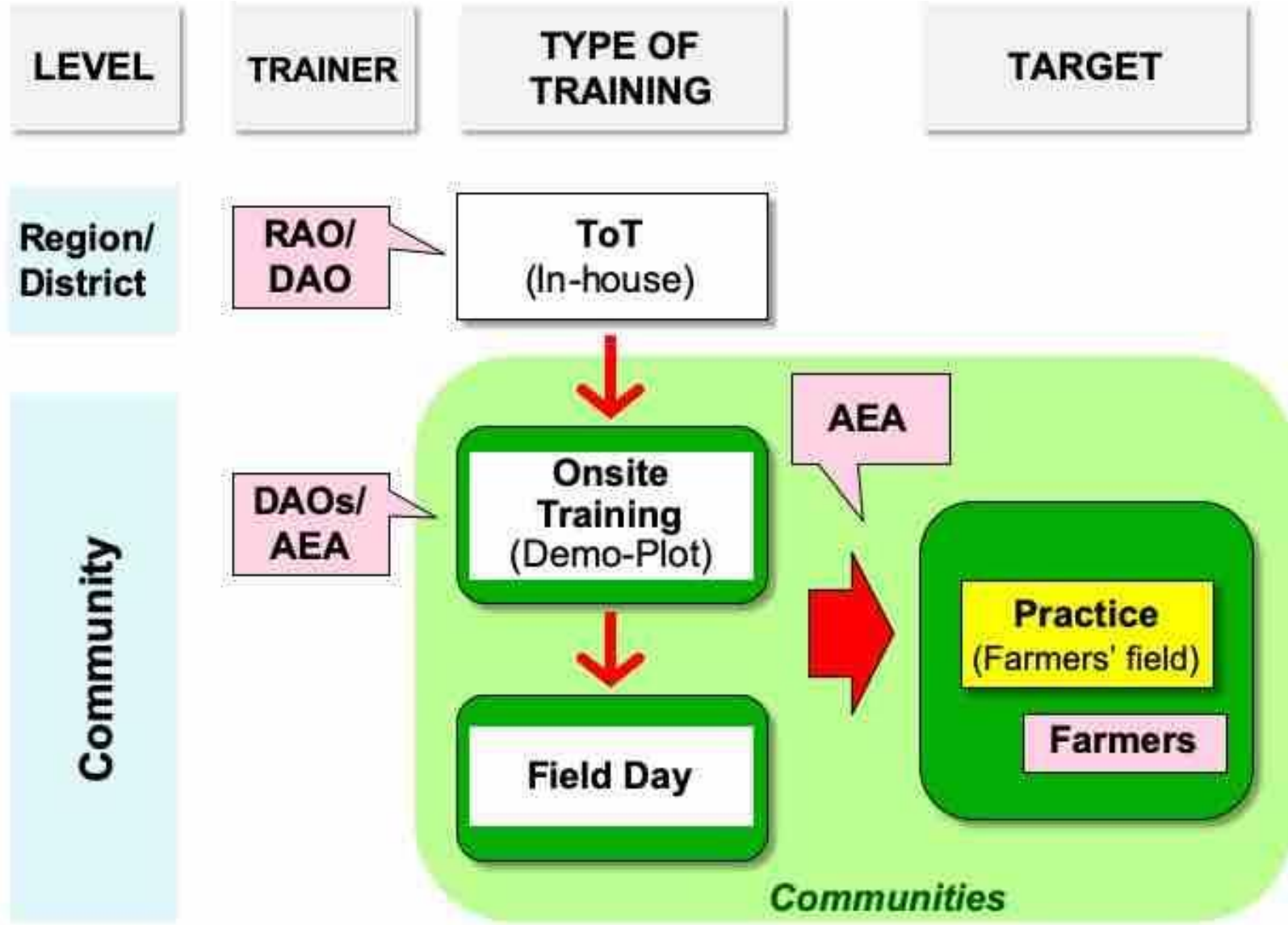


# Extension Methodologies

1. In-House Training (Training of Trainers)
  - Theoretical training to officers at district level.
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/Field Day)
  - “Farmer to Farmer Extension” through field observation and exchange opinions.

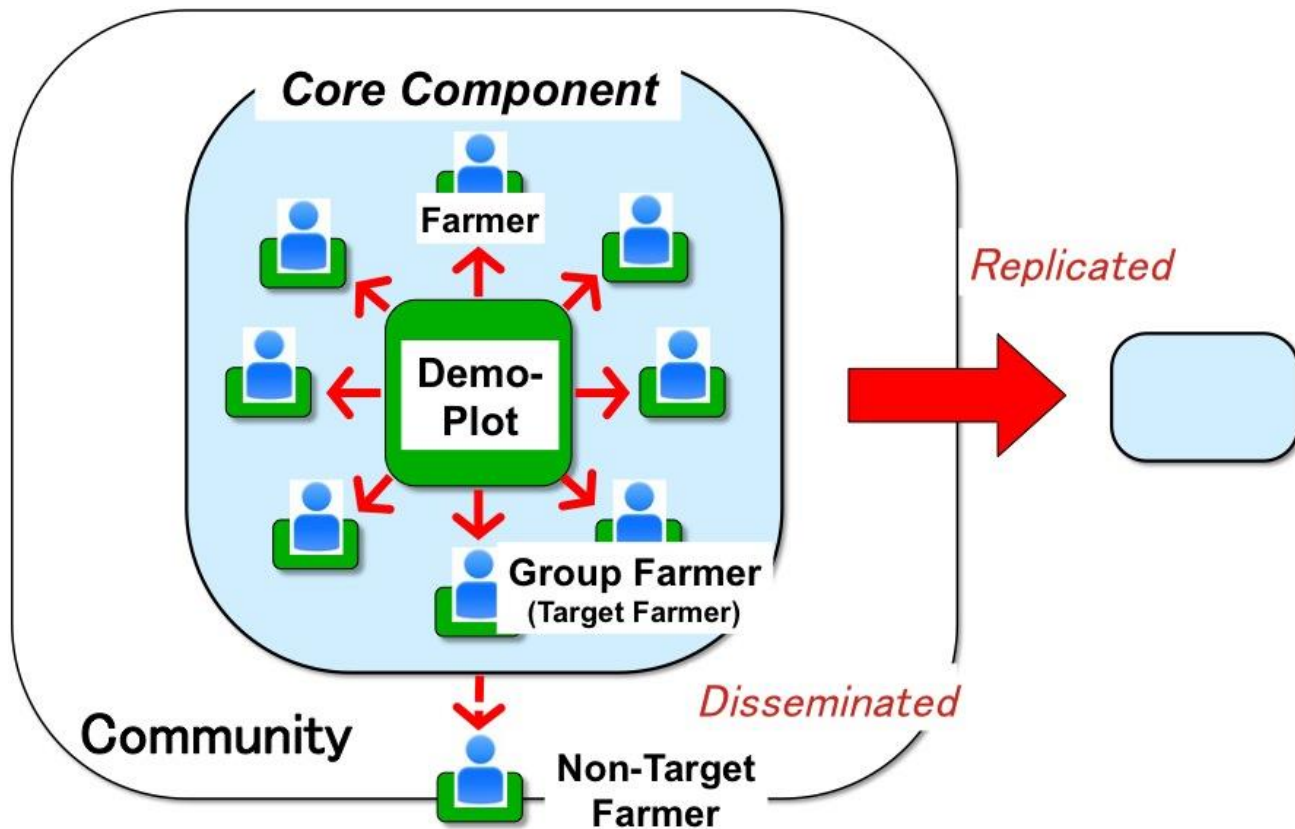


# Cascade Training



# Approach at the Field Level

- A set of demonstration plots (**Demo-Plots**) and group of farmers (**Group Farmer**) 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 District Assembly
- ✓ Close working relationship with District Assembly
- ✓ Communicate with RAD for backstopping



# Roles and Responsibilities cont.

## **District Agriculture Officers (DAOs)**

- ✓ Organize and implement necessary meetings assigned by DDA
- ✓ Collect necessary information (baseline and end-line data) from AEAs and compile reports
- ✓ Organize and implement Training of Trainers at District
- ✓ Supervise and 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 and prepare Action Plan for Demo-Plot
- ✓ Arrange On-site Training at Demo-Plots
- ✓ Organize Field Days for non-target farmers
- ✓ Make regular field visits to manage Demo-Plots
- ✓ Collect baseline and end-line data from target farmers and submit to DAOs
- ✓ Prepare field reports



# Annual Schedule-Tentative

| Month                                  | Jan.        | Feb. | Mar. | Apr.  | May   | June  | July  | Aug.  | Sep.  | Oct.  | Nov. | Dec. |  |
|--|-------------|------|------|-------|-------|-------|-------|-------|-------|-------|------|------|--|
| <b>Forest Savannah Transition Zone</b> |             |      |      |       |       |       |       |       |       |       |      |      |  |
| <b>Rainy Season</b>                    |             |      | ▶    |       |       |       |       |       | ▶     |       |      |      |  |
| <b>Cropping Season</b>                 |             |      | ◀    |       |       |       |       | ▶     |       |       |      |      |  |
| <b>Training</b>                        |             |      |      |       |       |       |       |       |       |       |      |      |  |
| <b>ToT</b>                             |             |      |      | ToT 1 |       |       | ToT 2 |       | ToT 3 |       |      |      |  |
| <b>Onsite Training</b>                 | Preparation |      |      | OST 1 | OST 2 | OST 3 |       | OST 4 | FT/FD | OST 5 |      |      |  |

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





# Step 1: Preparing District Rice Extension Plan

- Briefing DCD/DCE/DDA by Region(PCU)
- DDA/DAOs prepare District Rice Extension Plan and incorporate rice extension into Composite Budget.
- 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 Sensitization

- 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.





# Step 3: Site Selection

- 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.

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

- Resource person: Trained DDA/DAO and AEA in charge
- Target: Group Farmers of target community
- Purpose: To train Group Farmers in the target community to obtain the improved techniques and apply into their own field





# Coverage of activities in Onsite Training

- Onsite Training is organized according to the Action Plan for Demo-Plot.
- It is recommended to conduct 5 times during the rice cropping season.

| 1 <sup>st</sup> OST  | 2 <sup>nd</sup> OST                                       | 3 <sup>rd</sup> OST | 4 <sup>th</sup> OST                | 5 <sup>th</sup> OST |
|--|---|---------------------|------------------------------------|---------------------|
| Salt water seed selection, Hot water seed treatment, Nursery preparation, Sowing | Land development (bond construction, levelling, puddling) | Transplanting       | 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.



at Dadease Field Trip, 2019



Participants of a Field Day



# 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 planned 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

**1st Onsite Training**

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

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

Training materials  
(in the form of a flipchart)

**RICE CULTIVATION HAND BOOK**

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

Handbook for AEAs

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

*Version 2.*

**TENSUI RICE Phase II**

March 2018.

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

M&E tools

**Farm record notebook / Farmer's record**

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

Farmer's name: \_\_\_\_\_

**MATERIALS**

|                            |                          |                            |                               |
|----------------------------|--------------------------|----------------------------|-------------------------------|
| Seeds (for one season)     | Fertilizer (NPK)         | Chemicals (for one season) | Push sweeper (for one season) |
| Leveler (for one season)   | Sickle (for one season)  | Rice (for one season)      | Net (for one season)          |
| Tarpaulin (for one season) | Bombard (for one season) | Sacks (for one season)     |                               |
| GHC                        | GHC                      | GHC                        | GHC                           |
| SUB-TOTAL: GHC             |                          |                            |                               |

**LABOUR** (including unpaid labor)

|                                   |                        |                                    |                                 |
|-----------------------------------|------------------------|------------------------------------|---------------------------------|
| Basic construction or maintenance | Planting               | Pruning & Leveling                 | Transplanting or Direct seeding |
| Weeding                           | Fertilizer application | Rice weeding                       | Harvesting                      |
| Threshing & Winnowing             | Drying                 | Transporting (from field to house) | Milling                         |
| GHC                               | GHC                    | GHC                                | GHC                             |
| SUB-TOTAL: GHC                    |                        |                                    |                                 |

**Total production**    **Costs (Sales/Profit or loss)**

|                       |       |             |             |                |
|-----------------------|-------|-------------|-------------|----------------|
| No. of bags harvested | Land  | Total costs | Total sales | Profit or loss |
| 94kg                  | Acres | (GHC)       | (GHC)       | (GHC)          |
| 120kg                 |       |             |             |                |
| Hiring: GHC           |       |             |             |                |

**NO SOIL NO WEED SEED**  
**WELL FILLED PURE VARIETY**

**LESS BROKEN GRAINS NO HUSK NO STONE**

**MY RICE IS QUALITY ONE!!**

**How I achieved this quality in the field?**

1. Use of seeds from reliable sources
2. Good construction, timely weeding/fertilization
3. Off-type removal
4. Timely harvesting
5. Eliminating soil and stone during and after harvest
6. Proper winnowing

Tools for farmers



# How to use Dissemination Kit?

- 3 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 Cultivation Handbook** should be provided to all AEAs for their reference.



# How to use Dissemination Kit?

- **On-Site Training Materials** consist of 3 sections namely;
  - 1) Land Development,
  - 2) Rice Cultivation,
  - 3) Farm Management and Support System.
- It is recommended to use material for explaining technical package to farmers before starting practices in the field.



# How to use Dissemination Kit?

## On-Site Training Materials

RC OST 1-3

**Transplanting**

Rice Cultivation

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

①

Show front side to farmers.



Back side

Face

**Transplanting**

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

MERITS OF TRANSPLANTING

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

①

Back side is for AEA use.

AEA can explain in accordance with the instructions provided.



# How to use Dissemination Kit?

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

VERSION 2,  
13 March 2018

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 2**

**TENSUI RICE Phase II**

March 2018

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

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):<br>Location Name | Season<br>(major/minor) | Area<br>(acre) | Rice<br>Variety | Tenure* | Rental<br>Cost<br>(in kind) | Rental<br>Cost<br>(in kind) | Total No. of<br>Bags<br>Harvested<br>(A)** | Unit (Size<br>of Bag:<br>Refer<br>**below) | No. of maxi<br>bags Sold<br>(C) | Unit (Size<br>of Bag:<br>Refer<br>**below) | Unit price to<br>sell per maxi<br>bags<br>(GHC) |
|----|--------------------------------|-------------------------|----------------|-----------------|---------|-----------------------------|-----------------------------|--|--|---------------------------------|--|---|
| 1. |                                |                         |                |                 |         |                             |                             | ☐Paddy                                     |  | ☐Paddy<br>☐Milled               |  |   |
| 2. |                                |                         |                |                 |         |                             |                             | ☐Paddy                                     |  | ☐Paddy<br>☐Milled               |  |   |
| 3. |                                |                         |                |                 |         |                             |                             | ☐Paddy                                     |  | ☐Paddy<br>☐Milled               |  |   |
| 4. |                                |                         |                |                 |         |                             |                             | ☐Paddy                                     |  | ☐Paddy<br>☐Milled               |  |   |
| 5. |                                |                         |                |                 |         |                             |                             | ☐Paddy                                     |  | ☐Paddy<br>☐Milled               |  |   |
|    |                                |                         | Total          |                 |         | Total                       | Total                       | ☐Paddy<br>☐Milled                          | Total                                      | Total                           | Average                                    |   |

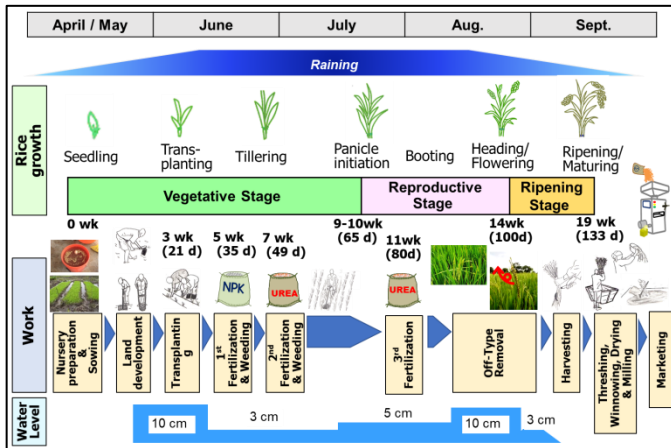
\*Tenure: 1=respondent own, 2=family member's own, 3=rental from the chief, 4=rental from the others excluding family & chief 99=other/specify \_\_\_\_\_ )

\*\* 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, SizeE=Size 5 bag 120kg, SmG=Small Grawaa (tin) 25kg, BigG=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.



**Farm record keeping sheet / Ashanti region** LET'S TRY!

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

Farmers name: \_\_\_\_\_

| MATERIALS                         |                                    |                               |                                     |                |
|-----------------------------------|------------------------------------|-------------------------------|-------------------------------------|----------------|
| Seeds<br>GHC                      | Fertilizer<br>GHC                  | Chemicals<br>GHC              | Push weeder (for one season)<br>GHC |                |
| Leveler (for one season)<br>GHC   | Sickle (for one season)<br>GHC     | Ho (for one season)<br>GHC    | Net (for one season)<br>GHC         |                |
| Tarpaulin (for one season)<br>GHC | Bambam box (for one season)<br>GHC | Sacks (for one season)<br>GHC |                                     |                |
|                                   |                                    |                               |                                     | SUB-TOTAL: GHC |

| LABOUR (excluding unpaid labour)        |                               |   |                                       |                |
|---|-------------------------------|---|---------------------------------------|----------------|
| Bund construction or maintenance<br>GHC | Ploughing<br>GHC              | Puddling & Leveling<br>GHC                | Transplanting or Direct sowing<br>GHC |                |
| Weeding<br>GHC                          | Fertilizer application<br>GHC | Bird scaring<br>GHC                       | Harvesting<br>GHC                     |                |
| Threshing & Winnowing<br>GHC            | Drying<br>GHC                 | Transporting (from field to house)<br>GHC | Milling<br>GHC                        |                |
|   |                               |   |                                       | SUB-TOTAL: GHC |

| Total production              |               |                   |                   |                      |
|-------------------------------|---------------|-------------------|-------------------|----------------------|
| No. of bags harvested<br>84kg | Land<br>Acre: | Total costs (GH¢) | Total sales (GH¢) | Profit or loss (GH¢) |
|                               | Hiring: GHC   |                   |                   |                      |

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

**NO SOIL NO WEED SEED** **LESS BROKEN GRAINS**

**WELL FILLED PURE VARIETY** **NO HUSK NO STONE**

**MY RICE IS QUALITY ONE!!**

**How I achieved this quality in the field?**

- 1. Use of seeds from reliable sources:** Research institute, MoFA, JICA, Farmer.
- 2. Bund construction, timely weeding/fertilization:** Well-filled grain, No weed seed can be found! Bund construction to retain water, Proper utilization of fertilizer by rice plants.
- 3. Off-type removal:** No other variety can be found!
- 4. Timely harvesting:** Harvesting when the colour of the leaves are still green, Appropriate moisture content can be kept, Less broken grains.
- 5. Eliminating soil and stone during and after harvest:** Cut here, Keep harvested rice away from the ground.
- 6. Proper winnowing:** Threshing using bambam-box, No husk can be found! Winnowing on Tarpaulin, Soil or stone, Husk.

This promotion sheet is made for the smallholder farmers who received training by the MoFA-JICA project to enhance the quality rice production and marketing. For any query, please contact MoFA Northern Regional Office (037-202-7748).

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





# GROUP FORMATION

- A **group** is a collection of individuals who coordinate their individual efforts .
- Farmers in many communities have a long tradition of performing certain agricultural productive activities as a group rather as individuals
- Group formation facilitate the transfer of knowledge, information and technologies as



# Some Key Criteria for selection of group members

- Group membership should be voluntary and optional by farmers.
- Farmers in same community and preferably in same valley or whose fields are near.
- Farmers who already have experience in rice cultivation
- Membership constitution should be by individual farmer's willingness (grouping) e.g. same social, religion, scale of production e.tc.
- 10 members in a group (1 Key farmer, 9 members)



# The Role of AEAs in Group activities

- Facilitation role
- Helped in preparation of rice action plan and cropping calendar
- Input arrangement and technical information for demonstration plot establishment.
- On-the-job training for farmers from valley selection through to rice marketing.



# The Role of AEAs in Group activities cont.

- AEAs ensured a cohesive group activity (Group bylaws, operation of bank account ,meetings etc).
- Organized Agric. extension programme (Field days, Field trip , farmer competition etc.
- AEAs and district staff facilitated,sensitized rice farmers on the objective project-Technical Cooperation project.
- Monitory and other roles



# The role of Key farmers and group members

- The Key farmer plays leadership roles- contact person
- He could also lead discussions during field days
- Should be able to teach and explain necessary rice techniques to other group members upon request.
- Group members transfer rice technology to colleague group farmers and other non-group rice farmers .
- All group members develop skill in rice technologies as they work on demonstration plot.



# Success story from the field during Tensui II – CYCLE 1 & 2

- Group acquisition of inputs, fieldwork, social welfare & group savings (Amoamang; Sekyere Central District)
- High level of cooperation, key partners to DADU programs (Tweapease; Adansi South District, Tetrem; Afigya Kwabre North District)
- Group marketing leading to farmers increased bargaining power (Tepa; Ahafo Ano North District)
- Strong leadership skills (Boffour; Sekyere Afram Plains District)
- Group enthusiasm and willingness (Kente-Amansie Central, Kyerefamso-Mampong)

# GROUP FARMERS OF BOFFOUR – SEKYERE AFRAM PLAINS DISTRICT





THANK YOU.





MOFA/JICA TENSUI RICE

# LAND DEVELOPMENT TRAINING

## 1st Training of Trainers

Land  
Development



# TRAINING CONTENT

- 1-1. Land development process
- 1-2. Site Selection and Guidelines
- 1-3. Land Demarcation & Field Measurements
- 1-4. Bunds Construction
- 1-5 Ploughing, Puddling and Land Levelling
- 1-6. Water Use and Management



# 1-1 Land Development Process

This involves;

- Good site selection
- Bund construction
- Ploughing
- Puddling and Land levelling
- Water harvesting and management



# 1-2 SITE SELECTION AND GUIDANCE



# VALLEY SELECTION 1

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

# Valley Selection 2

- Flood water level should not be above the 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
- Avoid areas where either soil or water has been contaminated [Galamsey operated areas]
- Check for Gamba, Acheampong, elephant, oil palm, cyperus esculentus and other local grasses that grows in good valleys



Elephant Grass



Gamba Grass





# Valley Selection 3



**A fairly flat valley / Valley with a gentle slope**



**Cyperus Esculentus**



MOFA/JICA TENSUI RICE

# 1-3 LAND DEMARCATION AND FIELD MEASUREMENTS





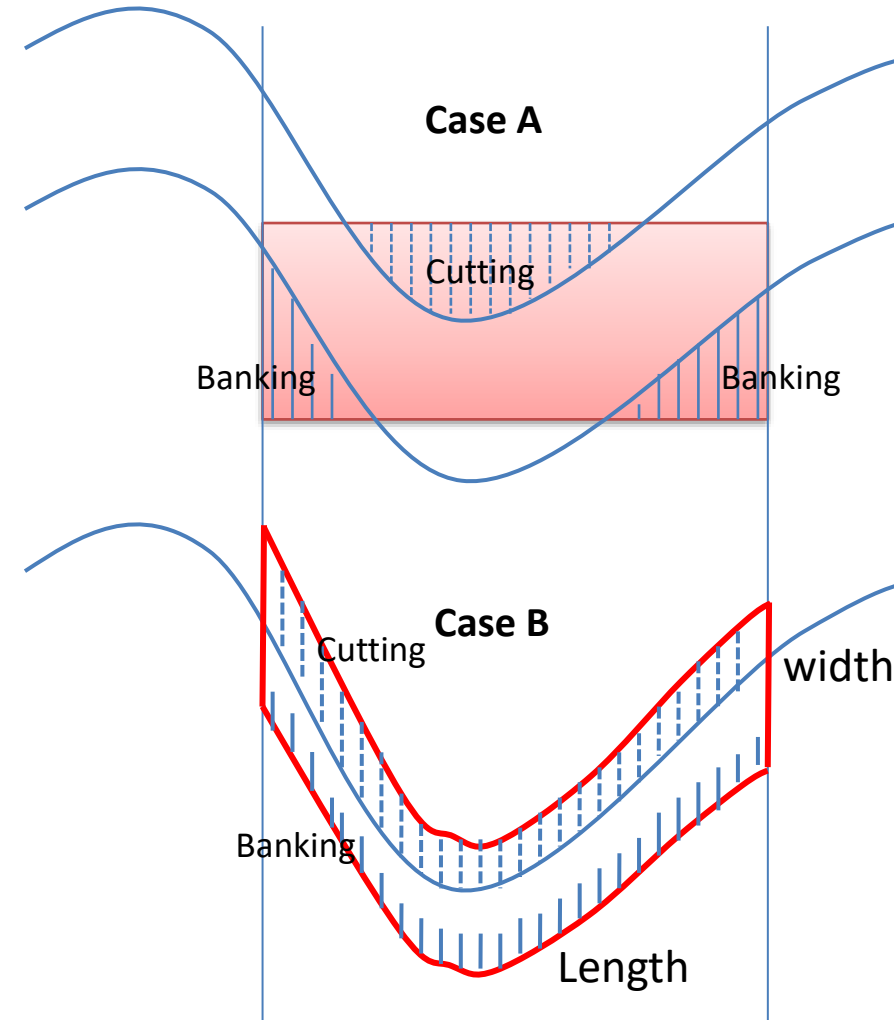
# Why Area Calculation?

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



# Some Points To Note In Determining Field Size

contour line



- **Length of field** should be along contour line
- The **land slope** is determined the **width of the field**
- As the **width of the field** becomes longer, **levelling becomes difficult** because large volumes of soil has to be moved of from higher elevations to lower points

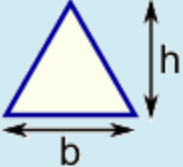
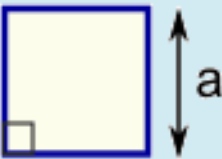
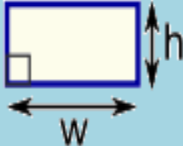
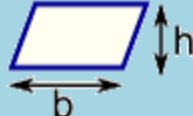
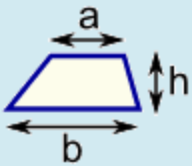
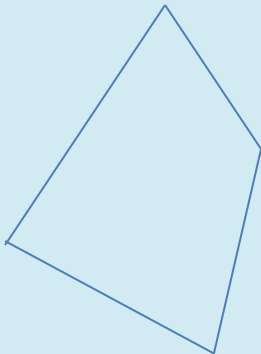


# Tools and Equipment Used

- GPS
- Tape measure
- Laser finder
- Hand levels



# Measuring the Fields

|  |   |   |  |
|--|---|---|--|
|   | <p><b><u>Triangle</u></b><br/> <b>Area = <math>\frac{1}{2}b \times h</math></b><br/> <b>b = base</b><br/> <b>h = vertical height</b></p>                        |  | <p><b><u>Square</u></b><br/> <b>Area = <math>a^2</math></b><br/> <b>a = length of side</b></p>   |
|   | <p><b><u>Rectangle</u></b><br/> <b>Area = <math>w \times h</math></b><br/> <b>w = width</b><br/> <b>h = height</b></p>  |  | <p><b><u>Parallelogram</u></b><br/> <b>Area = <math>b \times h</math></b><br/> <b>b = base</b><br/> <b>h = vertical height</b></p>   |
|  | <p><b><u>Trapezoid (US)</u></b><br/> <b><u>Trapezium (UK)</u></b><br/> <b>Area = <math>\frac{1}{2}(a+b) \times h</math></b><br/> <b>h = vertical height</b></p> |  | <p><b><u>Herons Formulae</u></b><br/> <b>A = <math>\sqrt{s(s-a)(s-b)(s-c)}</math></b><br/> <b>S = <math>\frac{1}{2}(a+b+c)</math></b><br/> <b>A = area    S = semi perimeter</b></p> |
| 23/04/2021   |   |   | 12   |

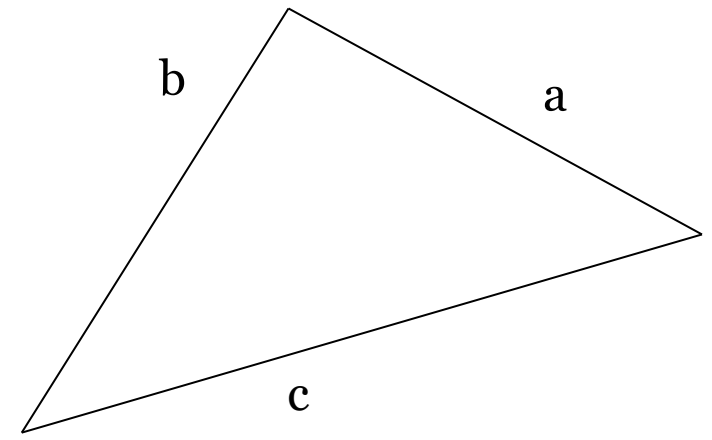
# What Is Heron's Formula?

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

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

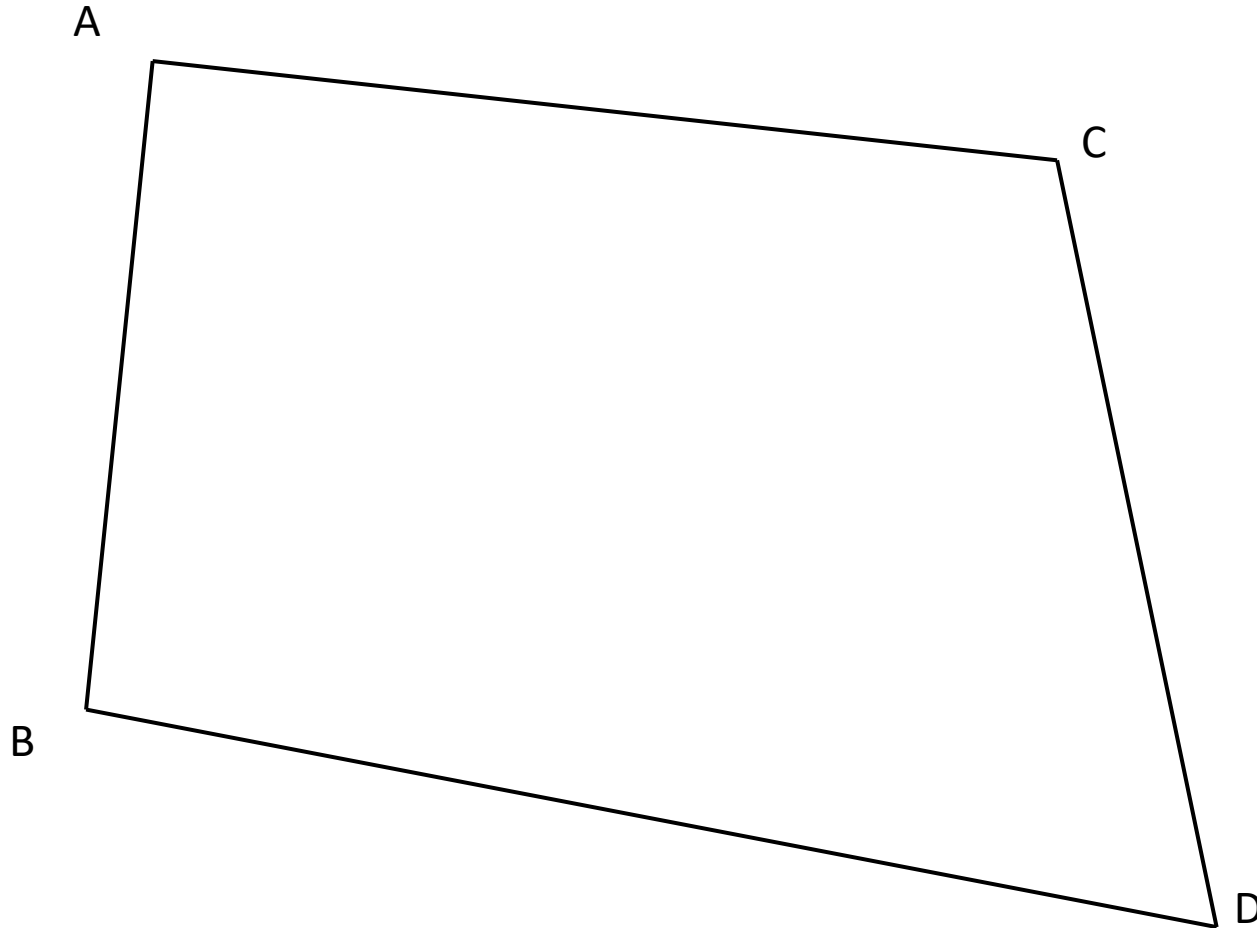




# Practice 1

**Step 1: Measure a distance at each sides.**

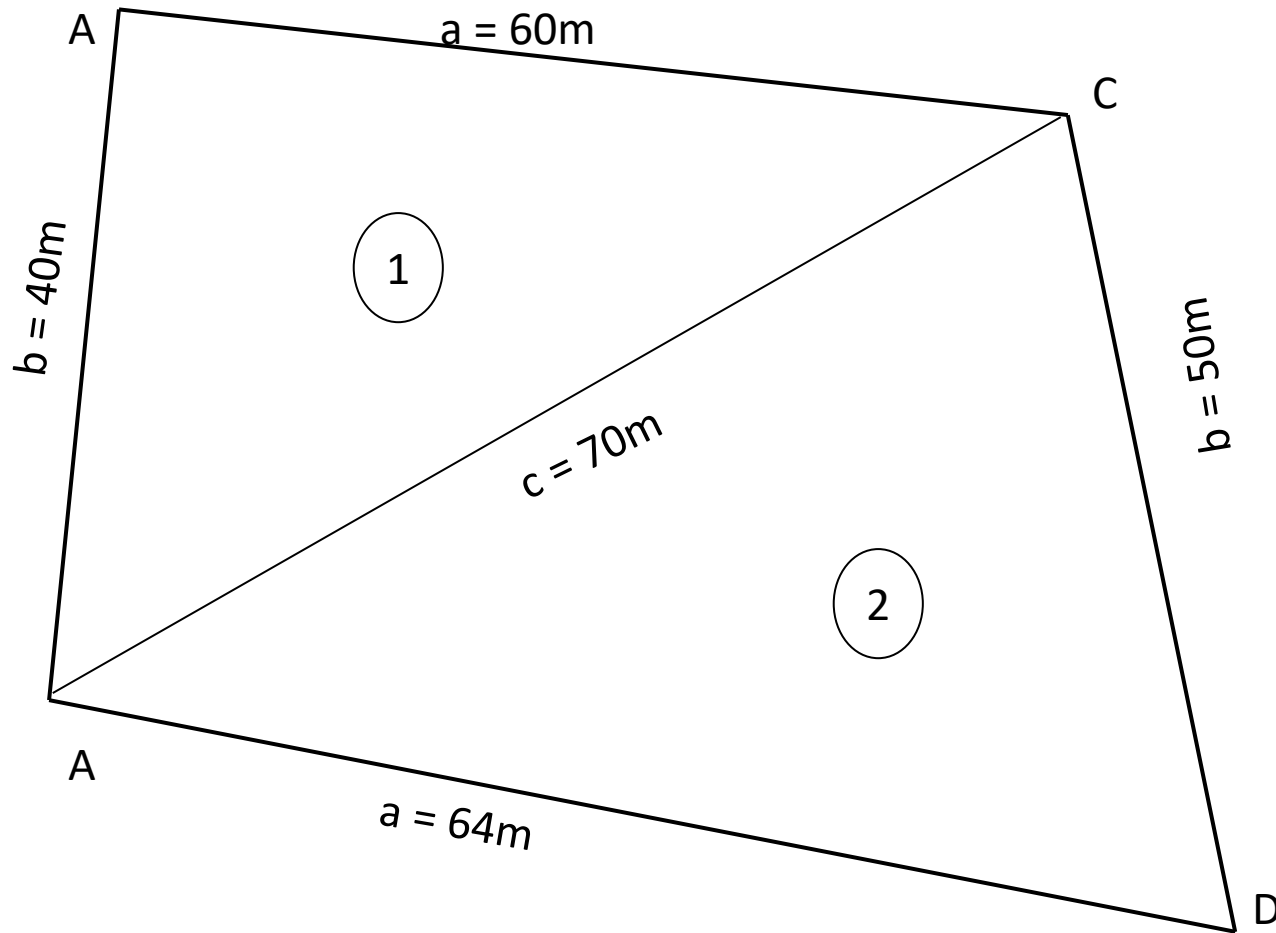
**Step 2: Dividing the polygon above into a triangle**





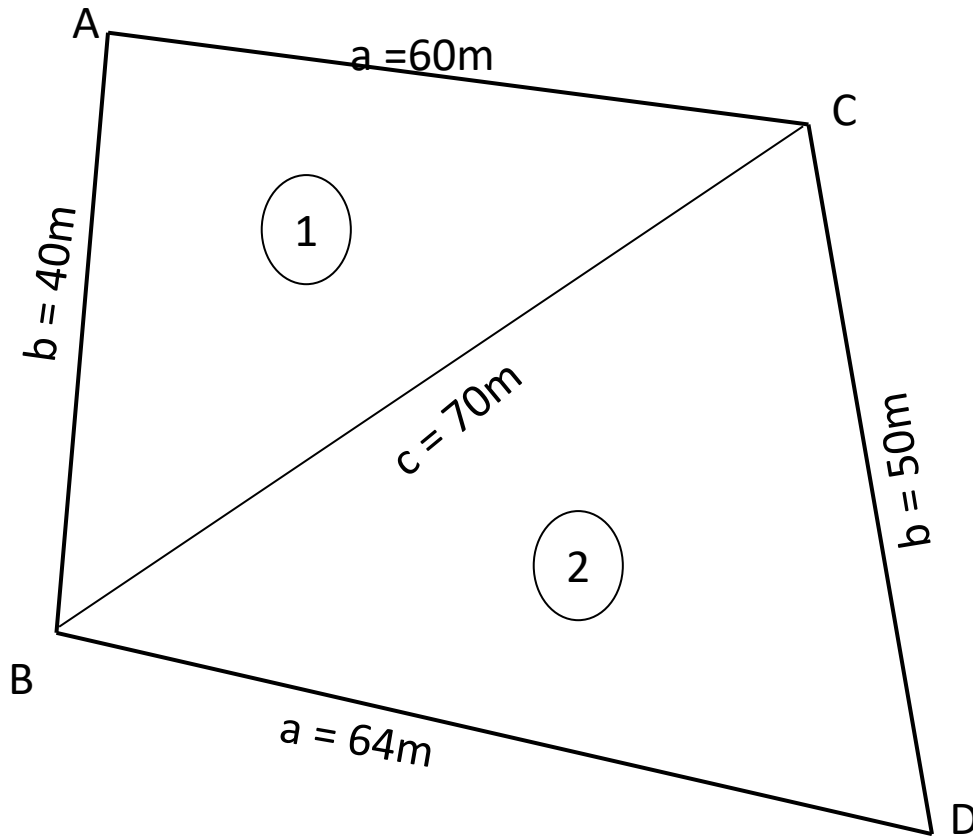
Step 3: put a number/mark for divided triangle

Step 4: Draw a sketch as follows.





## Step 5: Calculation



|                               | Triangle 1 | Triangle 2 |
|-------------------------------|------------|------------|
| a                             | 60         | 64         |
| b                             | 40         | 50         |
| c                             | 70         | 70         |
| a+b+c                         | 170        | 184        |
| $s = \frac{1}{2}(a+b+c)$      | 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       |            |





# Alternatives for Area Measurement

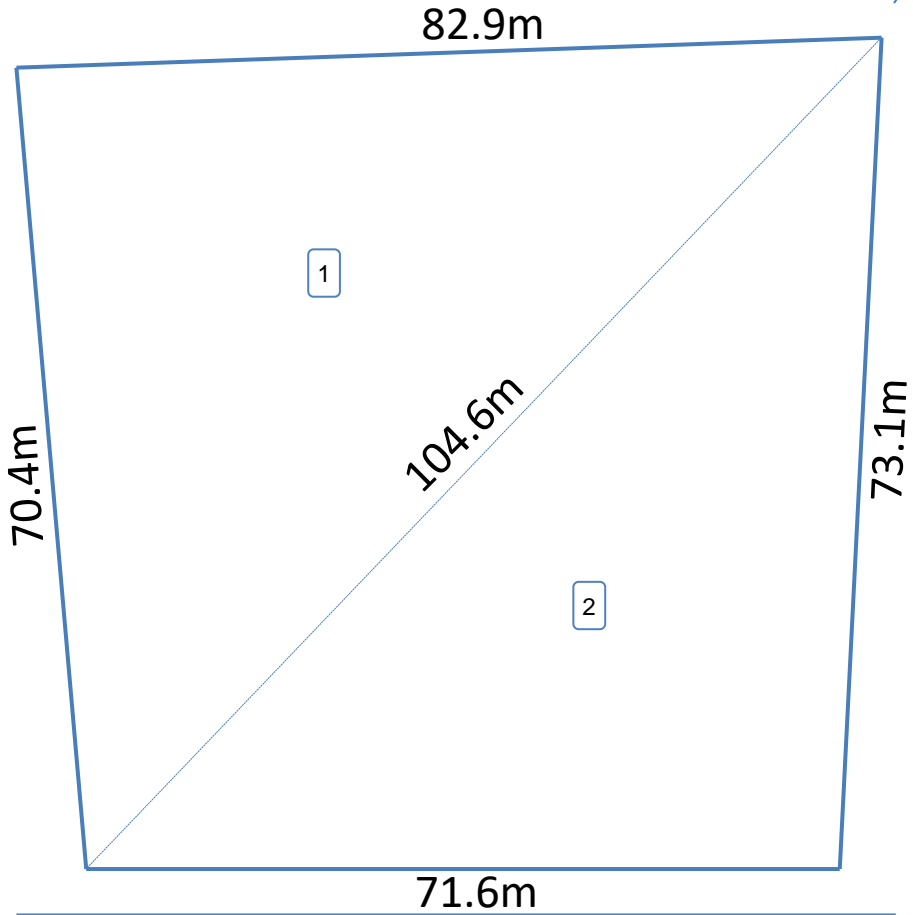
- Other formulae's can be used depending on the shape of the area
- Data can be gotten from GPS, tape measure, geographical map etc
- Data from tape measure are more accurate than GPS and Laser



# PRACTICE 2

Wungu, West Mamprusi

S=No Scale



To Wungu Road

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

From Heron's Formula

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

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

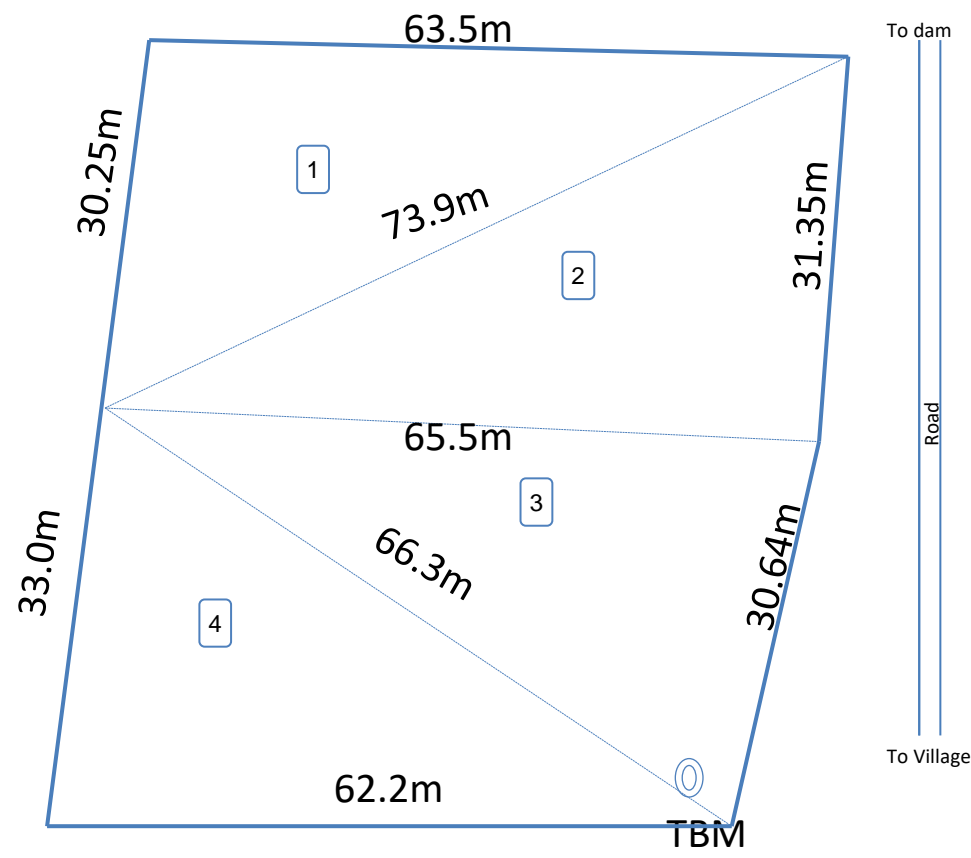
|                               | Triangle1 | Triangle 2 |
|-------------------------------|-----------|------------|
| a                             |           |            |
| b                             |           |            |
| c                             |           |            |
| a+b+c                         |           |            |
| $s = \frac{1}{2}(a+b+c)$      |           |            |
| (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



## 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

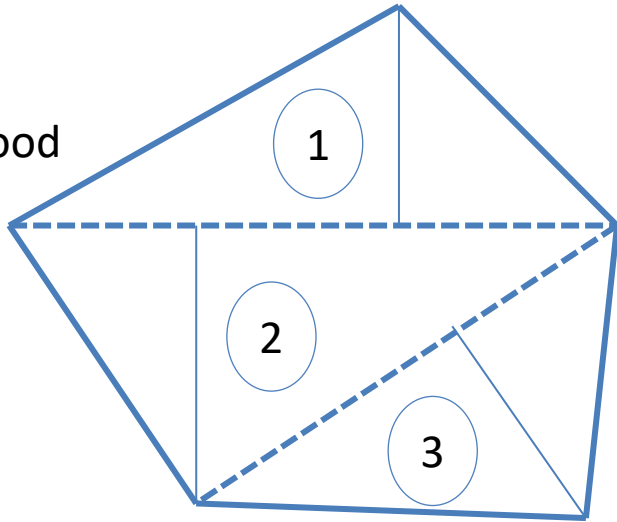


|                               | Triangle 1 | Triangle 2 | Triangle 3 | Triangle 4 |
|-------------------------------|------------|------------|------------|------------|
| a                             |            |            |            |            |
| b                             |         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

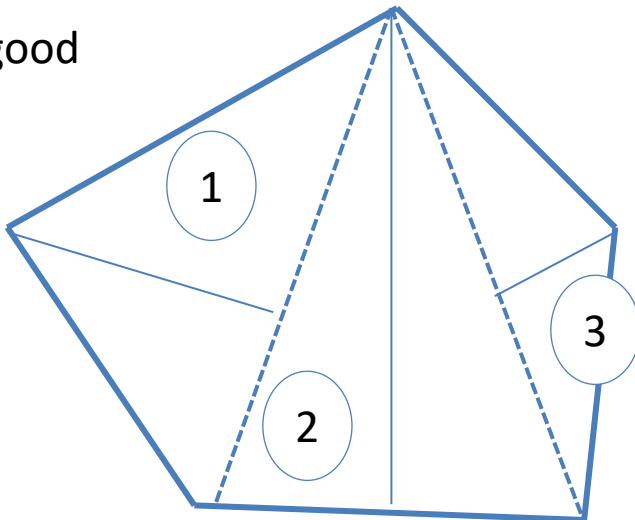


# Dividing the Polygon into Triangles

Good



Not good



➤ The base of a triangle and height should be almost same as much as possible.

➤ Assign a number to each triangle

➤ Measure distance at each sides.



MOFA/JICA TENSUI RICE

# 1-4 BUNDS CONSTRUCTION



# Bund Construction

## Requirements

### Height

30-50cm

Main/peripheral  
bunds

10-15cm for  
interlocking bunds

Clay soil is ideal  
Soil should be  
scooped from  
both sides of the  
bund

Heaped,  
Compacted,  
and firmed



# Why Bunds Are Necessary For Rice Cultivation

## Purpose (function)

- Store and keep water
- Avoid loss of fertilizer through moving water
- Pathway
- Boundary



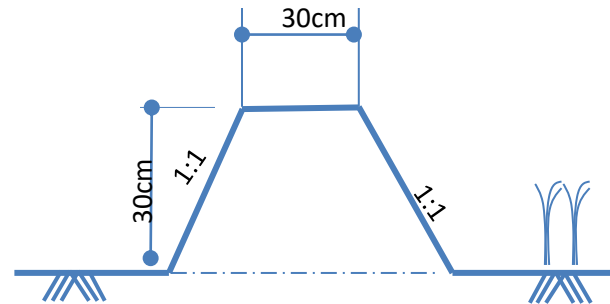
**Katabo field [Ahafo Ano North]**



# General Guideline on Bunds Construction

## 1. Materials (soil)

- Use the soil (Clay) in the field
- Use other material like grass in Akutuase



## 2. Shape

- Trapezoid
- Top Width 30cm, Height 30cm
- Side slope 1.0 : 1.0

## 3. Structure Required

- Stability (no erosion, slide)
- Impermeability (no side penetration)

## 4. Others

- Passable path for farming activity
- Economical
- technically simple



1



2

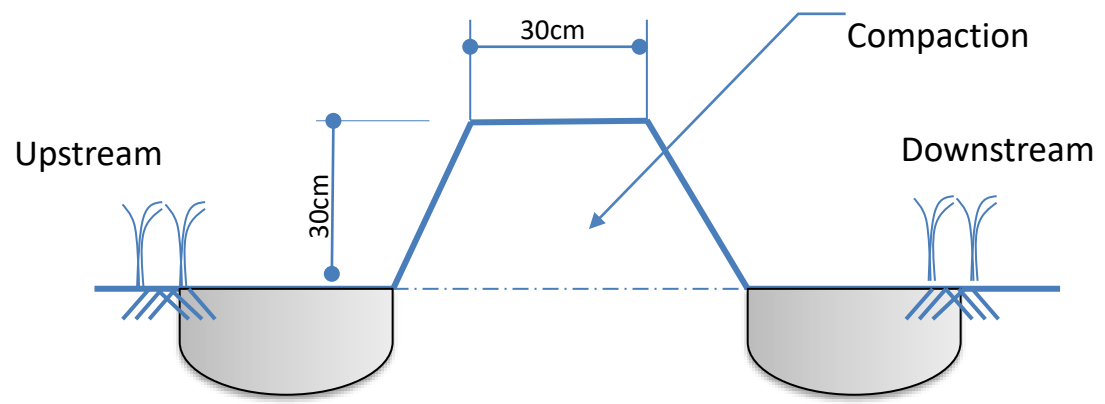


# Bunds Construction 1

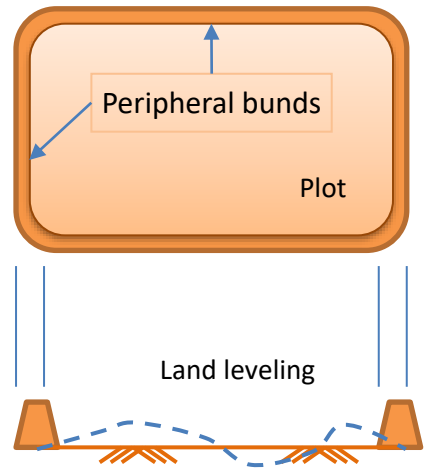
**Type - A**

**Cross section**

**Peripheral bunds along levelled field (AR)**



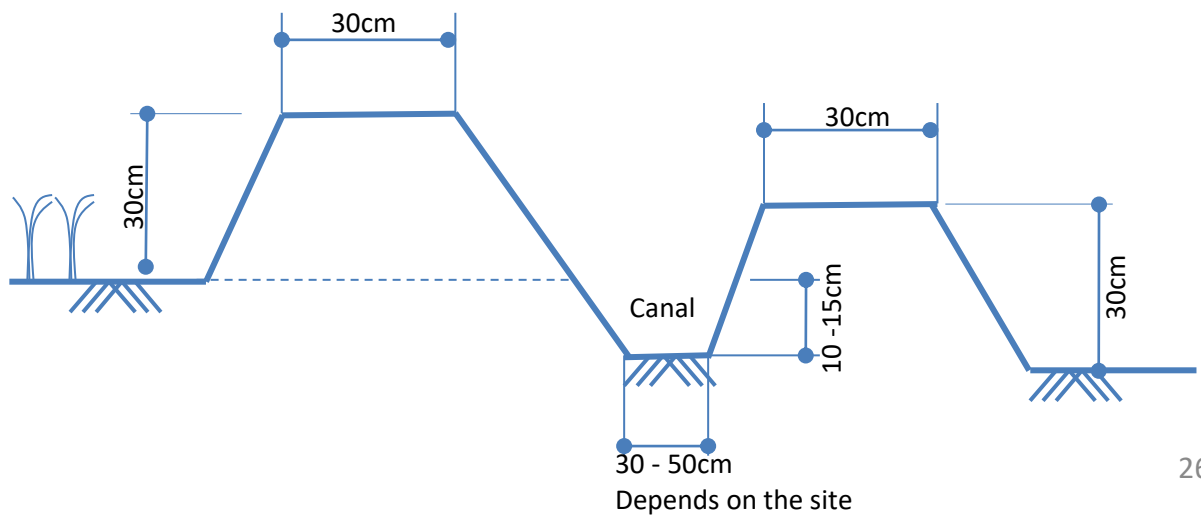
**Land Development at on-plot level**



**Type - B**

**Cross section**

**Peripheral bunds along canal (AR)**



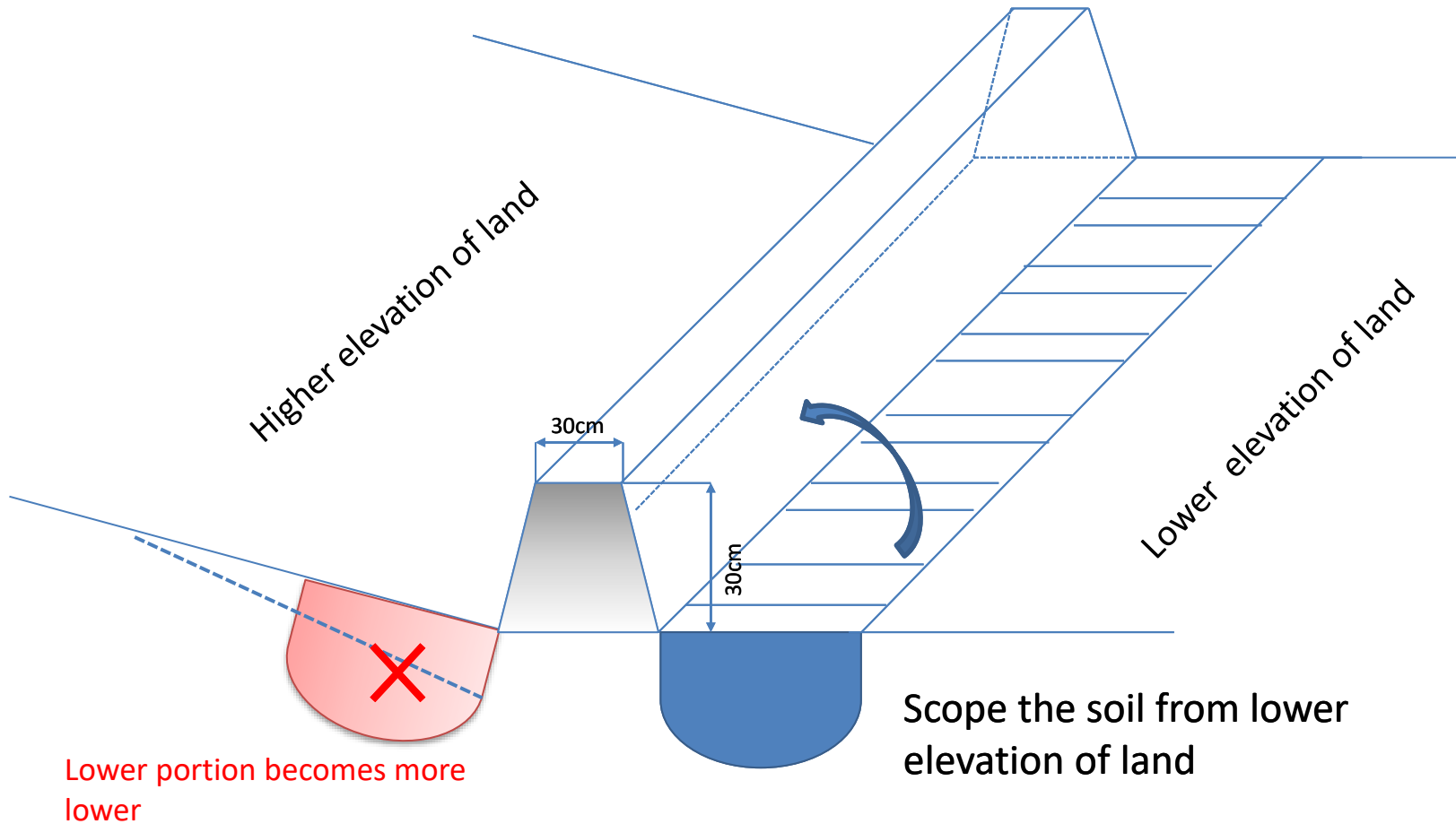


# Bunds Construction 2

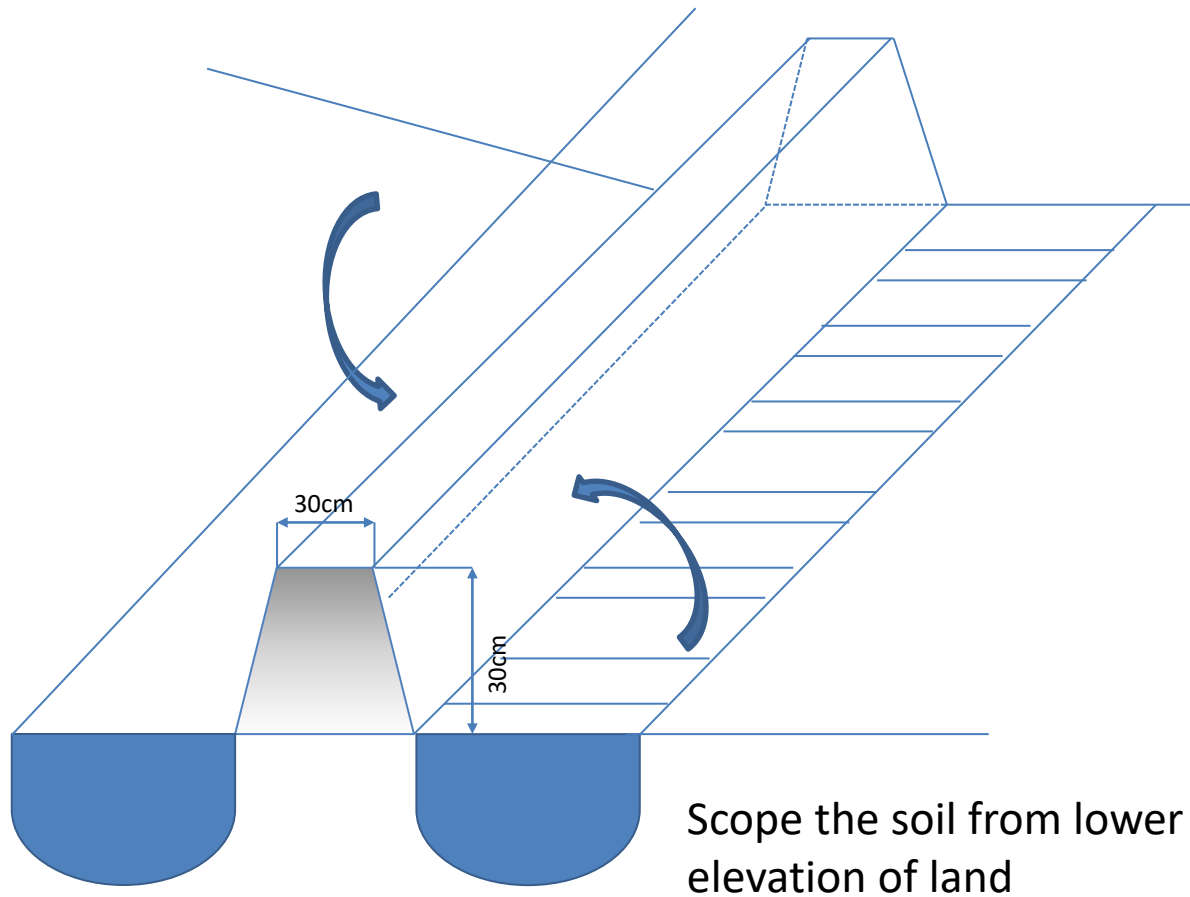


Type B: Peripheral Bund along a canal

# Bunds on the Sloping land

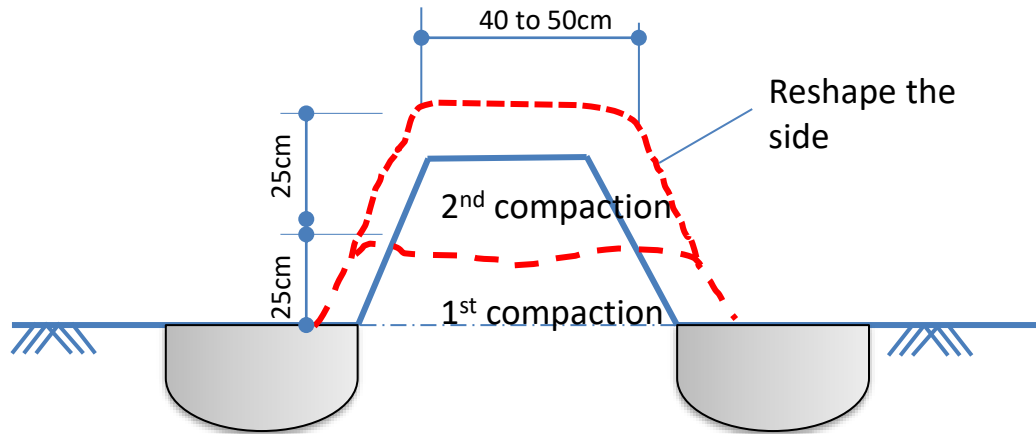


# Bunding on a Flat or Gentle Slope Land

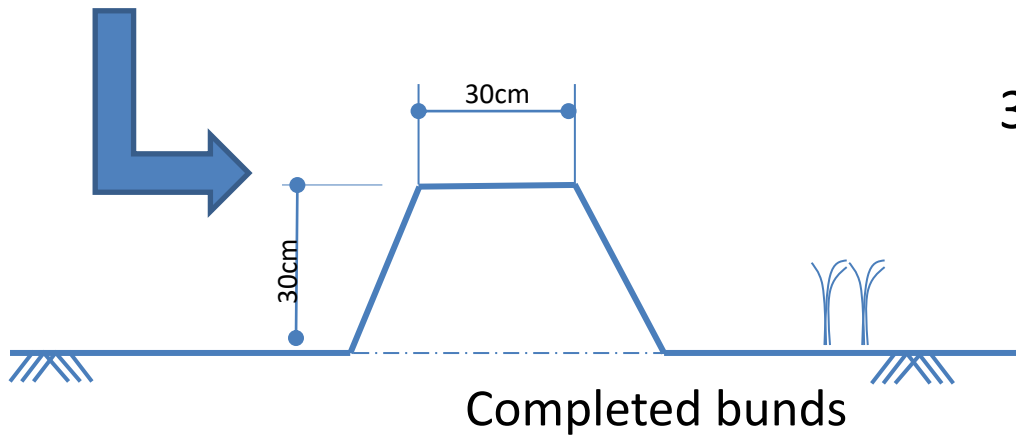




# Compaction and Reshaping



During construction



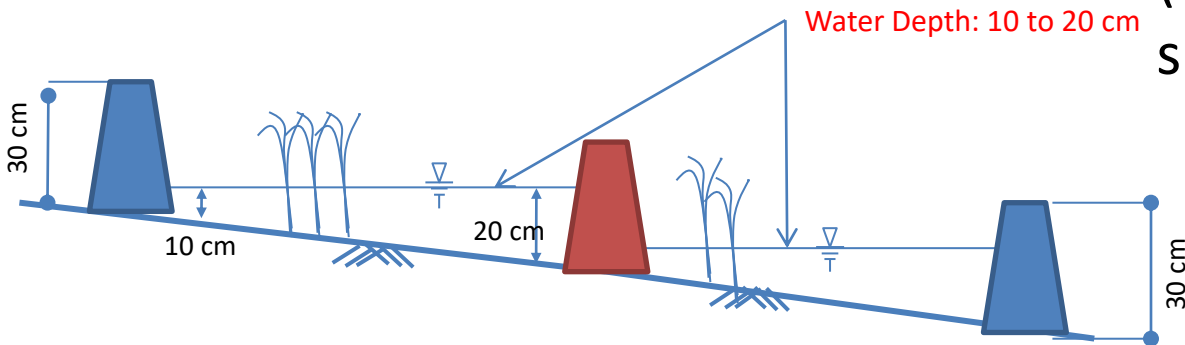
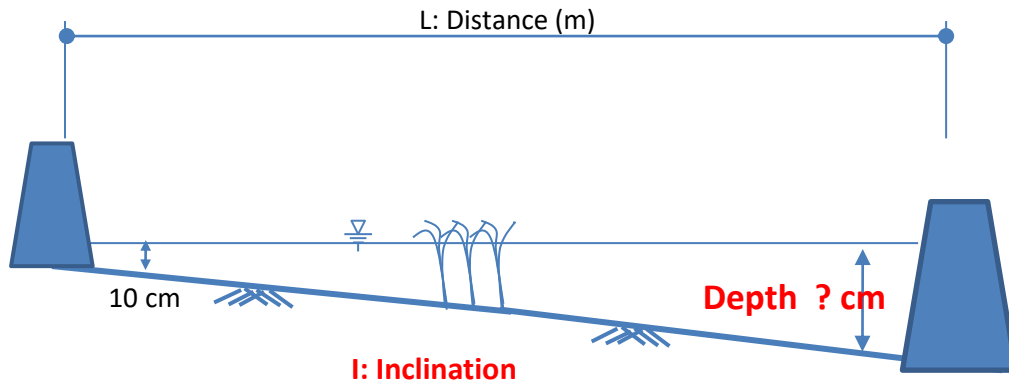
Completed bunds

1. Scope the soil from both side equally
2. Compact the soil at 1<sup>st</sup> layer and 2<sup>nd</sup> layer each
  - Soil has to be a little moist to aid compaction
  - Muddy soil should be compact with stamping
3. Tapping side slope
  - With side compactor
  - Muddy soil: Compact with a back of shovel
4. Reshape the bunds



# Interlocking Bunds

(depends on water availability)



To avoid deep water deposit in the field and at the same time ensure even water distribution, interlocking bunds should be created (Divide a plot into small size)



# Some Tools for Bunds Compaction



Side Compactor



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.

## During off-cropping season

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



In Japan



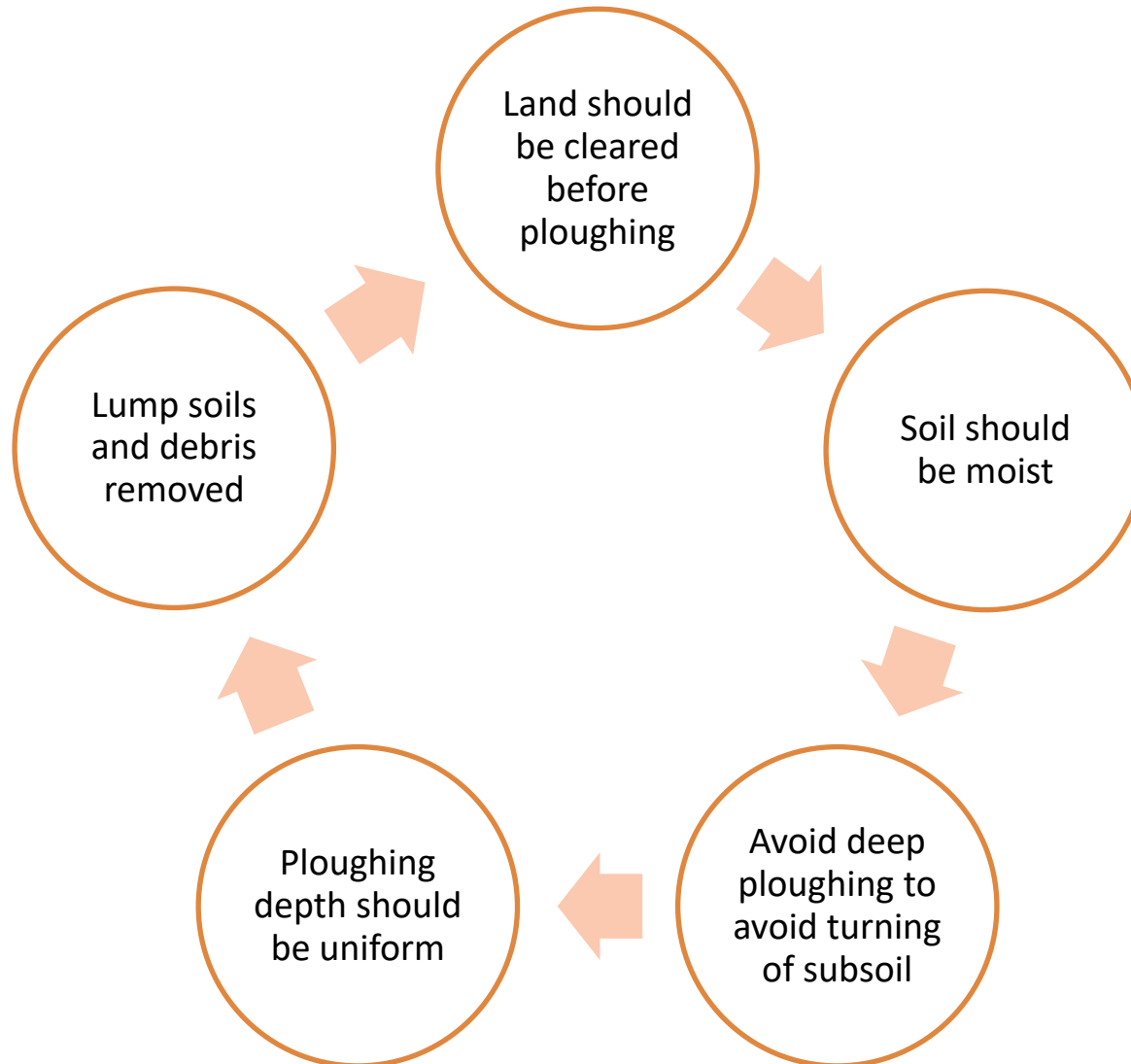
MOFA/JICA TENSUI RICE

# 1-5 PLOUGHING, PUDDLING AND LAND LEVELING

Land  
Development



# Ploughing 1



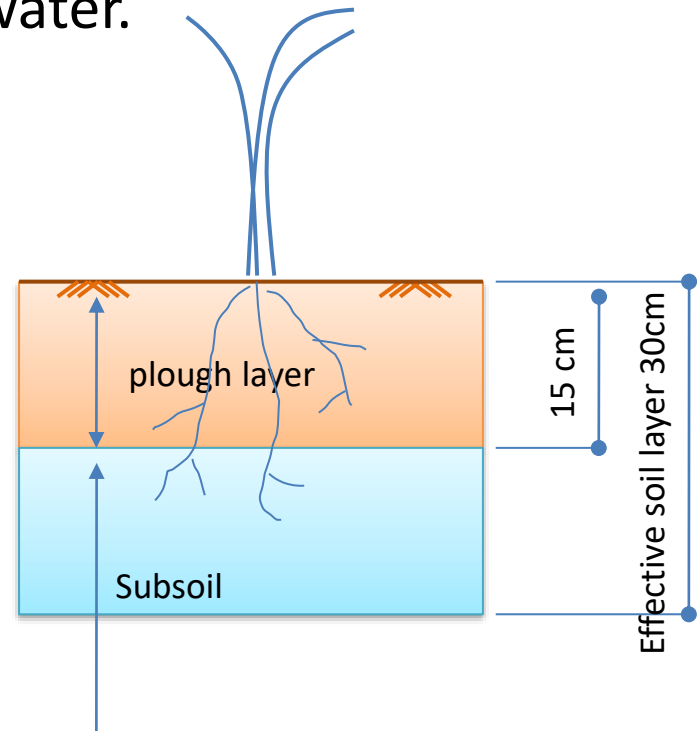


# Ploughing 2 - Soil Layer

- Ploughing layer should not be more than 15cm
- Effective soil layer should not be more than 30cm includes Plough layer 15 cm
- Gravel content: be less 20% in terms of volume

**Plough layer**: soil to be Ploughed or harrowed

**Effective soil layer**: the roots of rice can be extended to absorb water.





# Ploughing 3



**Farmers ploughing field before puddling**



# Puddling with legs and hoes





# Puddling





# Land Levelling

Soil depth layer should be considered

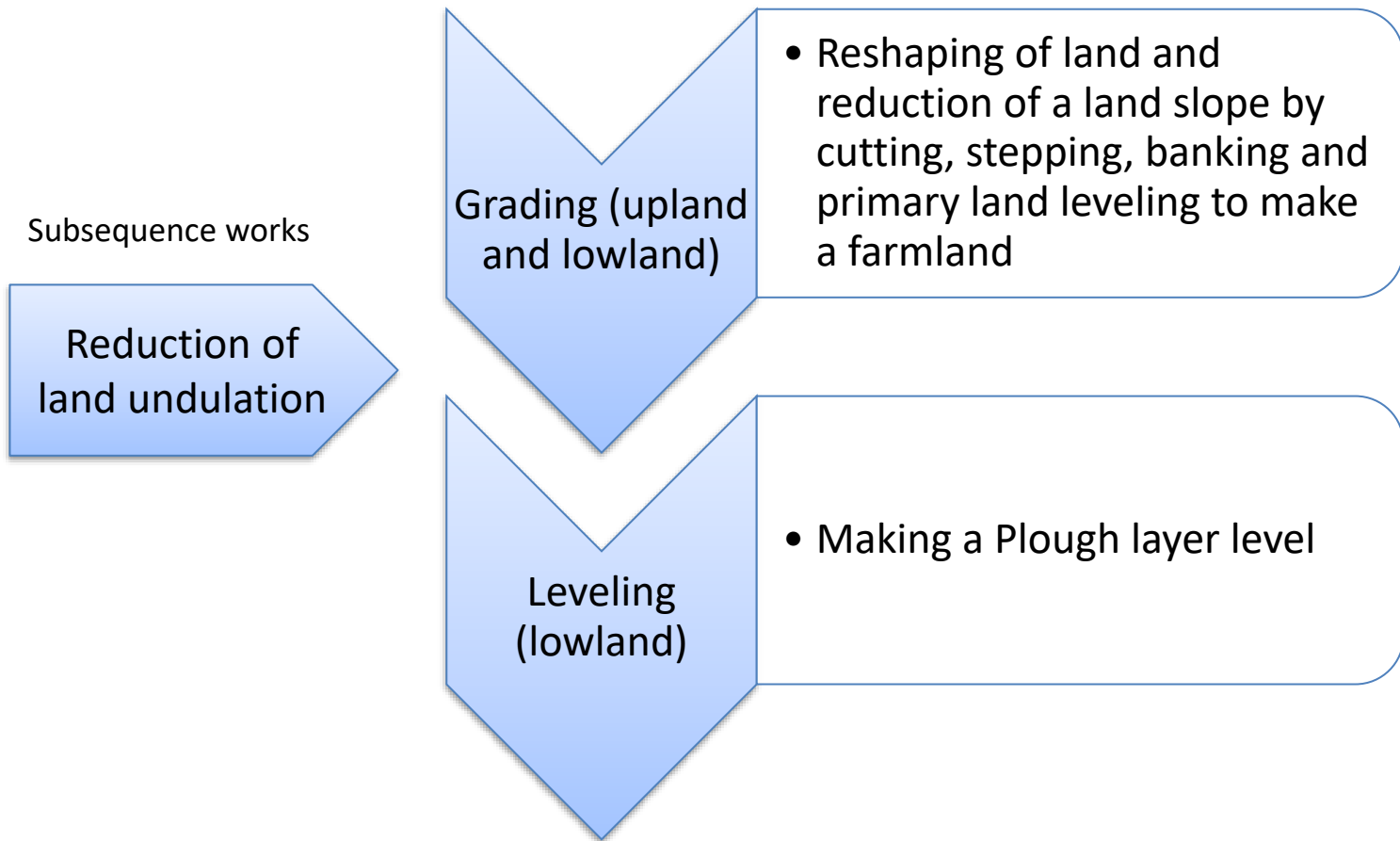
Replacement of top soil layer after scraping

Use flat board leveller for levelling





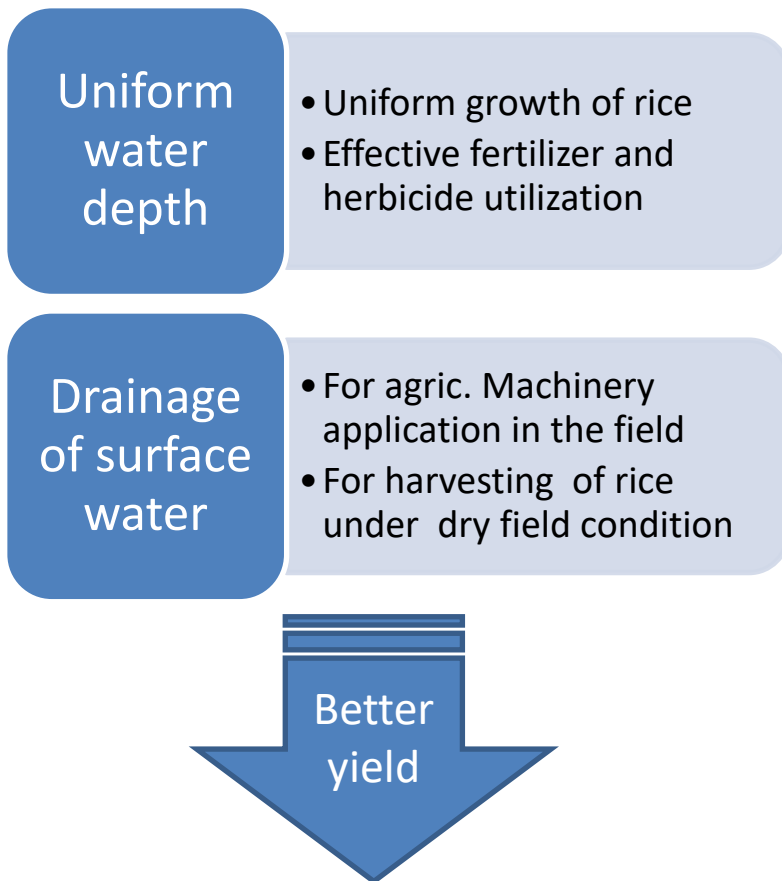
# Land Grading and Land leveling 1





# Land leveling 2

## Why land leveling is required.



## Points to be considered

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



# Land Levelling Requirement

## Requirements for paddy filed in Japan

1. Land level should be  $\pm$  5cm from mean elevation in a paddy field.
2. However, all of land elevation check points below more or less than 10 cm from the mean, and out of 80 % checked points must  $\pm$  5 cm.

## Requirements in Ghana

### Lowland place

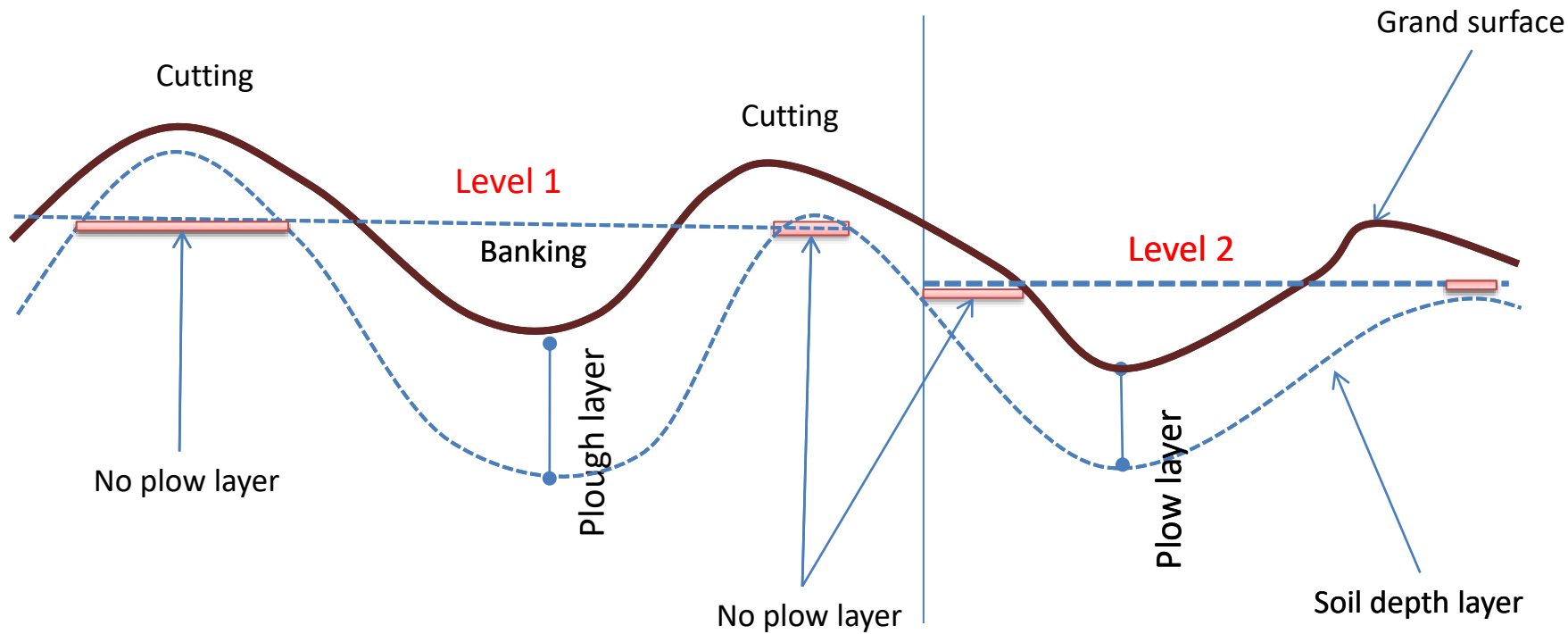
As much as possible

- land should be leveled
- land undulation should be Less

### Upland place

- Less land undulation as much as possible

# Land Levelling (Reduction of Land Undulation)





# Land Levelling Tools

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





# Levelling 1





# Levelling 2



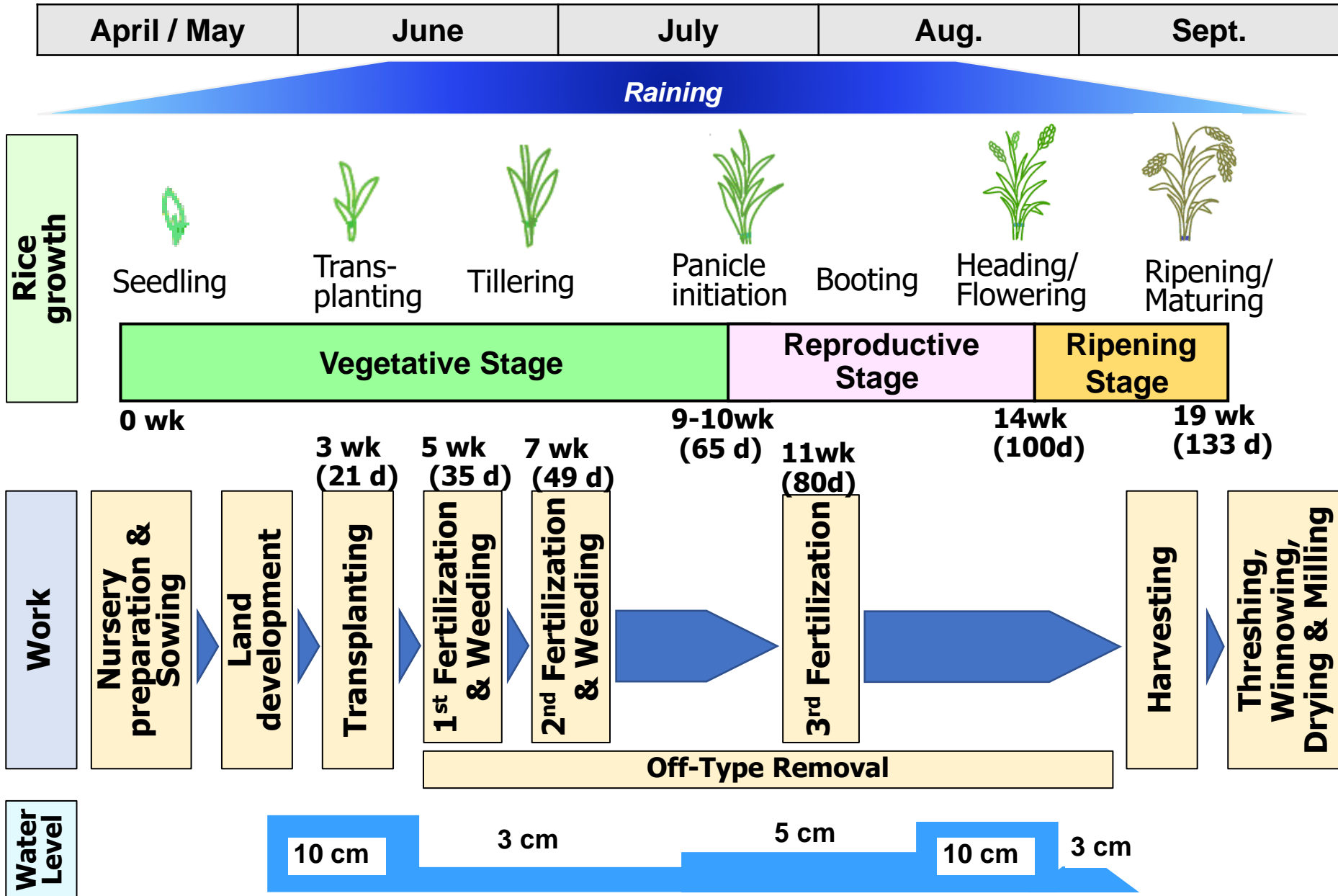


MOFA/JICA TENSUI RICE

# 1-6 WATER USE AND MANAGEMENT



# WATER MANAGEMENT LEVELS (TRANSPLANTING - AGRA)





# Water Management Techniques

Use of interlocking bunds

Use of diverging and drainage canal

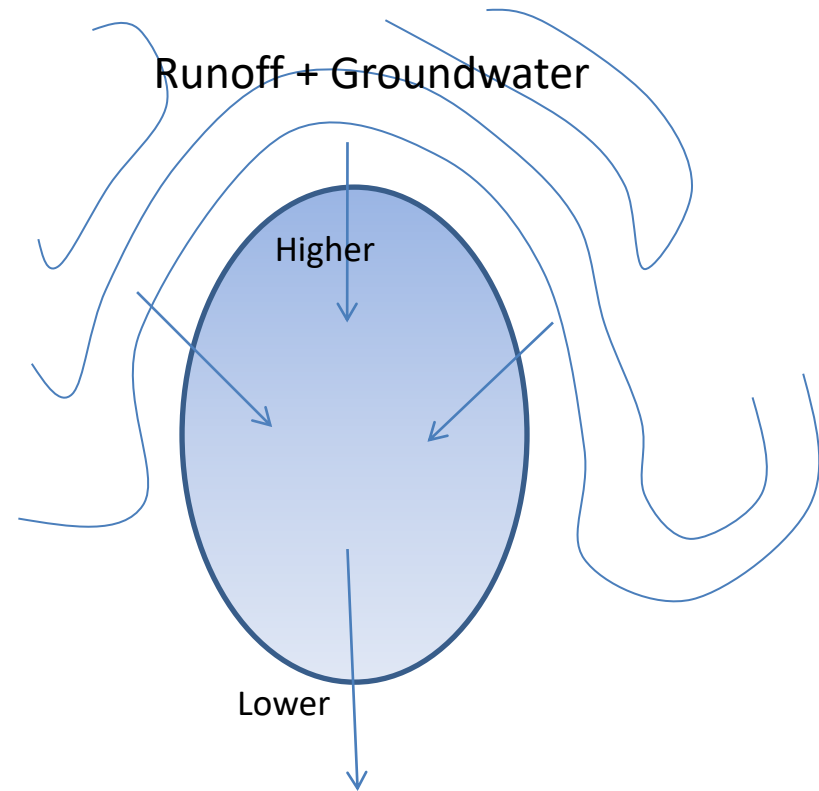
Use dug outs, weirs

Use of sand bags



# SHAPES 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.

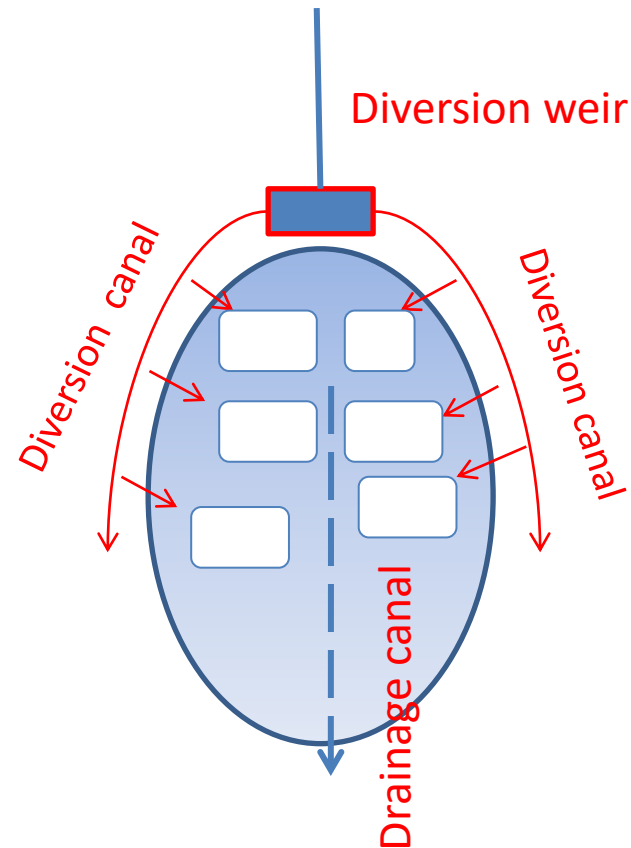


Quoted from JIRCAS paper : Activities in FY 2010  
The study on DIITRPA in Ghana , 23/02/2011

# 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.



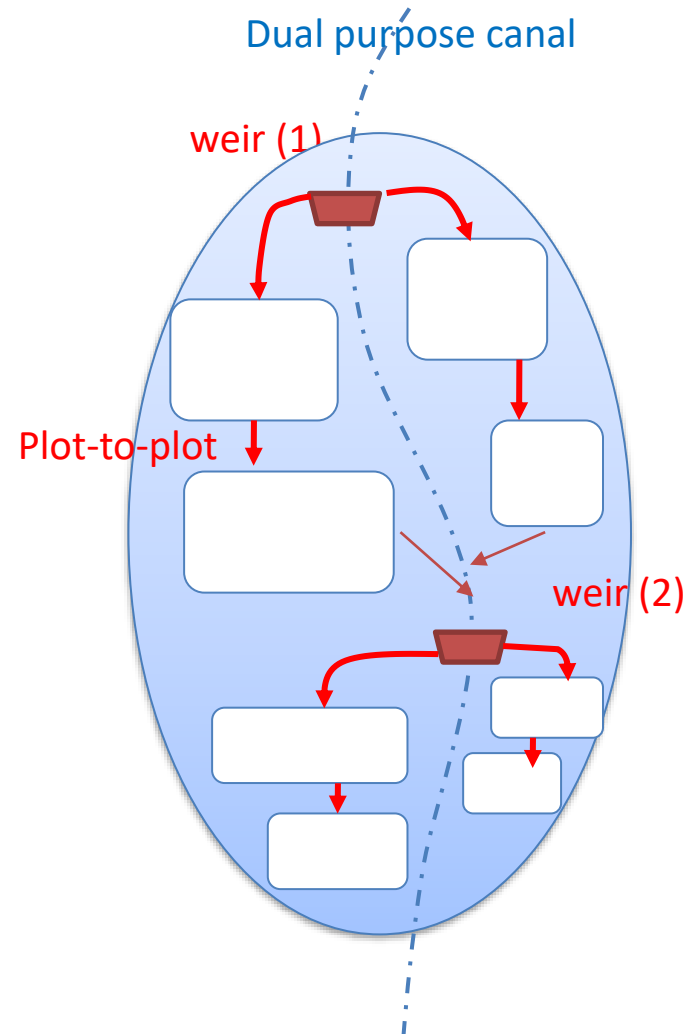
Quoted from JIRCAS paper : Activities in FY 2010  
The study on DIITRPA in Ghana , 23/02/2011



# TYPE OF WATER USE 2

## Dual purpose canal type

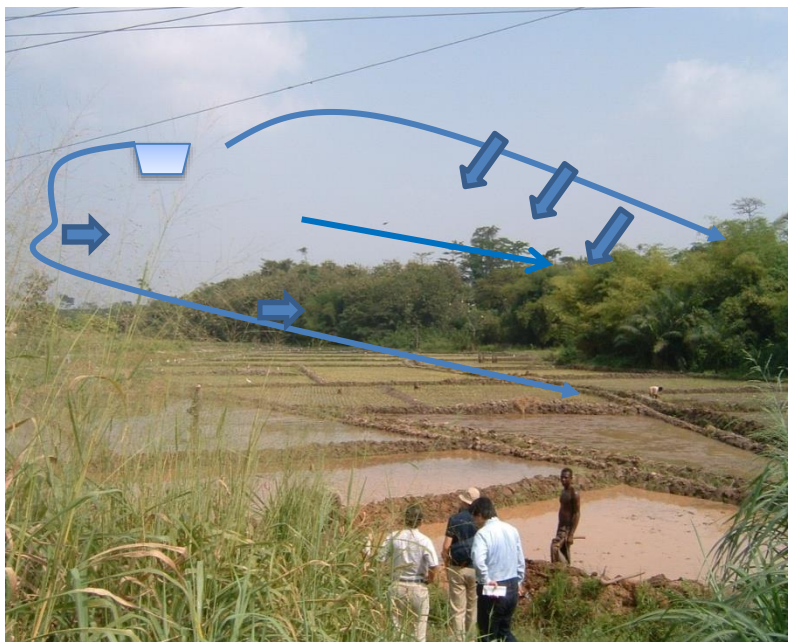
- Original water way is developed as a dual purpose canal.
- Along this canal, a weir is put in the canal in order to raise water level.
- Raised water go into rice field, then use in plot-to-plot.





# Pictures

## Divided-canal type



## Dual purpose canal type

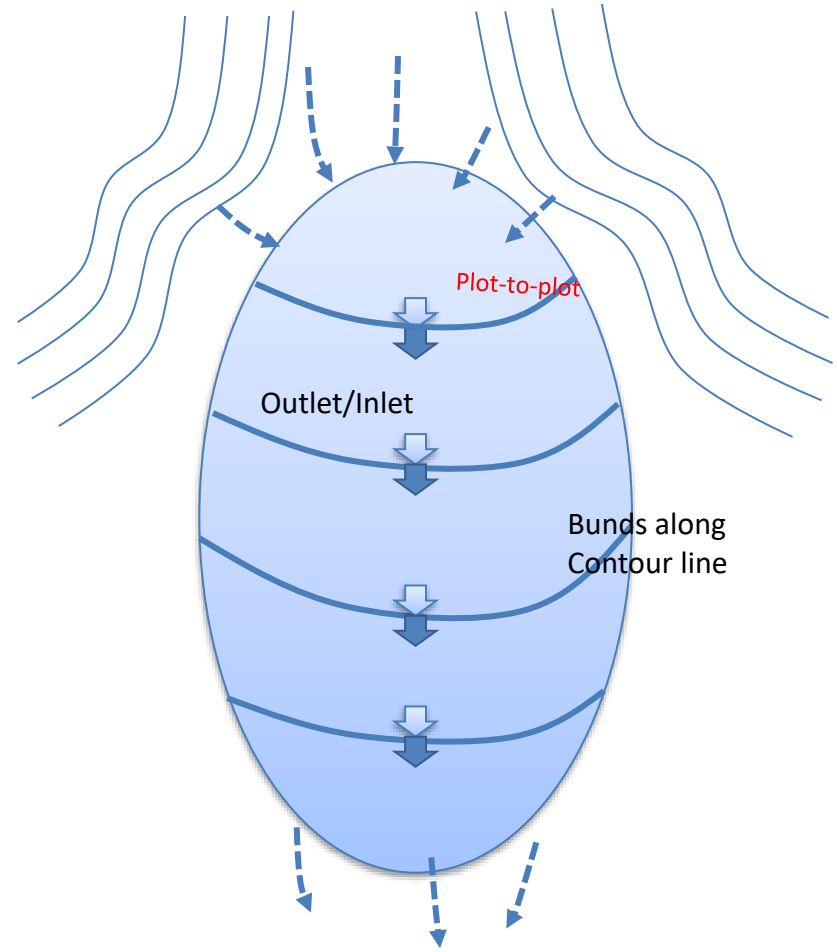


# TYPE OF WATER USE (3)

## 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 1<sup>st</sup> field.
- Water use in plot-to-plot.

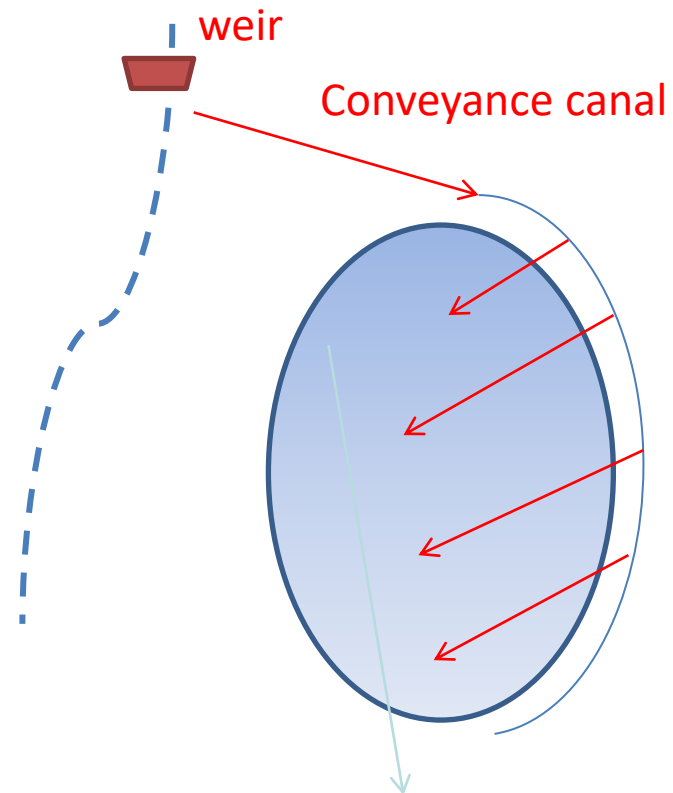
Note:  
Not recommendable for big Valley width.



# TYPE OF WATER USE (4)

## 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.



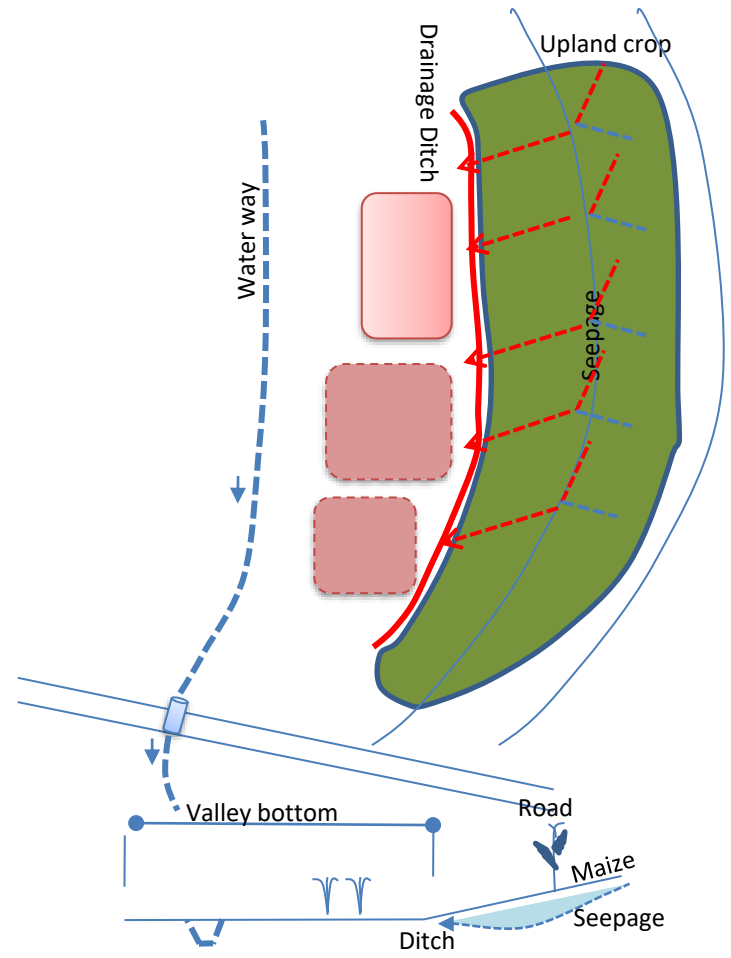
Quoted from JIRCAS paper : Activities in FY 2010  
The study on DIITRPA in Ghana , 23/02/2011



# TYPE OF WATER USE (5)

## Seepage water use type on a sloppy land

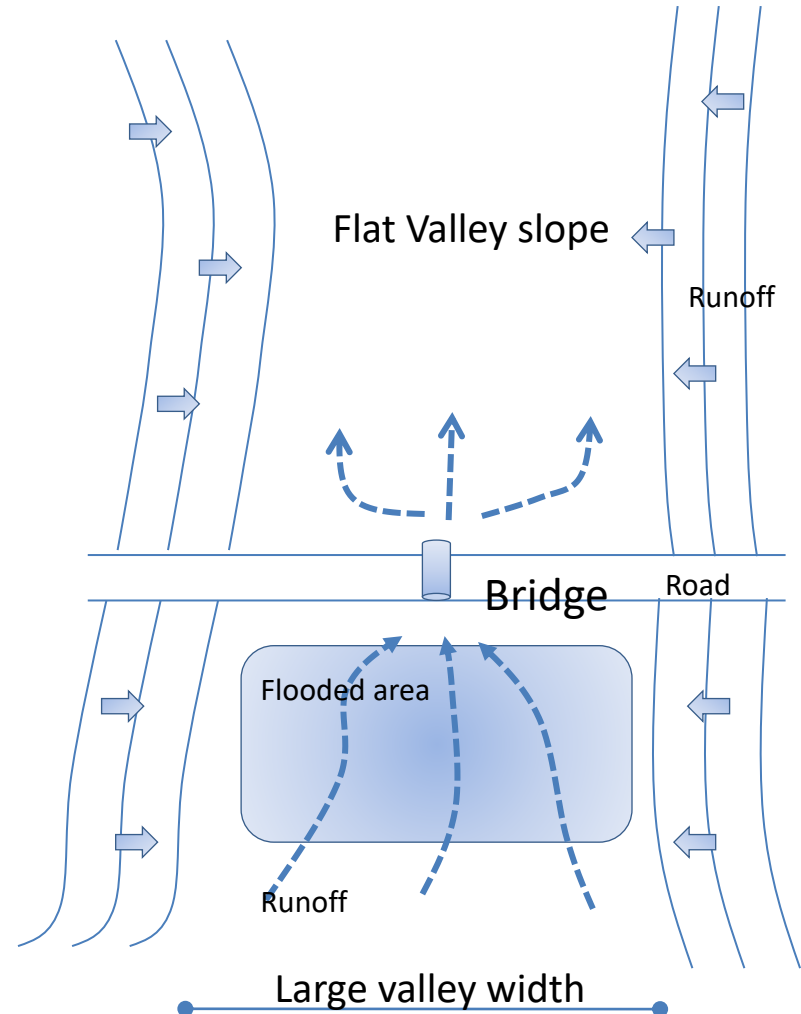
- Along the edge of upland farm, drainage ditch is developed as a water harvesting facility.
- During non raining days, collected seepage water will help for the rice growth.



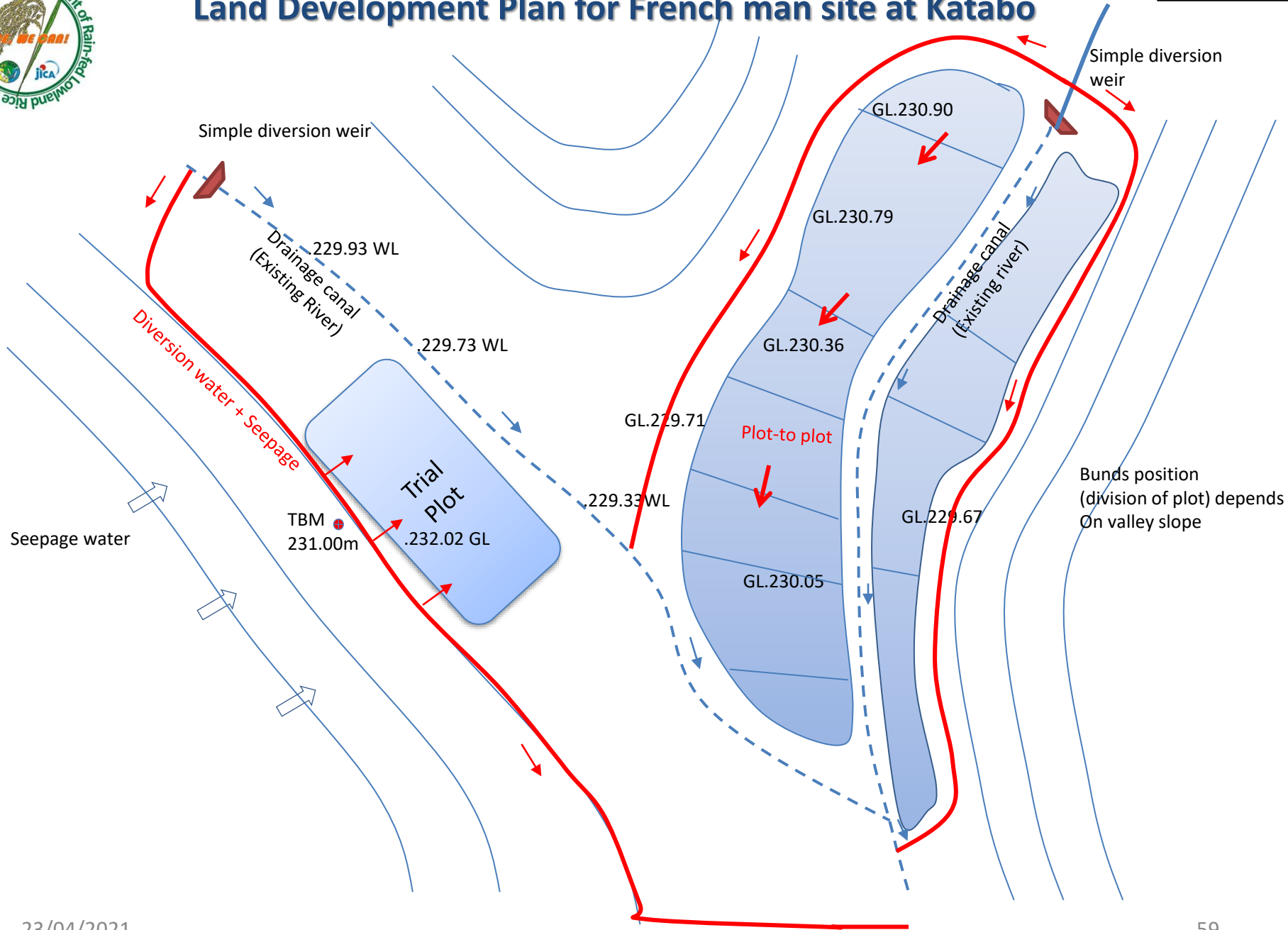
# TYPE OF WATER USE (6)

## 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 for French man site at Katabo



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

|            |  |                                |   |
|------------|--|--------------------------------|---|
|            | <b>DISTRICT:</b>   |                                |   |
|            | <b>NAME OF COMMUNITY:</b>                                |                                |   |
|            | <b>NAME OF AEA</b>                                       |                                |   |
|            | <b>DATE:</b>   |                                |   |
|            |  | <b>INDICATOR FOR SELECTION</b> | <b>NOTE/REMARKS</b>                             |
| <b>NO.</b> | <b>FACTORS</b>   |                                |   |
|            | <b>A.BIO-PHYSICAL</b>                                    |                                |   |
| 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>B.TECHNICAL</b>                                       |                                |   |
| 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         |                                |   |
|            | <b>C. SOCIO-ECONOMIC</b>                                 |                                |   |
| 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  |                                |   |
|            | <b>D. Other factors</b>                                  |                                |   |
| 21         | Harvesting period  |                                |   |
| 22         | Current Yield/ acre(paddy)-bags/kg                       |                                |   |
| <b>E</b>   | <b>PCU VISITING TEAM MEMBERS</b>                         |                                |   |
| <b>F</b>   | <b>NAME OF DISTRICT/MUNICIPAL DIRECTOR:</b>              |                                |   |
| <b>G</b>   | <b>DATE:</b>   |                                |   |

|  |
|--|
| <b>NB. Indicator</b> :Shows how suitable and relevant those factors are for rice cultivation |
| <b>Note:</b> Additional comments to be added to the factors for consideration                |



MOFA/JICA TENSUI RICE

Rice  
Cultivation

# RICE CULTIVATION

## 1<sup>st</sup> Training of Trainers



# Contents

1. Seed Preparation
2. Nursery Preparation and Sowing
3. Transplanting
4. Direct Sowing
5. Fertilizer Management
6. Fertilizer Calculation
7. Disease Control
8. Weed Control
9. Biochar Trials



MOFA/JICA TENSUI RICE

Rice  
Cultivation

# SEED PREPARATION

Seed selection  
and  
Seed soaking

# Sowing Rate

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



**6 kg**

Seeds for one large Voltic bottle (1.5L) equivalent 1 kg.



**8 kg**

A full rubber bucket of dry seeds (13%) equivalent 8 kg.

× 3 buckets = **24 kg**

× 4 buckets = **32 kg**



# 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

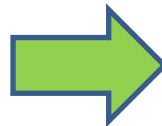
# Purpose of seed selection

## To obtain viable seeds

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



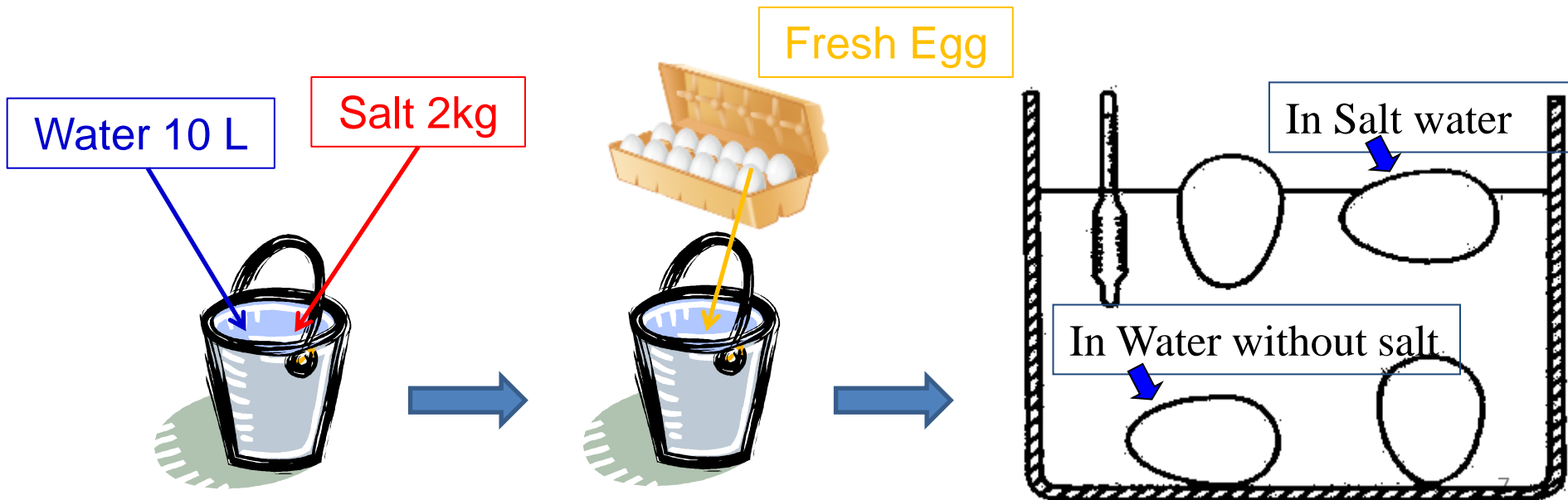
Some unfulfilled grains mixed in the seed



All the seeds fulfilled

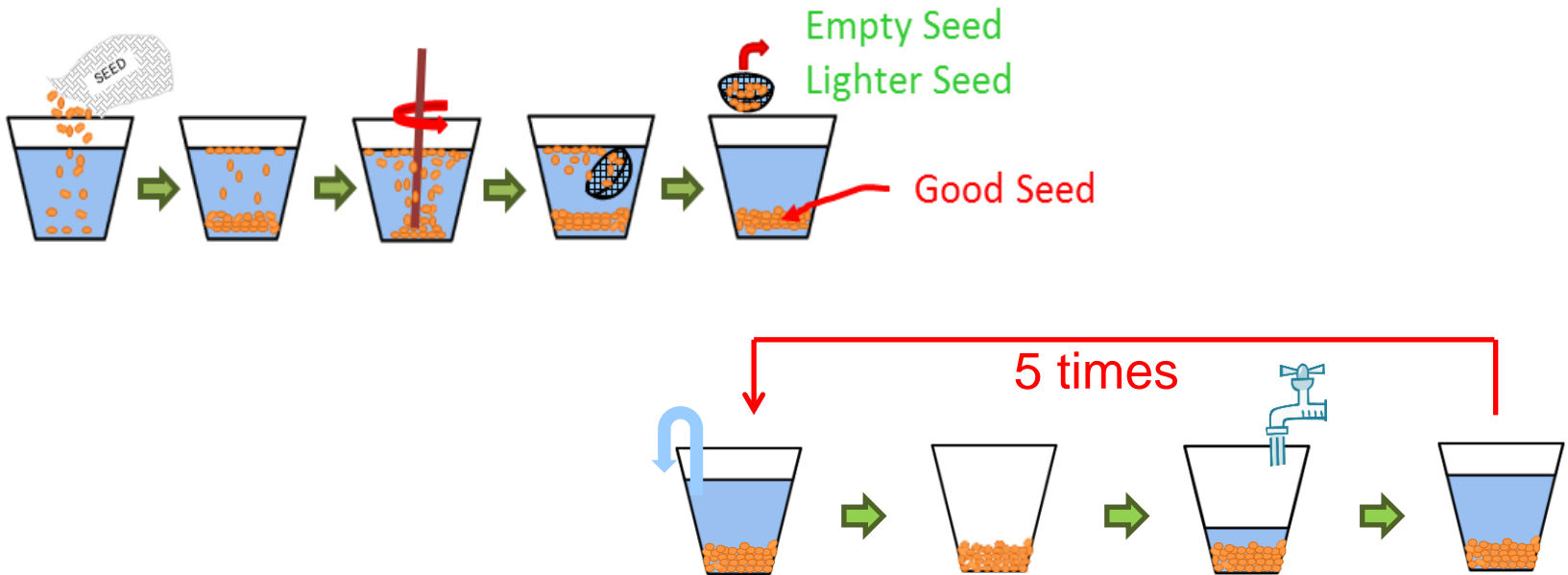
# Seed selection (1) by salt water method

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.

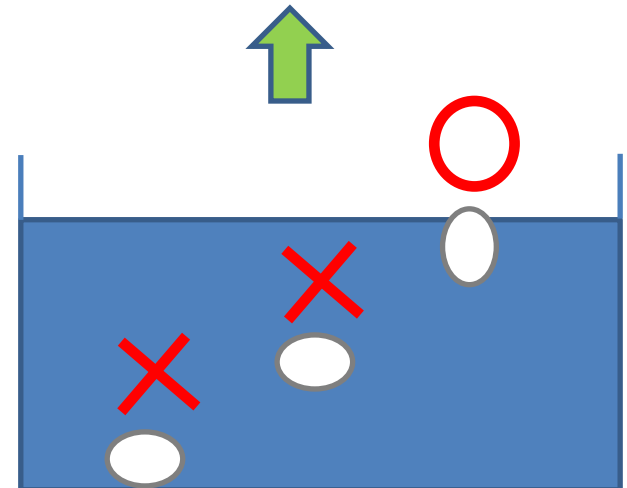
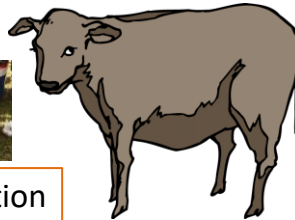


- ④ Put eggs into the Urea solution to check the specific gravity.

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, Brown Spot, 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 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.

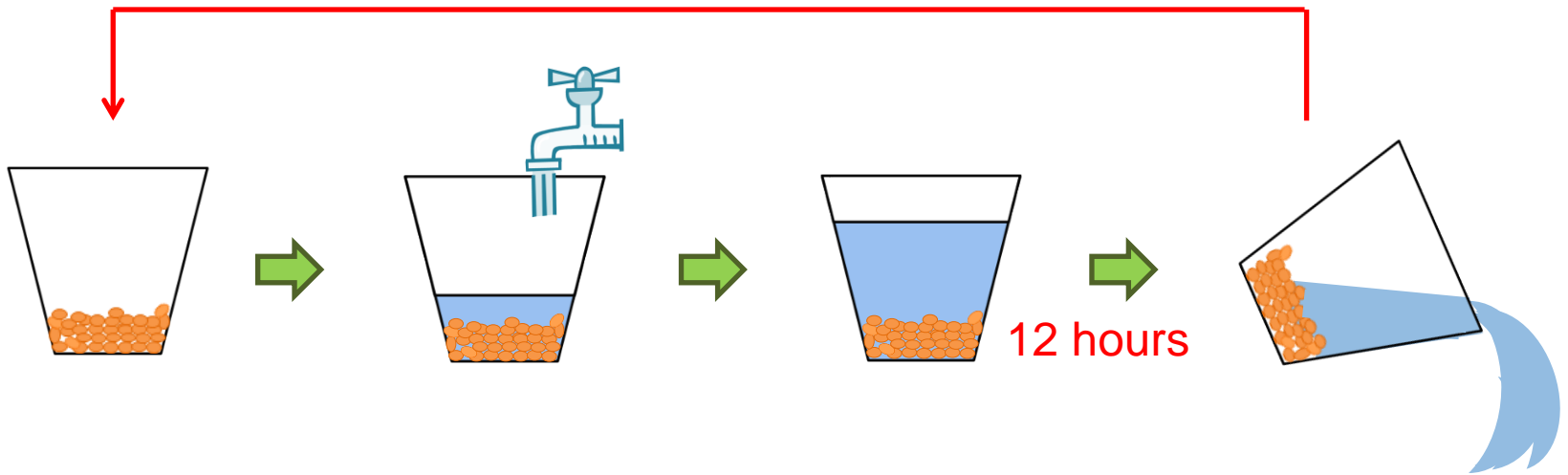
## **2. Purpose of seeds soaking**

**To enable seeds to absorb  
sufficient water for a period  
and to have a uniform  
germination**

# Seeds soaking

For 3 ~ 4 days

Change water twice a day

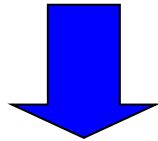




# Procedure of seed soaking

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

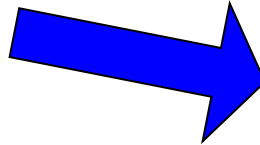
**Selected seed**



*Soak in water*



**Swollen seed**



**Seedling sprout from the seed**



Seed germinate well



Good extent  
of  
germination



Good extent  
of  
germination



MOFA/JICA TENSUI RICE

Rice  
Cultivation

# NURSERY PREPARATION AND SOWING

# Method of making a wet nursery

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

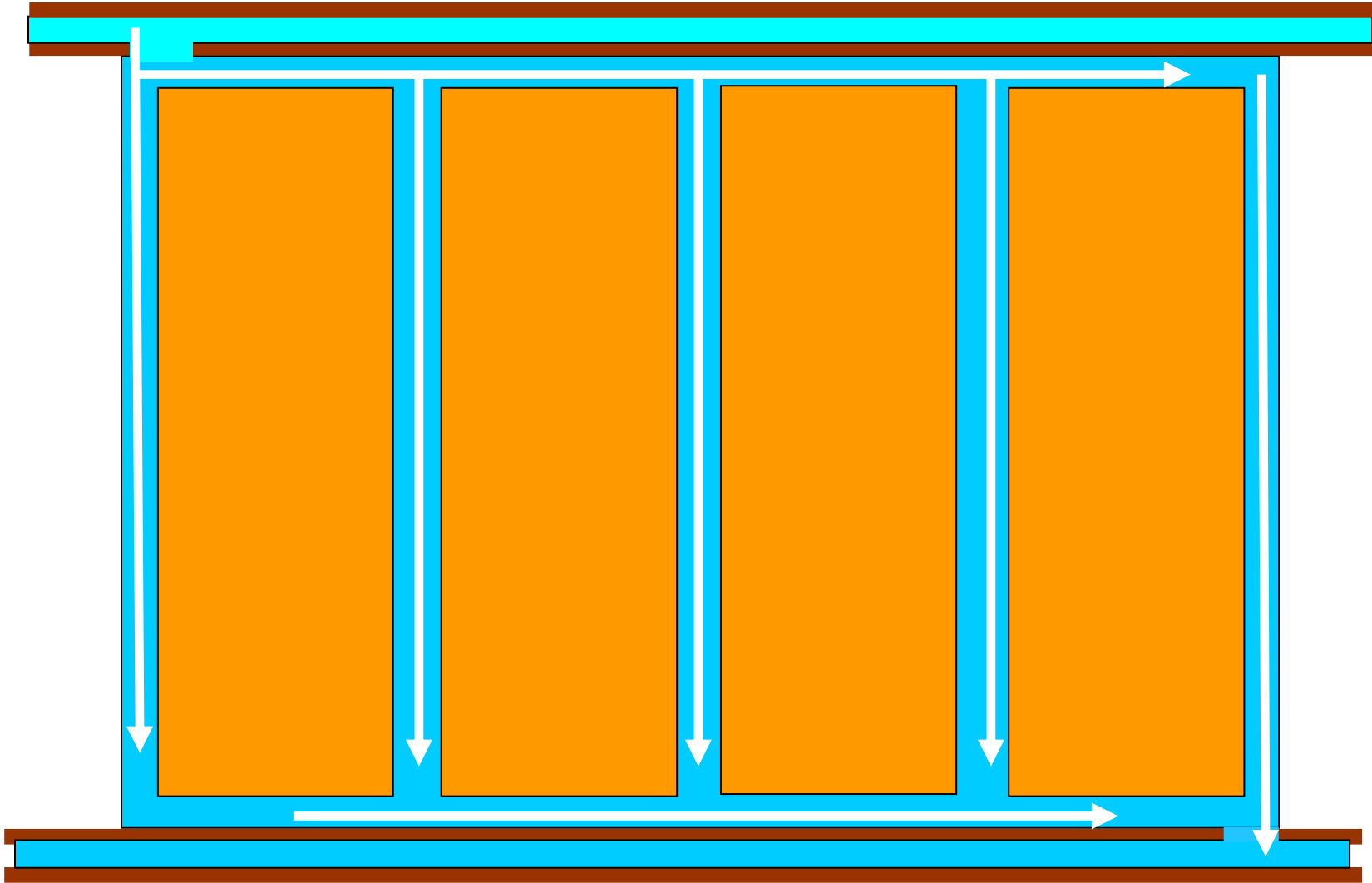


# Important qualities for good nursery

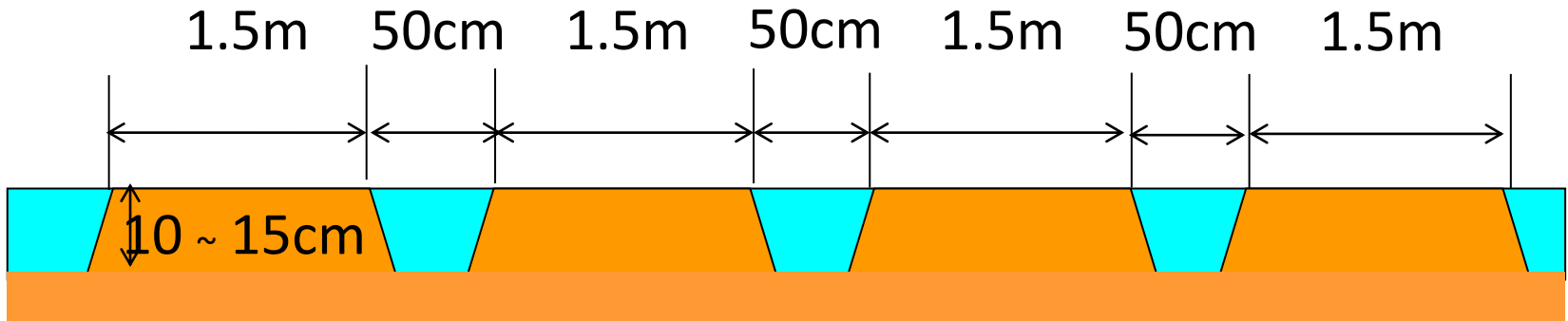
- Nursery beds must be level
- Water in the nursery must be controlled freely by irrigation and drainage systems
- Soil must be fertile to raise healthy seedlings



# Irrigating and draining water out



**Nursery beds must be well leveled**



**Cross-section of Nursery**

# How to determine the nursery area

5 kg of seed is sown for 1/4 acre

100 grams of seed covers 1m<sup>2</sup>

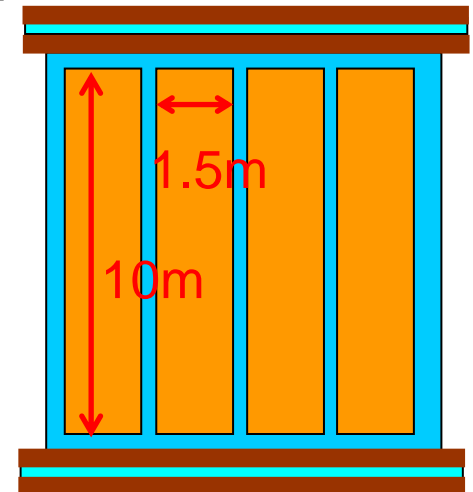
5 kg = 5,000 gms

5,000gms / 100 gms/m<sup>2</sup> = 50 m<sup>2</sup>

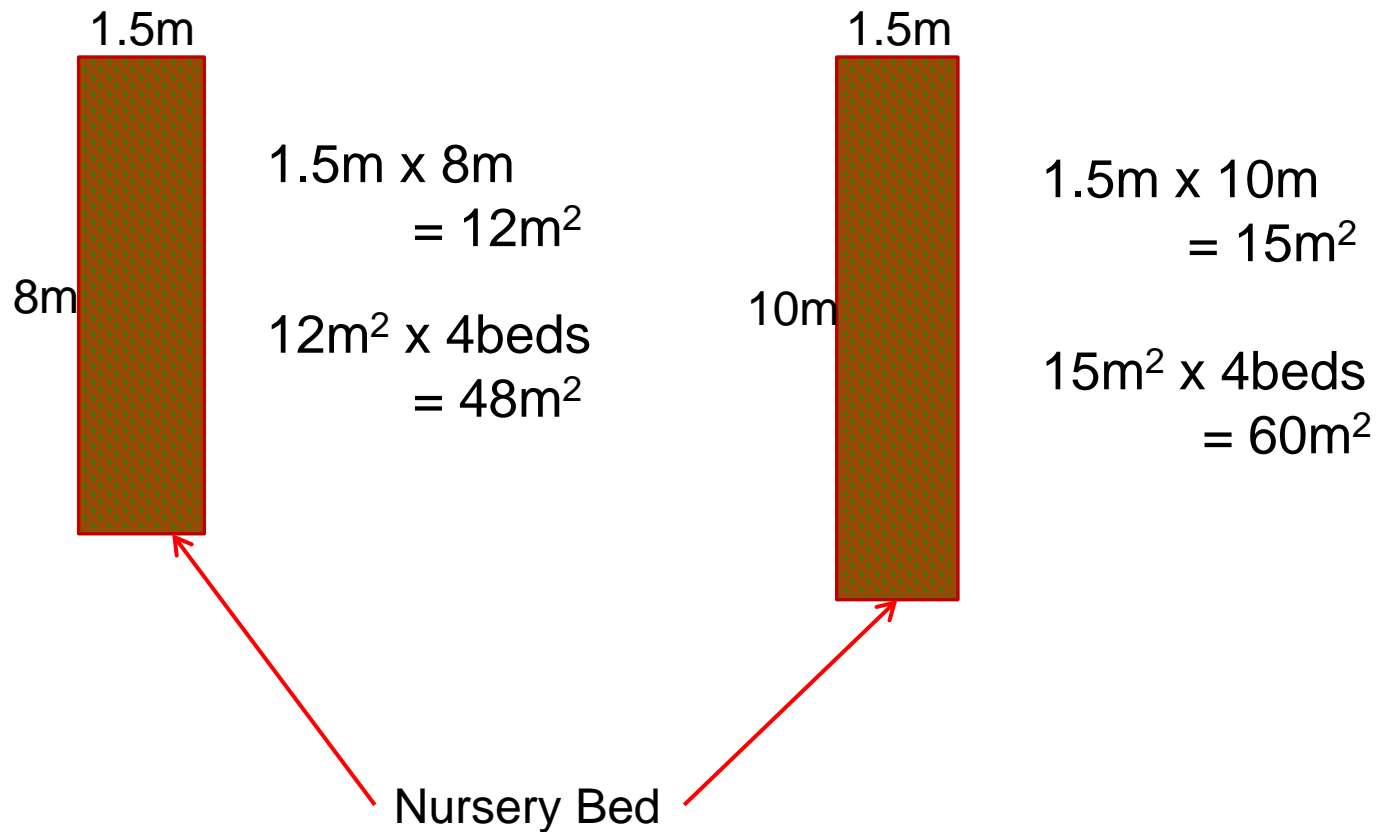
50 m<sup>2</sup> / 1.5m / 10m = 3.3

50 m<sup>2</sup> of nursery area

4 seed beds



# Example of the size of Nursery Bed

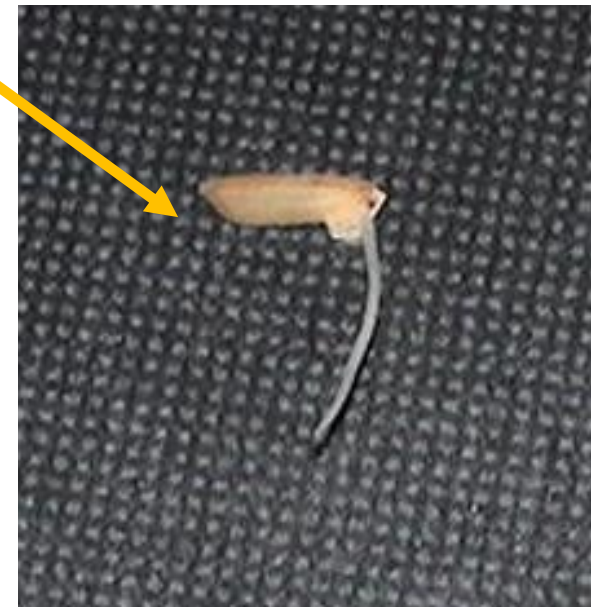
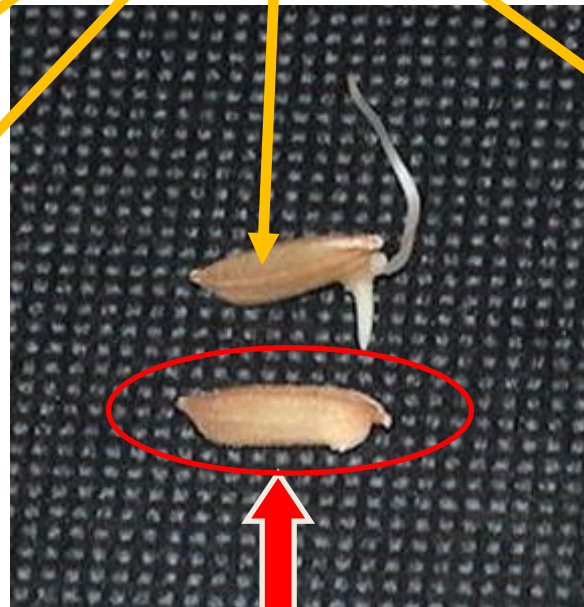


# Important technical points on sowing

- Soak seeds in adequate amount of water for considerable period time to obtain uniform germination
- 100 grams of seed per 1m<sup>2</sup> is sown on the nursery bed
- Broadcast seed evenly on the seedbed
- Cover seed with soil well by hand
- Cover nursery beds with palm leaves or other material to prevent bird damage.

# Seed germination

**Bad seed**



**Good seed for sowing**

# Inadequate incubation



**Normal growth**



**Elongated seedlings**



Sowing on nursery bed

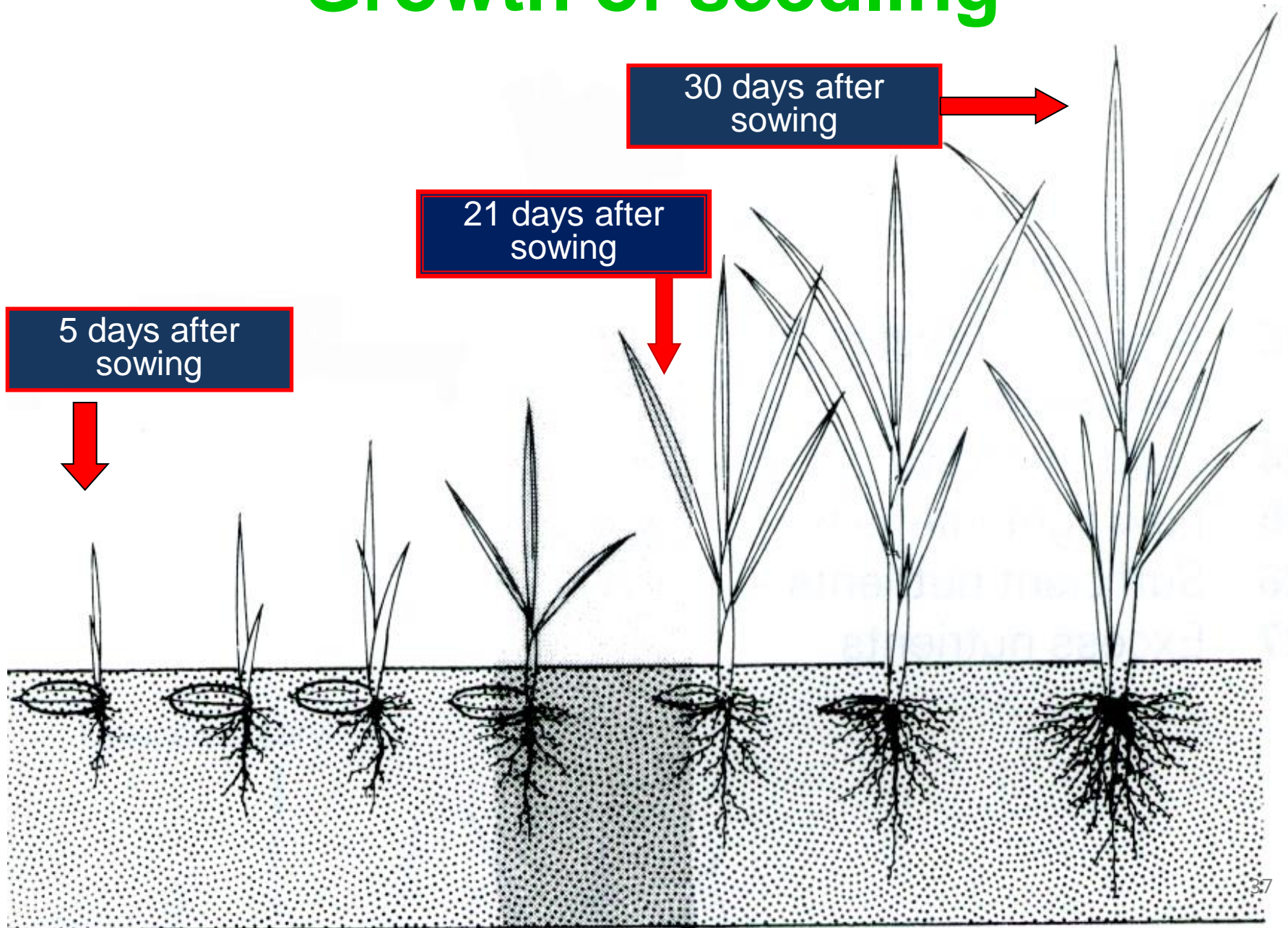


Prevention of bird damage



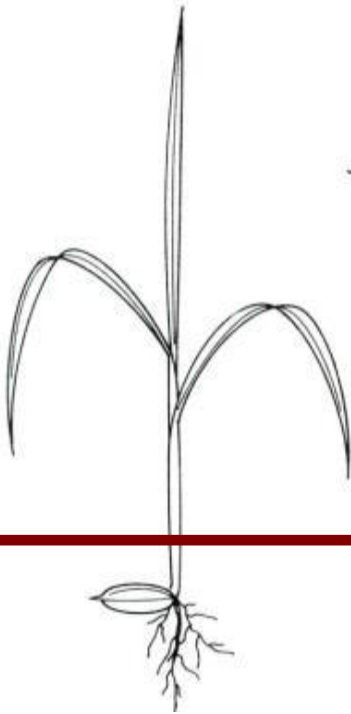


# Growth of seedling

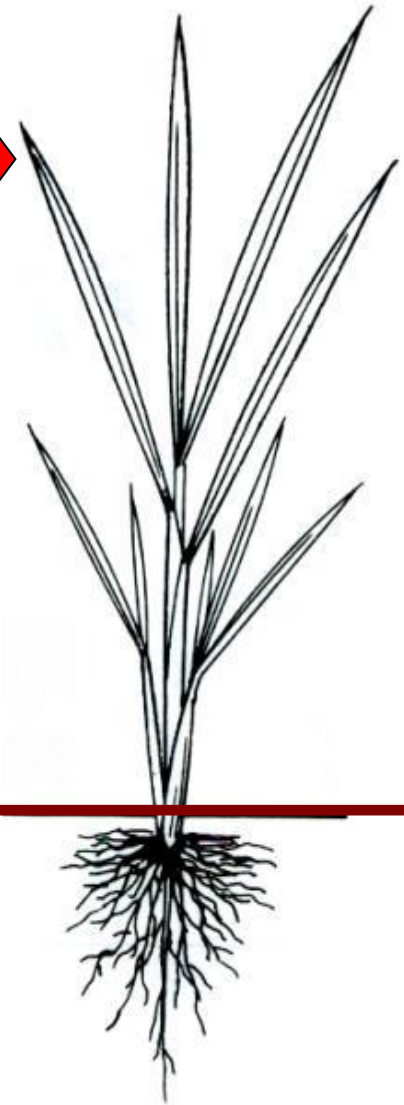
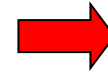
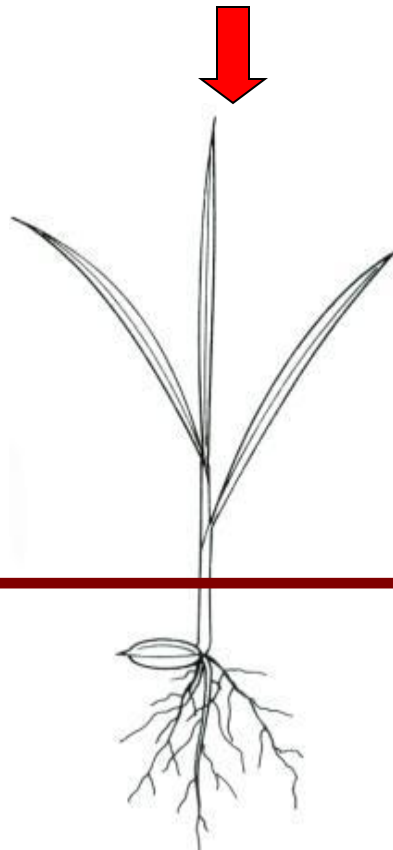


# Good and Bad

**Bad seedling**



**Good seedling**



# Qualities for good seedling

Good seedling



**Short height**

**More root**

**Stiff leaves**

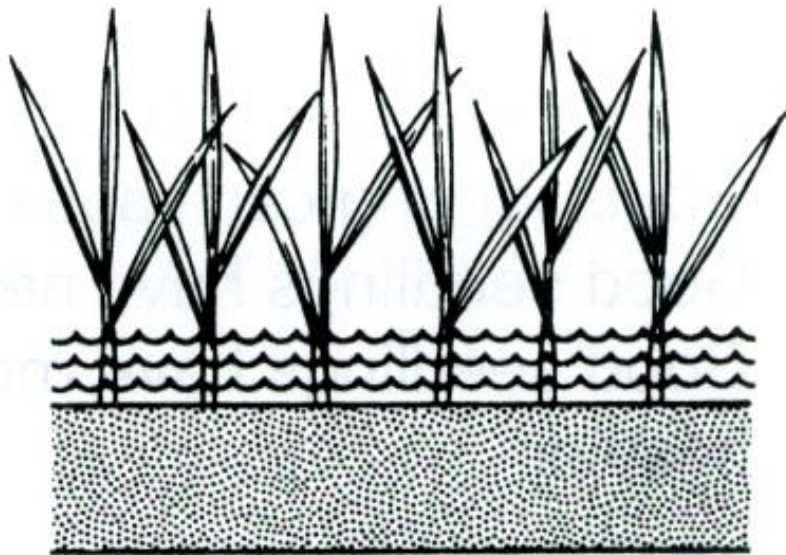
**No disease  
No pest damage**

**More biomass**

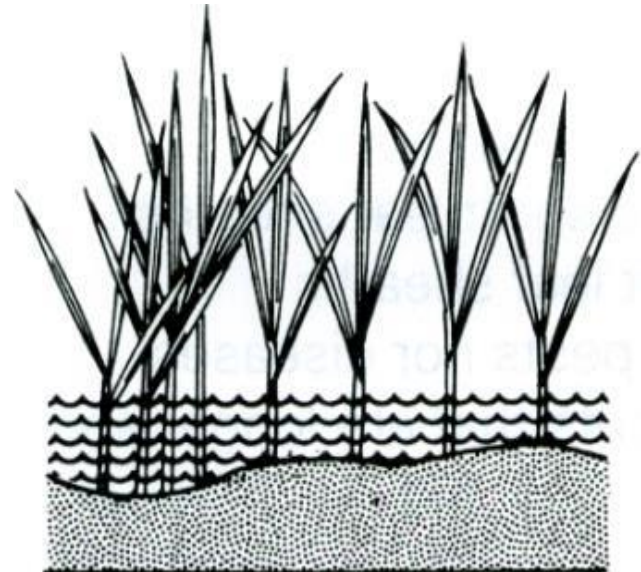
Poor seedling



# Leveling of Nursery bed



**Uniform growth**



**Irregular growth**



MOFA/JICA TENSUI RICE

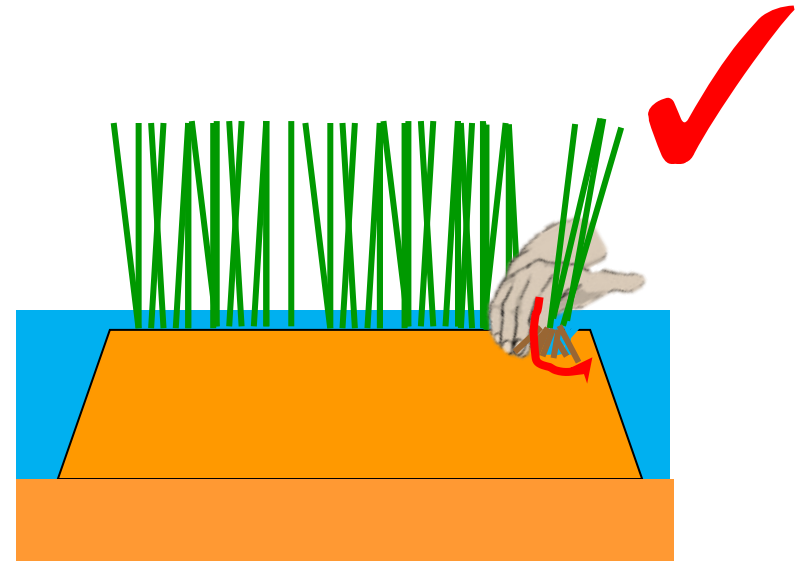
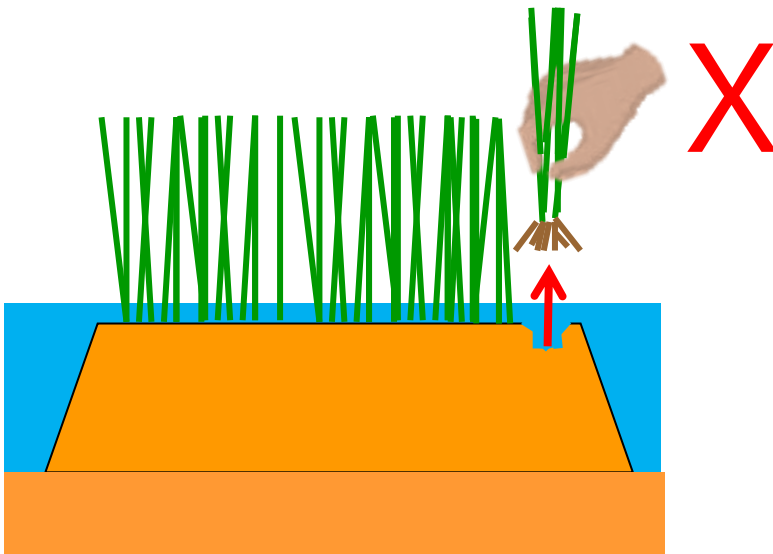
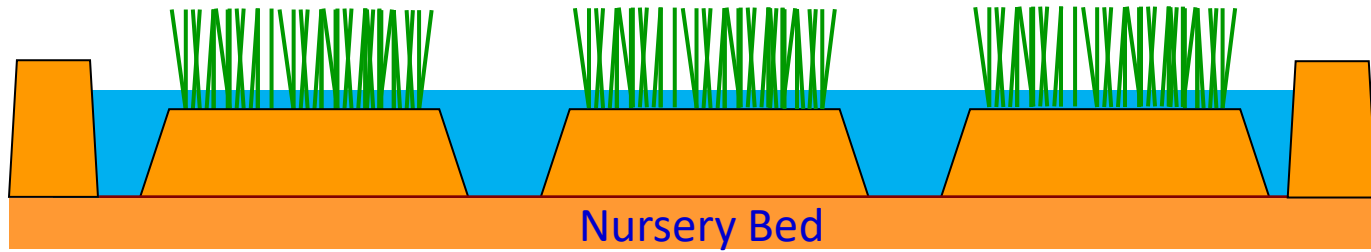
Rice  
Cultivation

# Transplanting

# Merits of Transplanting

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

# Uprooting of seedling







# Methods of transplanting

1. Random transplanting

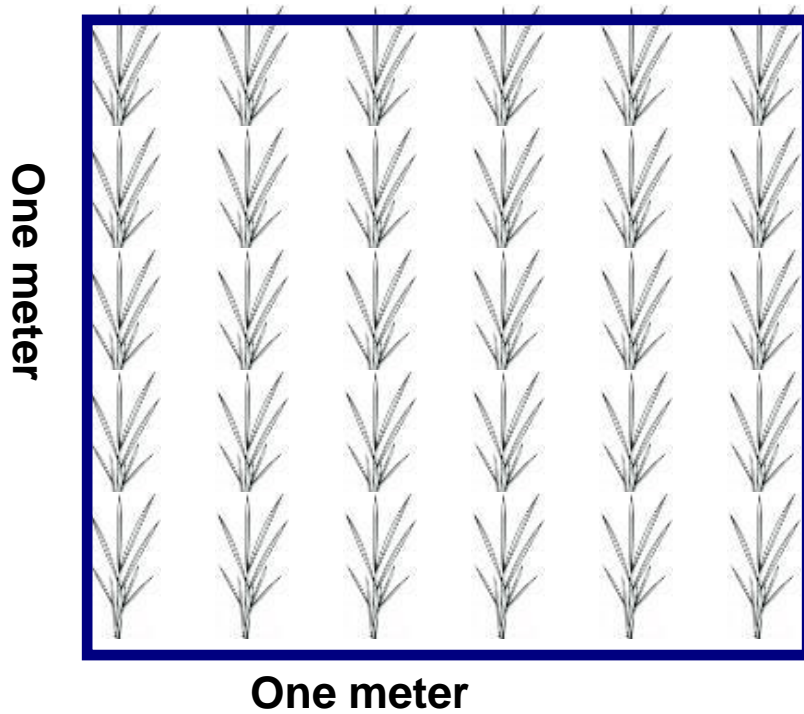
2. Row transplanting

① Square transplanting

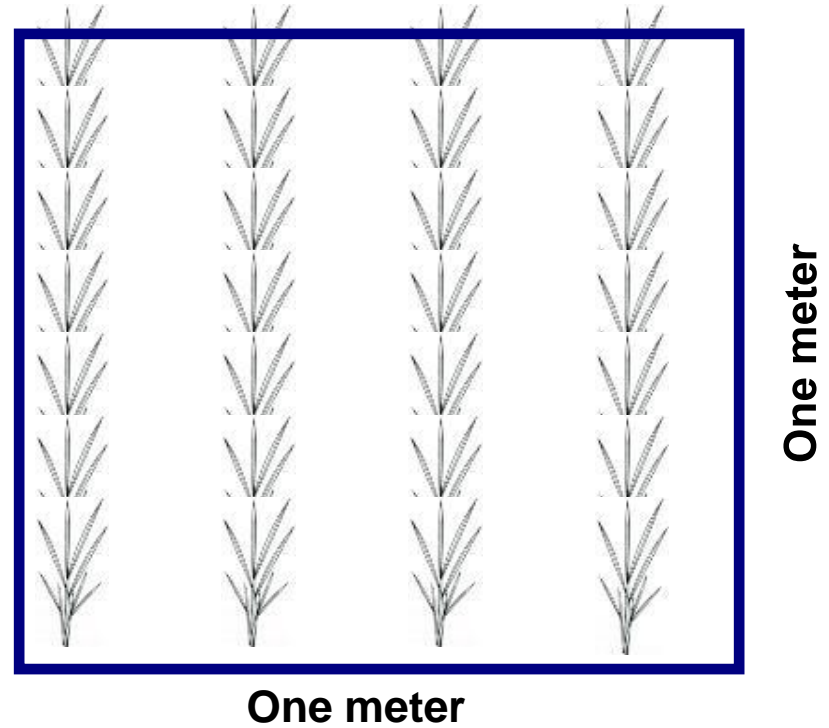
② Rectangular

# Methods of transplanting

Square

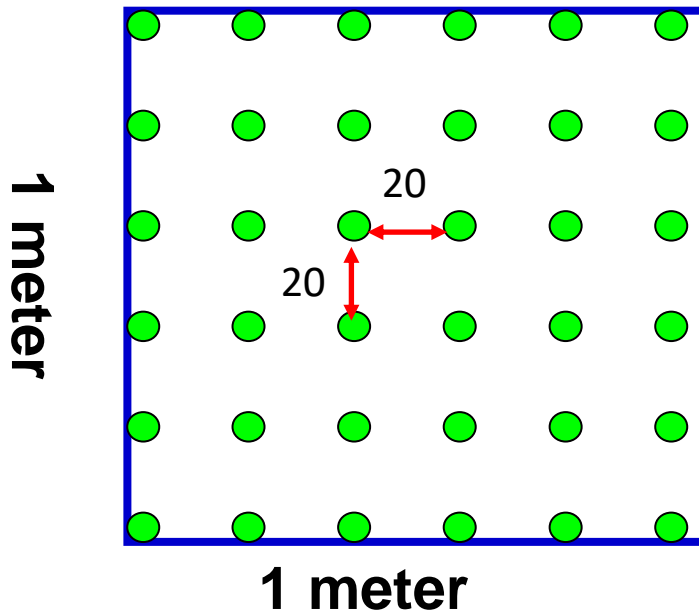


Rectangular



# Row transplanting

**Square**



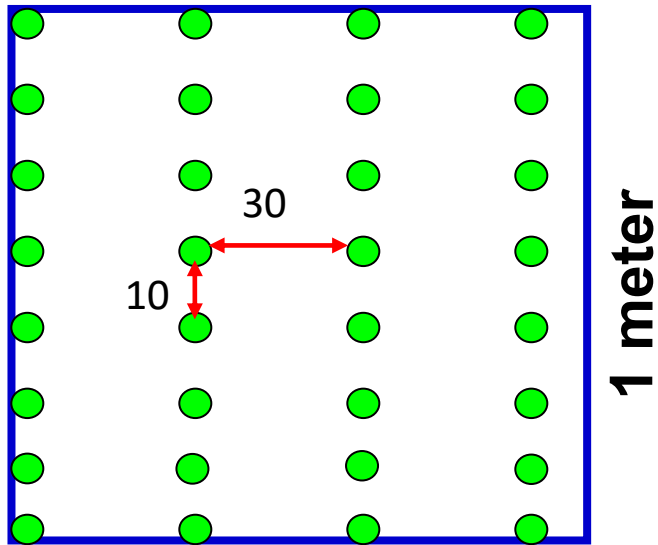
**20cmx20cm**

Planting Density:  
 $(100\text{cm} \times 100\text{cm}) / (20\text{cm} \times 20\text{cm}) =$   
 $25 \text{ hills/m}^2$

MOFA Recommendation

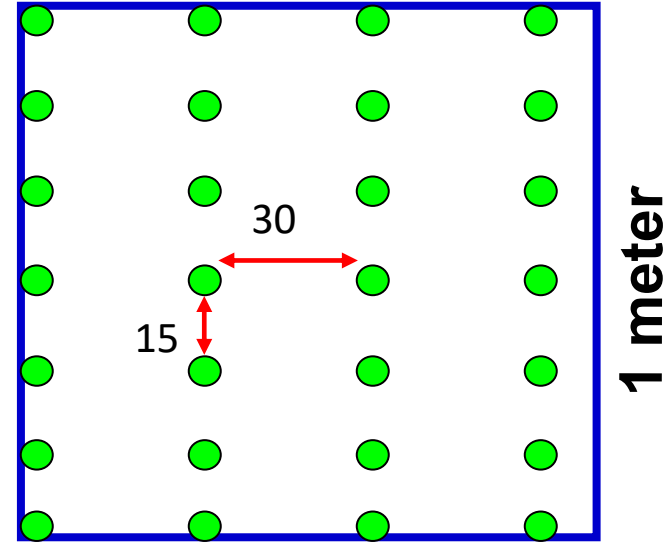
# Row transplanting

## Rectangular



**30cmx10cm**

$$(100\text{cm} \times 100\text{cm}) / (30\text{cm} \times 10\text{cm}) = 33.3 \text{ hills/m}^2$$



**30cmx15cm**

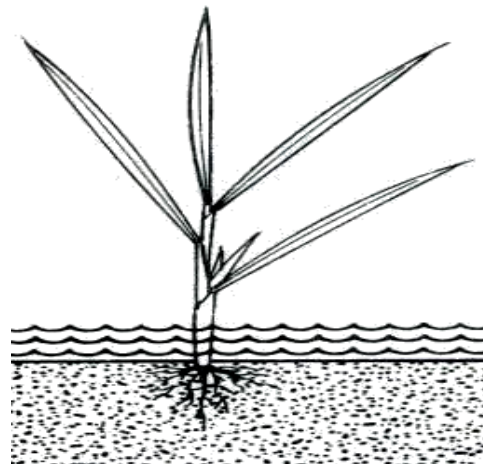
$$(100\text{cm} \times 100\text{cm}) / (30\text{cm} \times 15\text{cm}) = 22.2 \text{ hills/m}^2$$

# How to Transplant

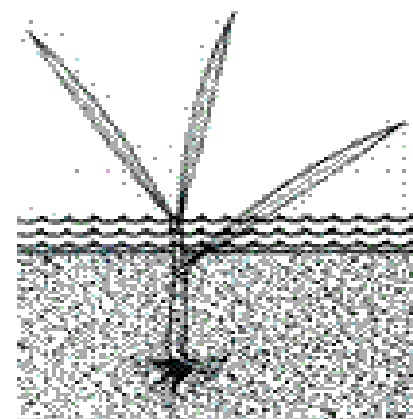
- Use a guide rope for transplanting.
- Transplant at most four (4) and not less than three (3) seedlings per hill.
- Hold the seedlings closer to the base as possible.
- Plant the seedlings 2 - 3 cm deep in the soil.
- Row distance is 30 cm and hill distance is 10 cm.
- In case of Certified Seed Production, row distance is 30 cm and hill distance is 15 cm.



Proper handling of seedlings



Proper depth



Improper depth

Transplanting depth





MOFA/JICA TENSUI RICE

Rice  
Cultivation

# Direct Sowing





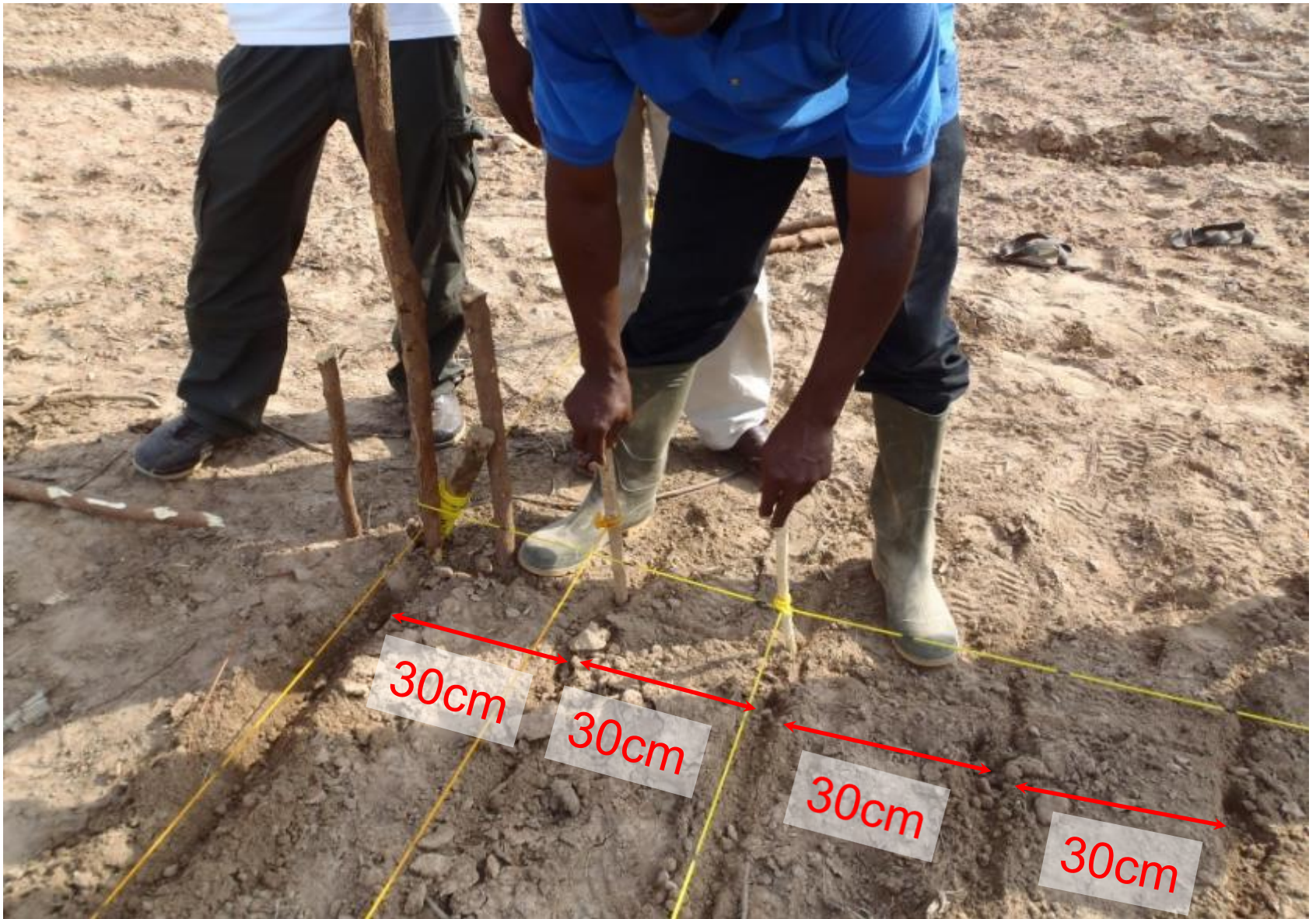
# Sowing Method (1)

- 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  $\frac{1}{4}$  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



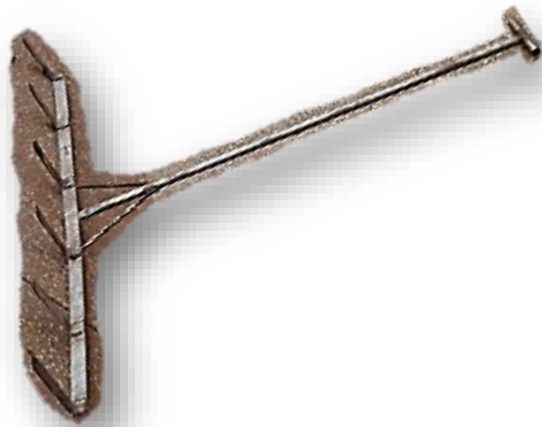
30cm

30cm

30cm

30cm







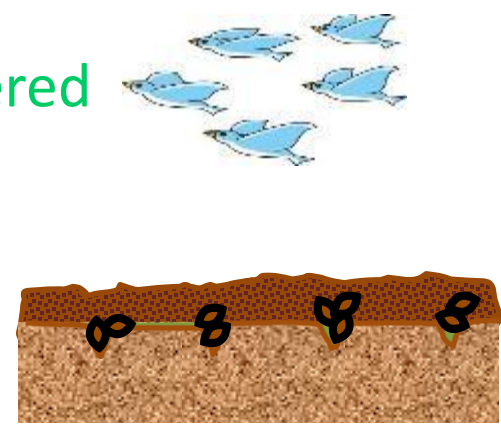


Uncovered

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

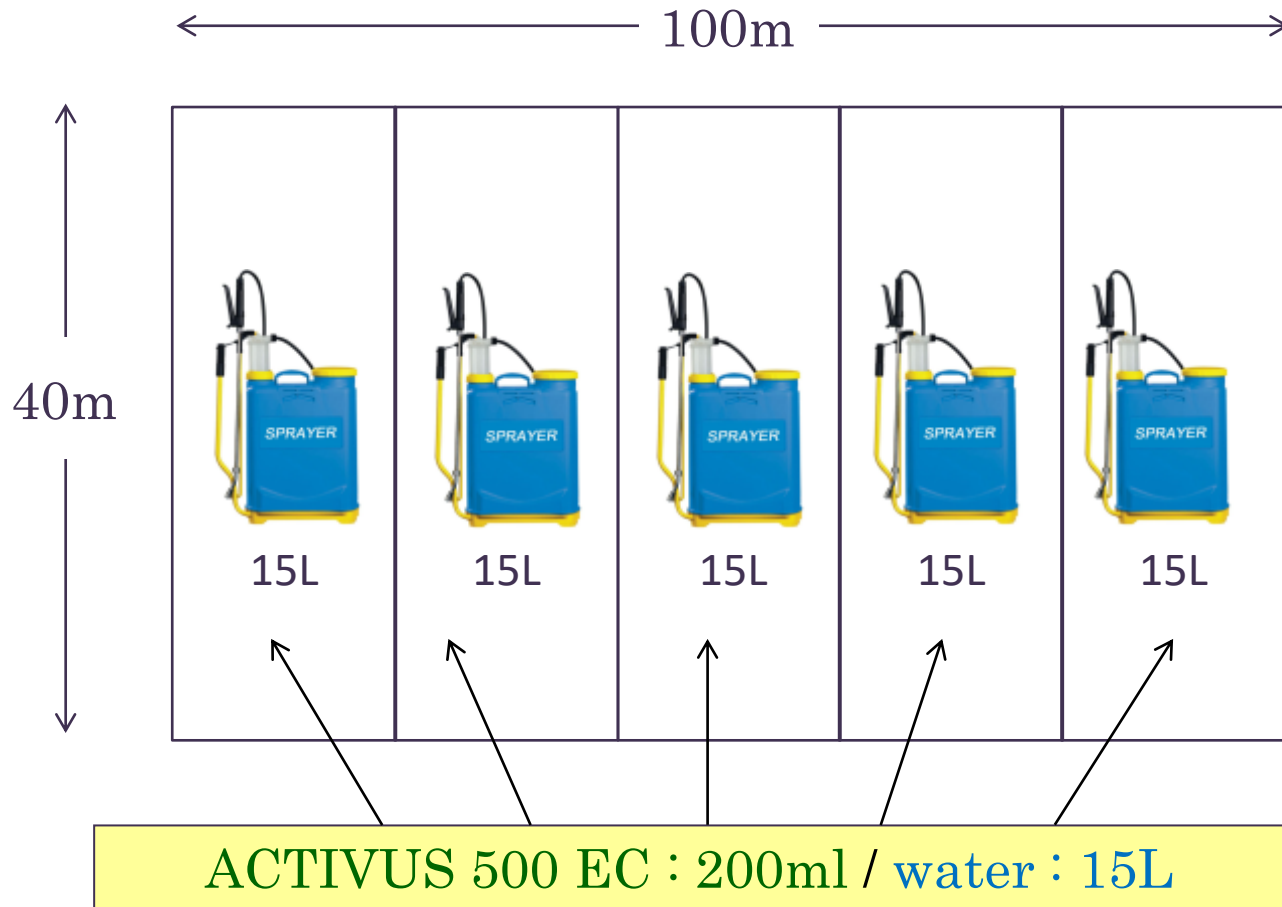


# For 1 acre, use knapsack sprayer

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

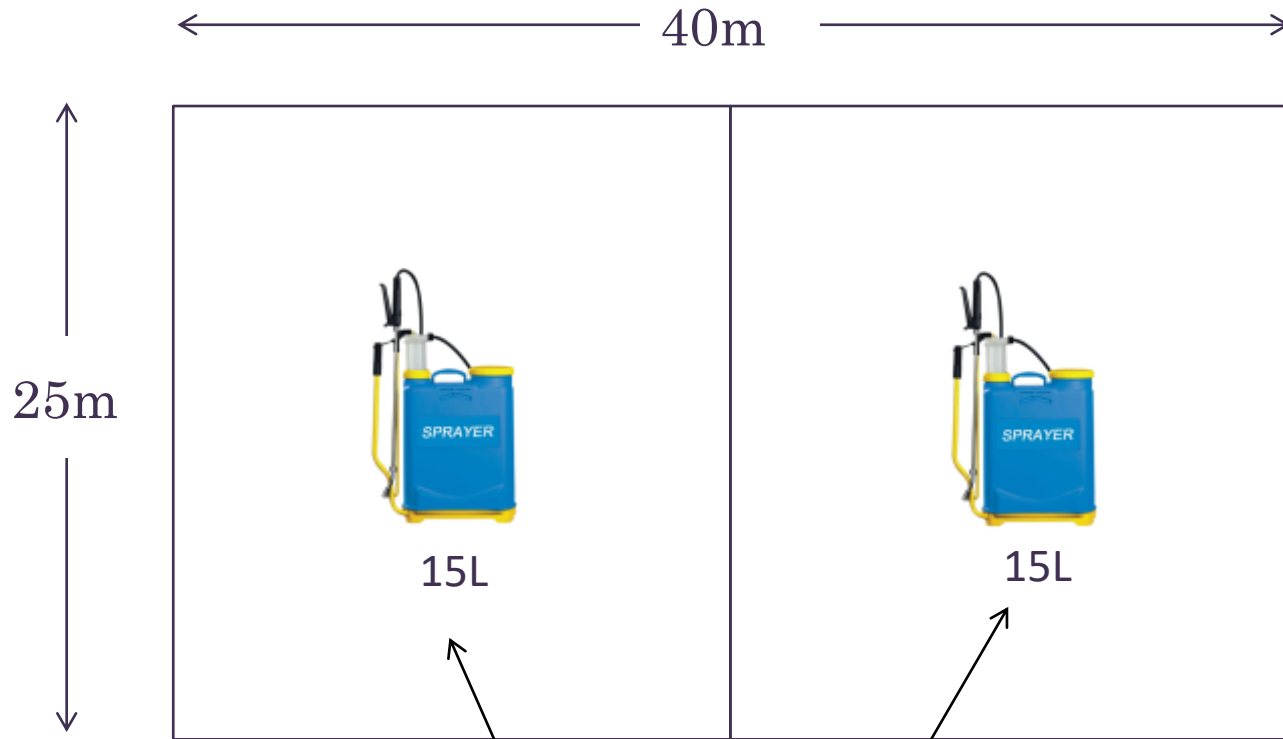


# For 1/4 acre, use knapsack sprayer

ACTIVUS :150ml / water:15L × 2 rounds

1/4 acre

# Herbicide Application



ACTIVUS 500 EC : 150ml / water : 15L



MOFA/JICA TENSUI RICE

Rice  
Cultivation

# On-farm Water Management

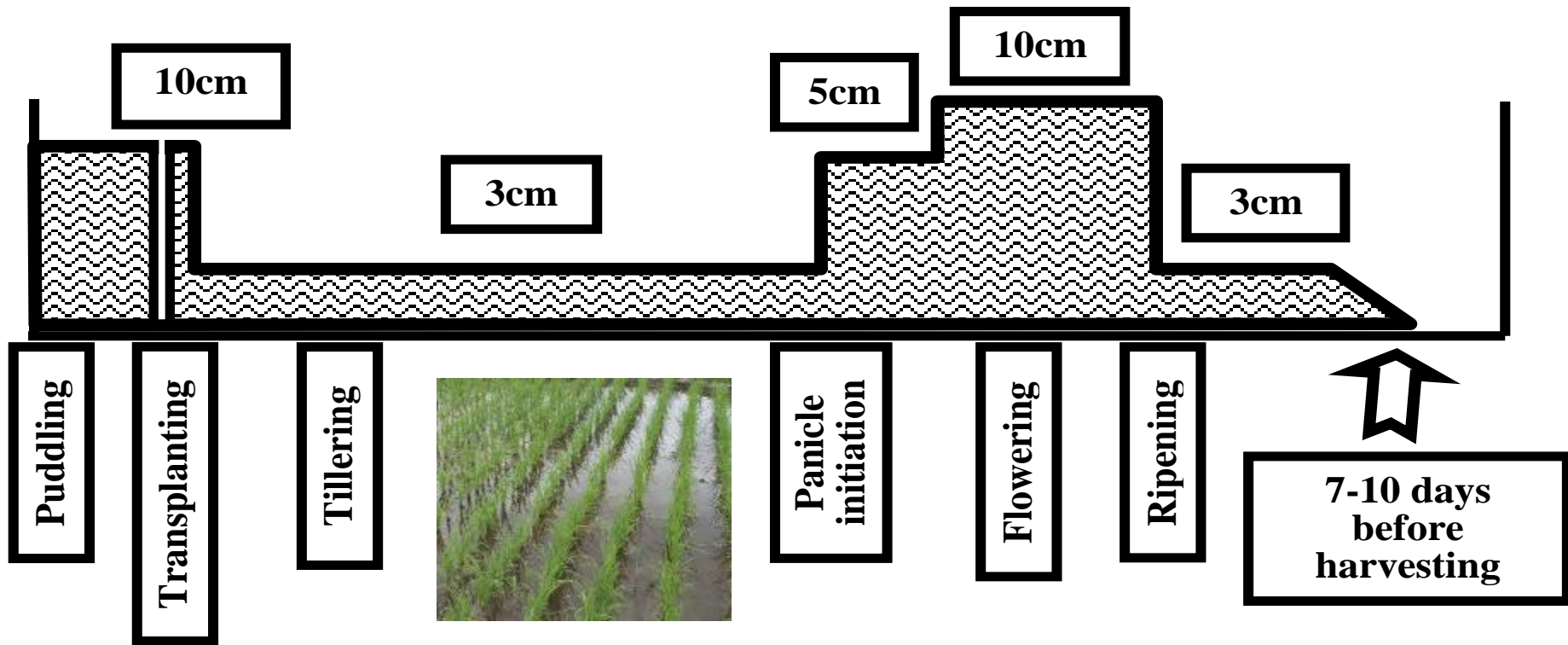


# **Water level**

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

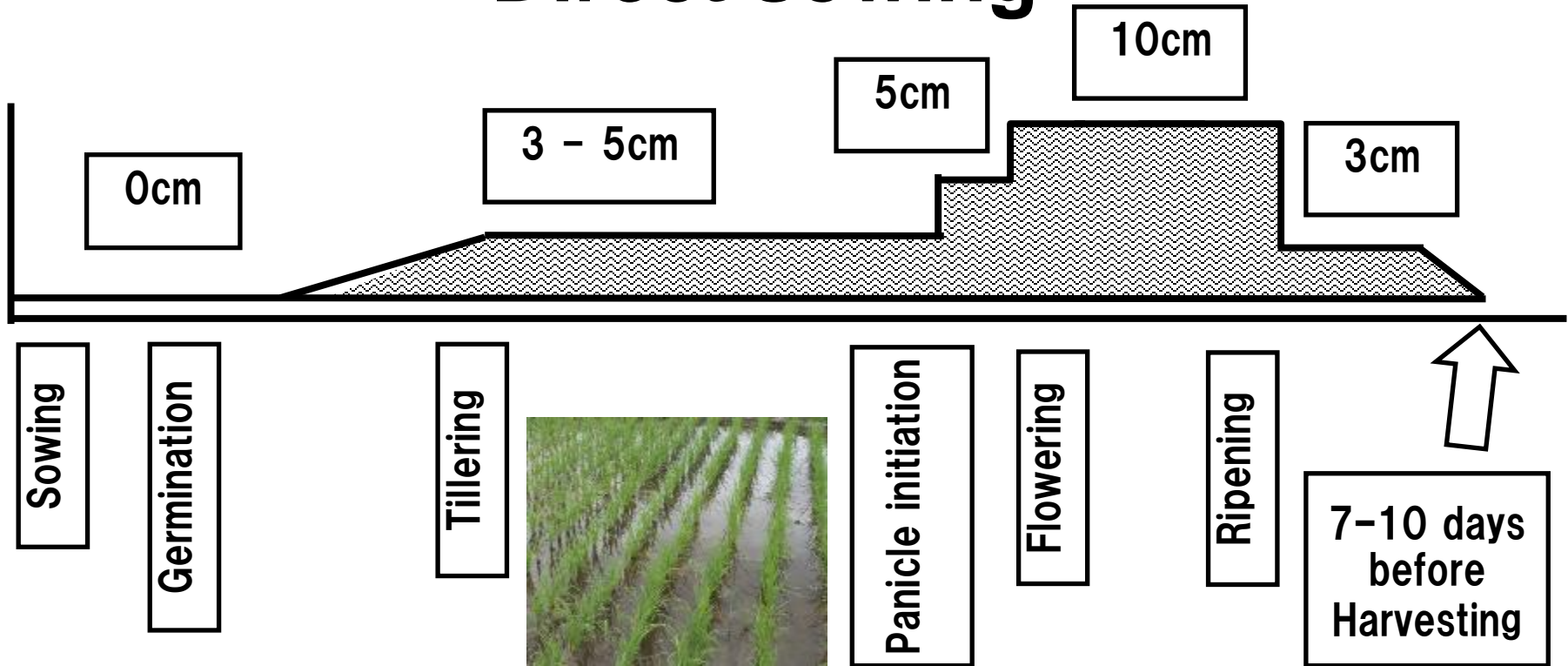
# Water level in the field

## Transplanting



# Water level in the field

## Direct sowing



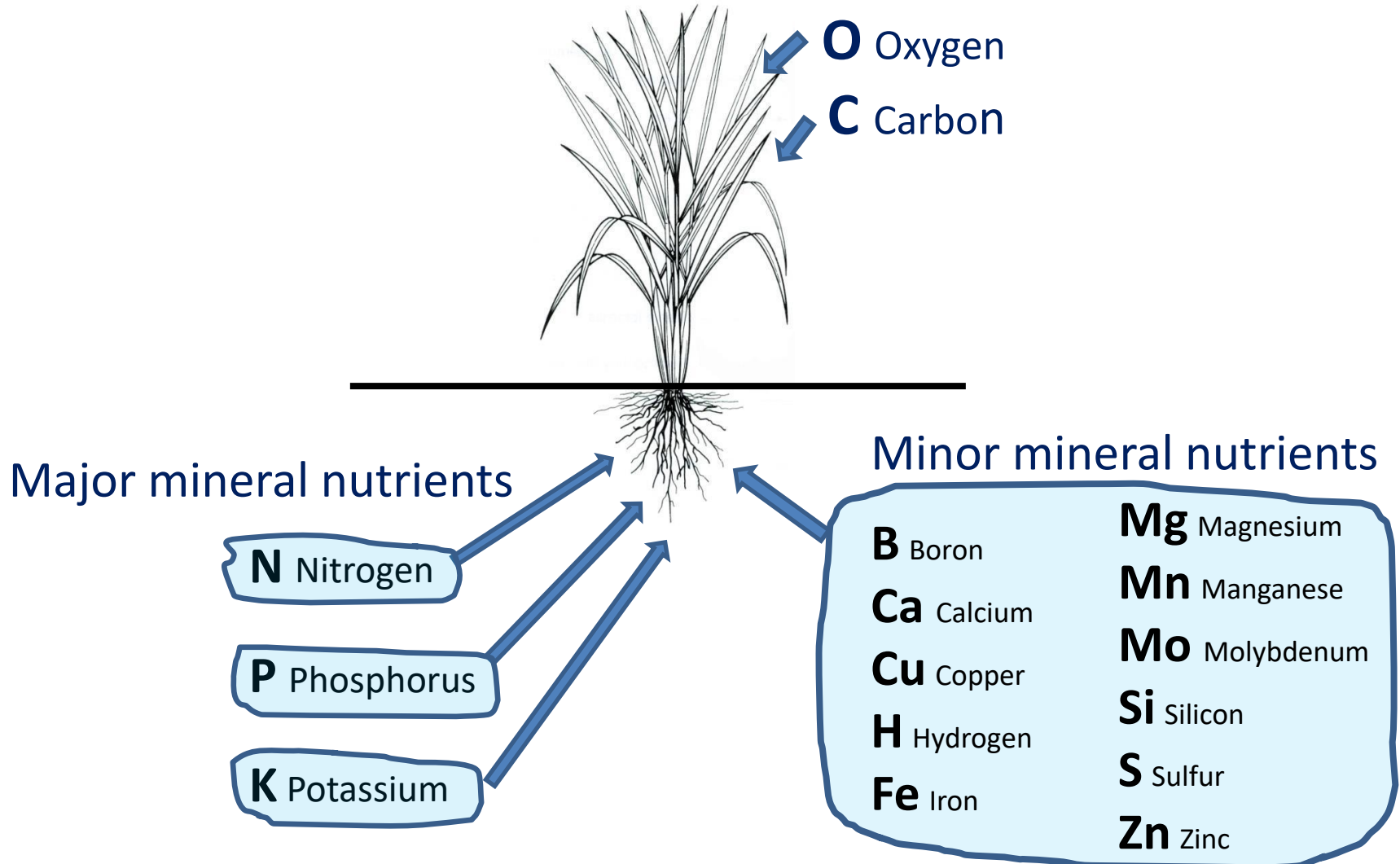


MOFA/JICA TENSUI RICE

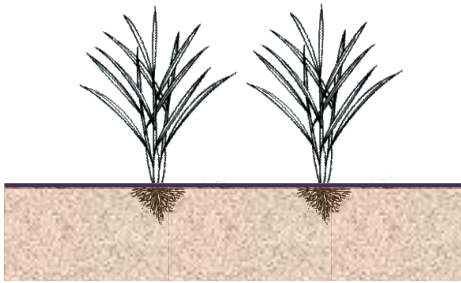
Rice  
Cultivation

# Fertilizer Management

# Nutrients needed by the rice plant



# Soil fertility (Non fertile)



Non fertile soil



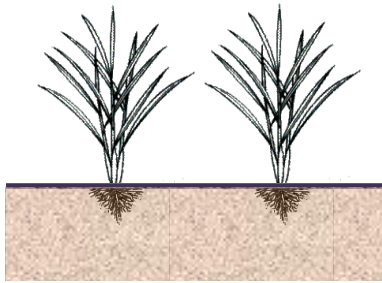
Right amount of  
nitrogen needed



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.

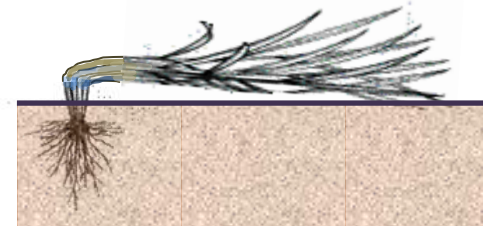
# Soil fertility (fertile)



Fertile soil



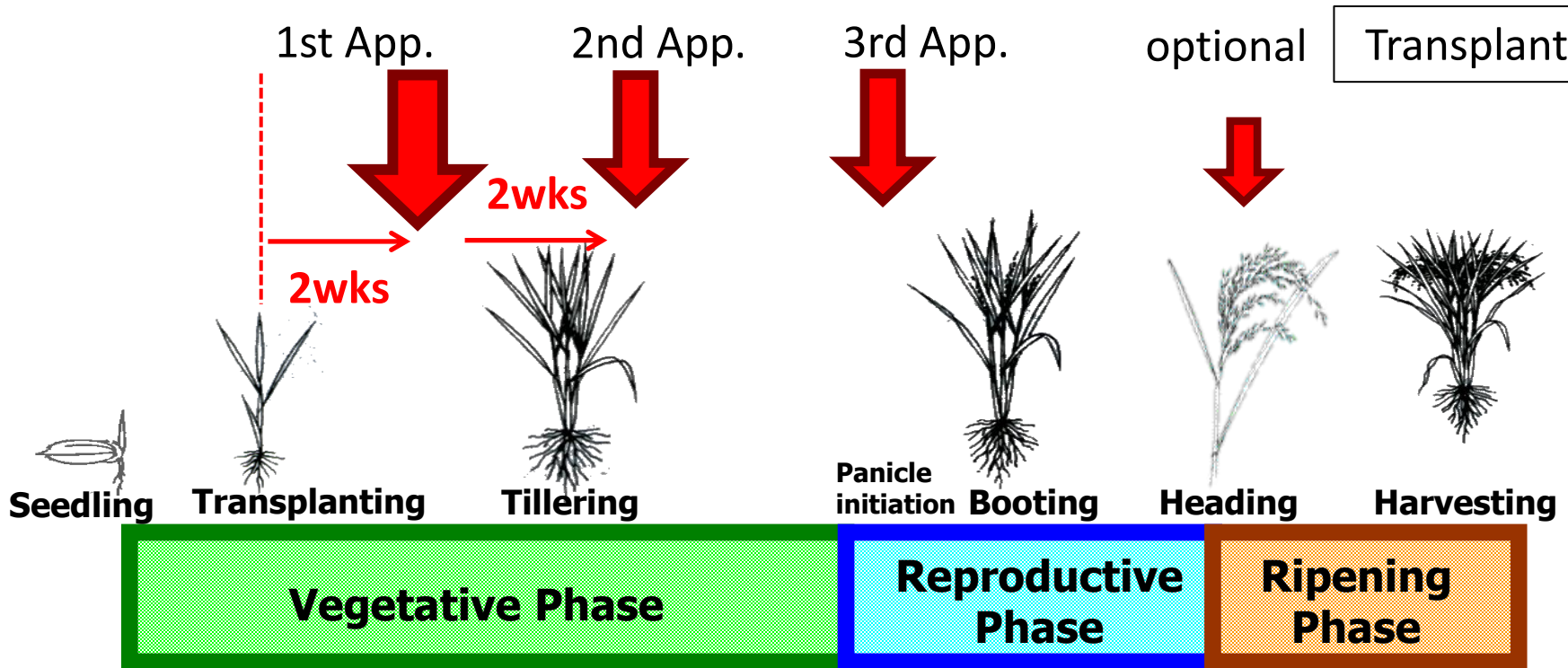
Large amount of  
nitrogen



Excess nitrogen

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

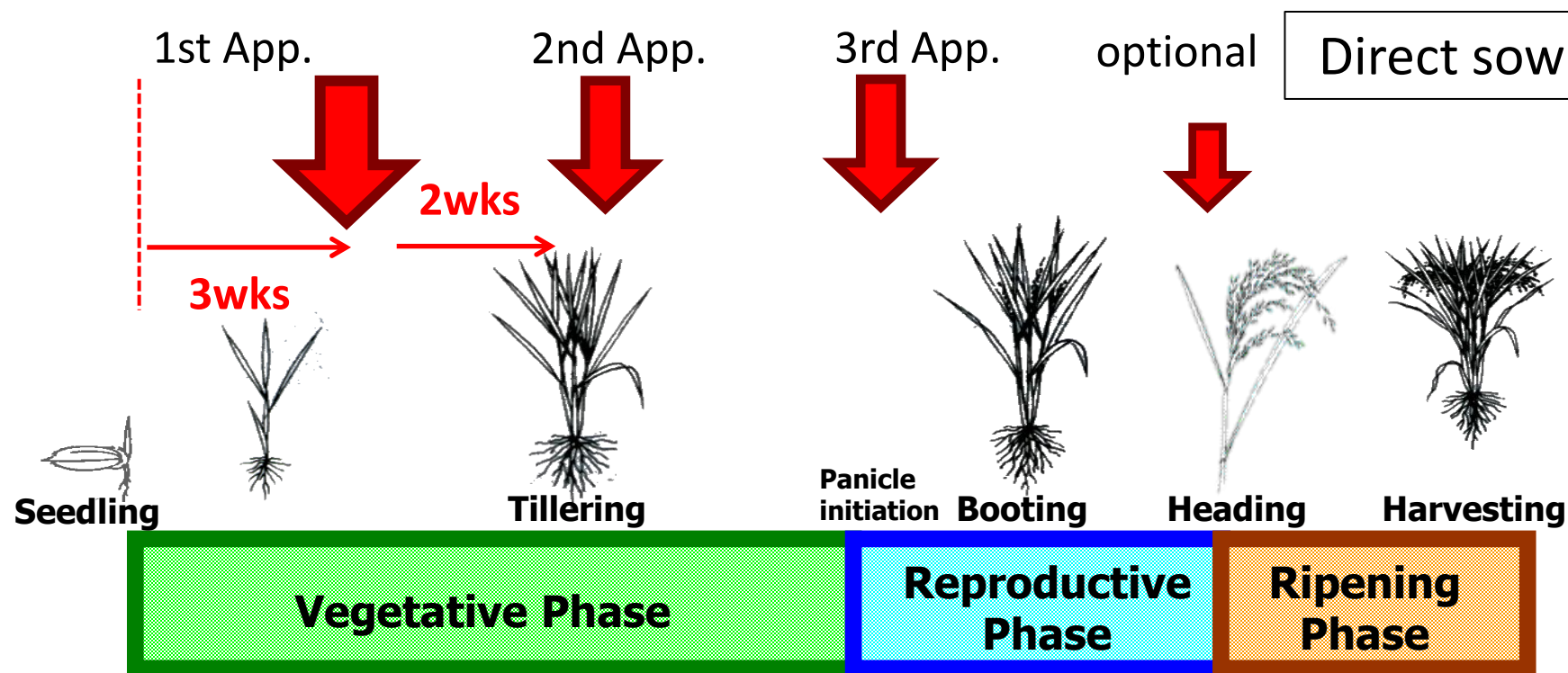
# Apply fertilizer at correct growth stage



| Application                            | Growth stage            | Yield Component             |
|--|-------------------------|-----------------------------|
| 1 <sup>st</sup> Application            | Tillering Stage         | Panicle Number              |
| 2 <sup>nd</sup> Application            | Tillering Stage         | Panicle Number              |
| 3 <sup>rd</sup> Application            | Panicle formation Stage | Number of Grain per Panicle |
| 4 <sup>th</sup> Application (optional) | Booting ~ Heading Stage | Percentage of Ripened grain |

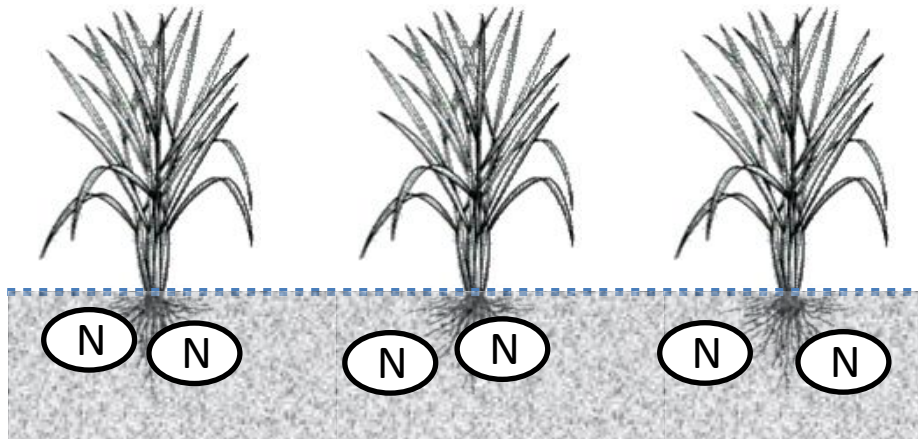
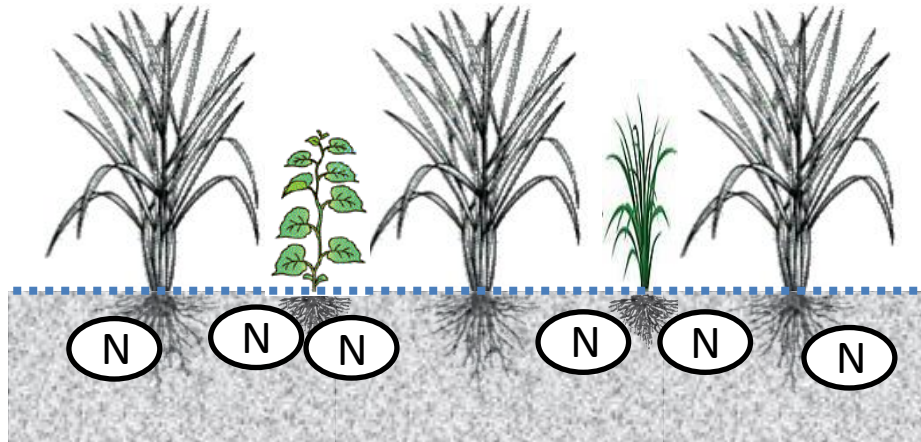


# Apply fertilizer at correct growth stage

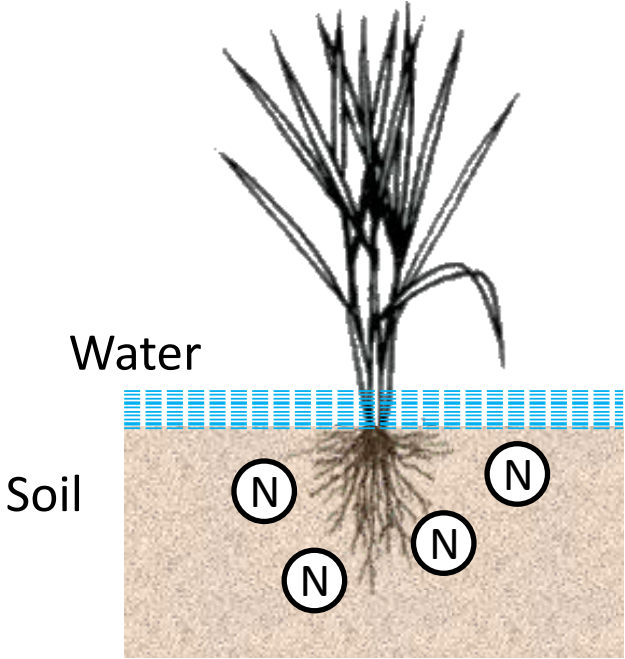
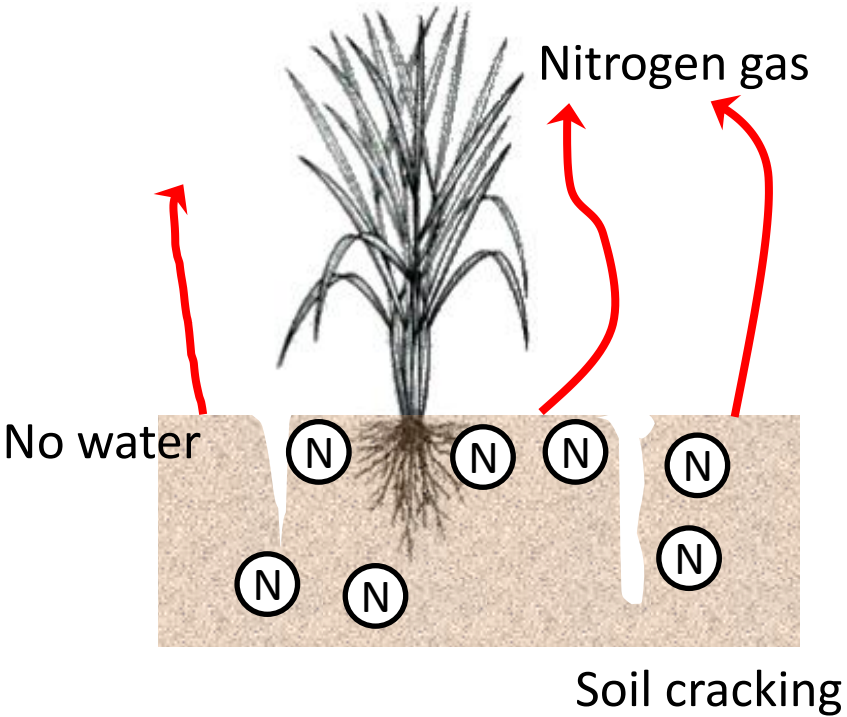


| Application                            | Growth stage            | Yield Component             |
|--|-------------------------|-----------------------------|
| 1 <sup>st</sup> Application            | Tillering Stage         | Panicle Number              |
| 2 <sup>nd</sup> Application            | Tillering Stage         | Panicle Number              |
| 3 <sup>rd</sup> Application            | Panicle formation Stage | Number of Grain per Panicle |
| 4 <sup>th</sup> Application (optional) | Booting ~ Heading Stage | Percentage of Ripened grain |

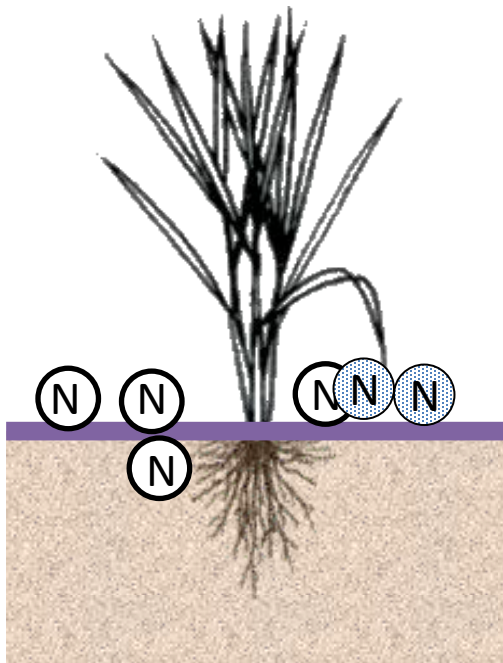
# Ensure the field free from weeds



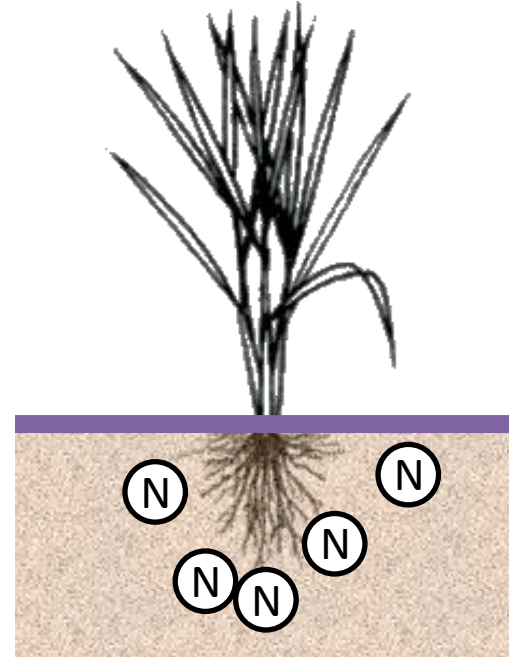
# Prevent the field from drying out



# Mix the fertilizer into the soil



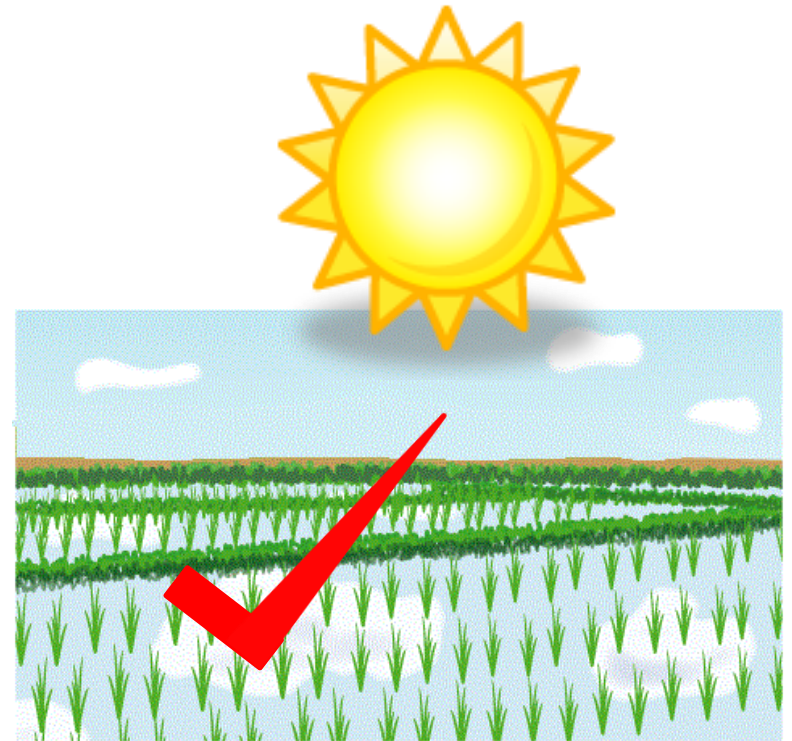
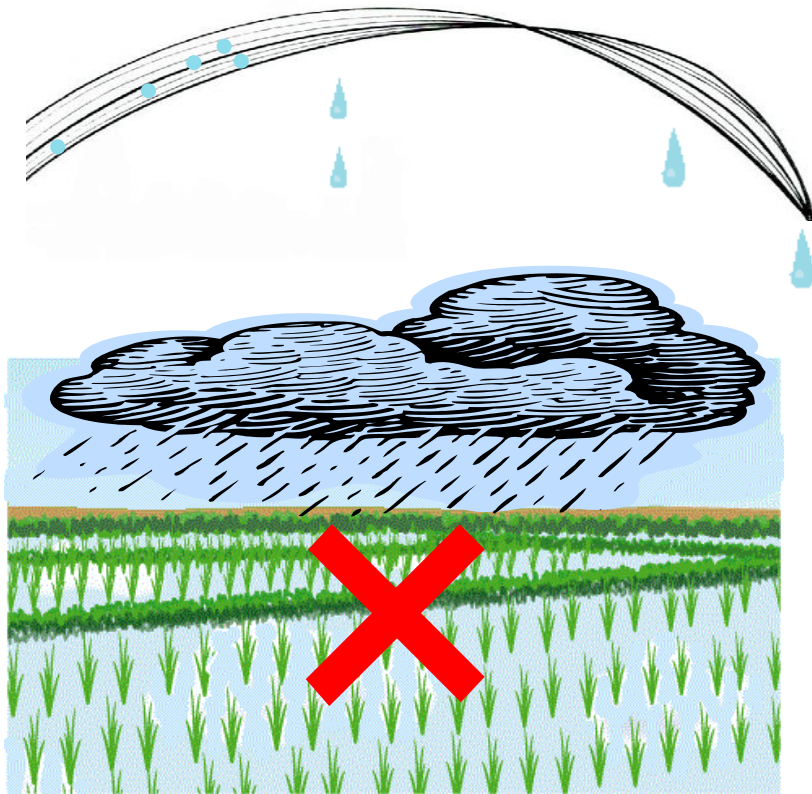
Fertilizer applied on top of the soil



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



MOFA/JICA TENSUI RICE

Rice  
Cultivation

# 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

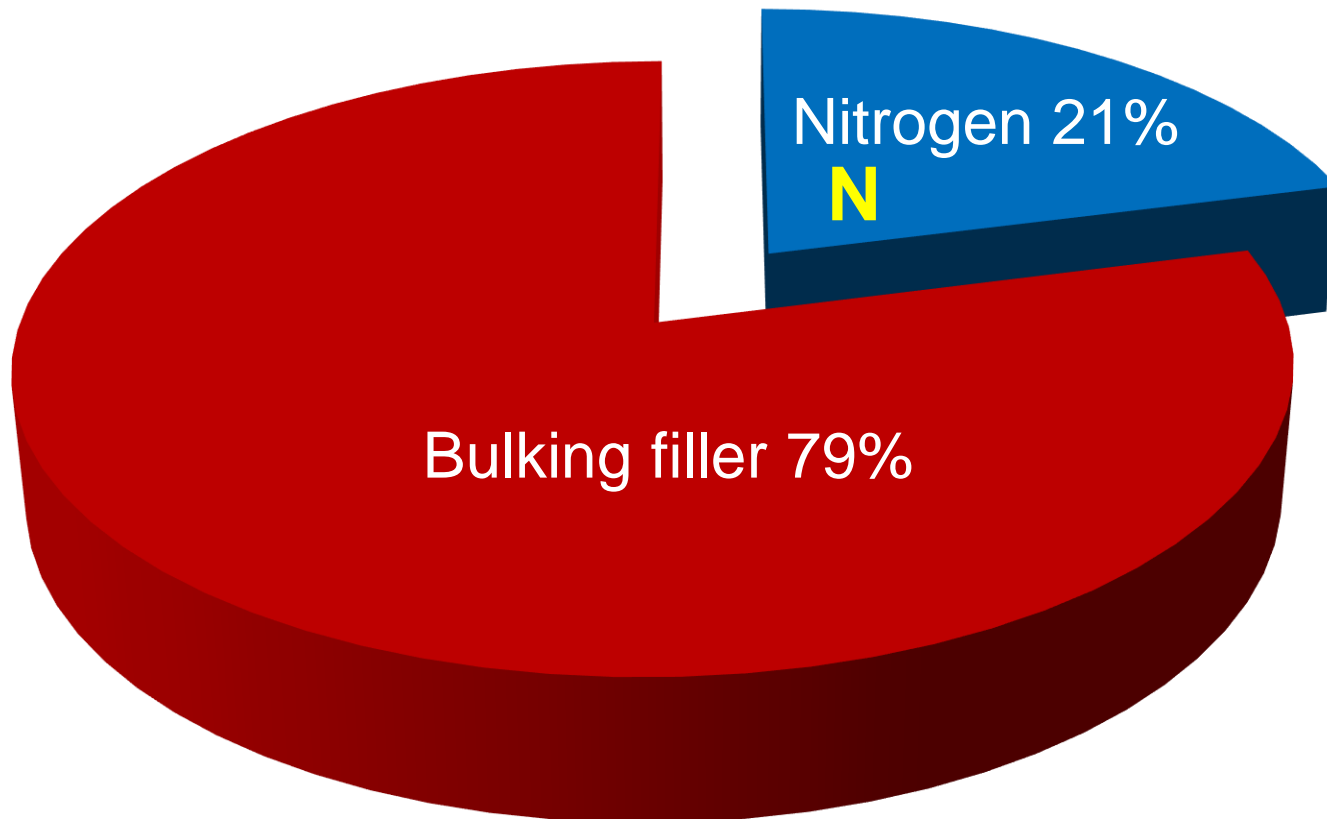
### ➤ Example

Ammonium Sulfate  
[(NH<sub>4</sub>)<sub>2</sub> SO<sub>4</sub>] contains  
**21% N**

# 4. Single Fertilizer

Ingredients of chemical fertilizer

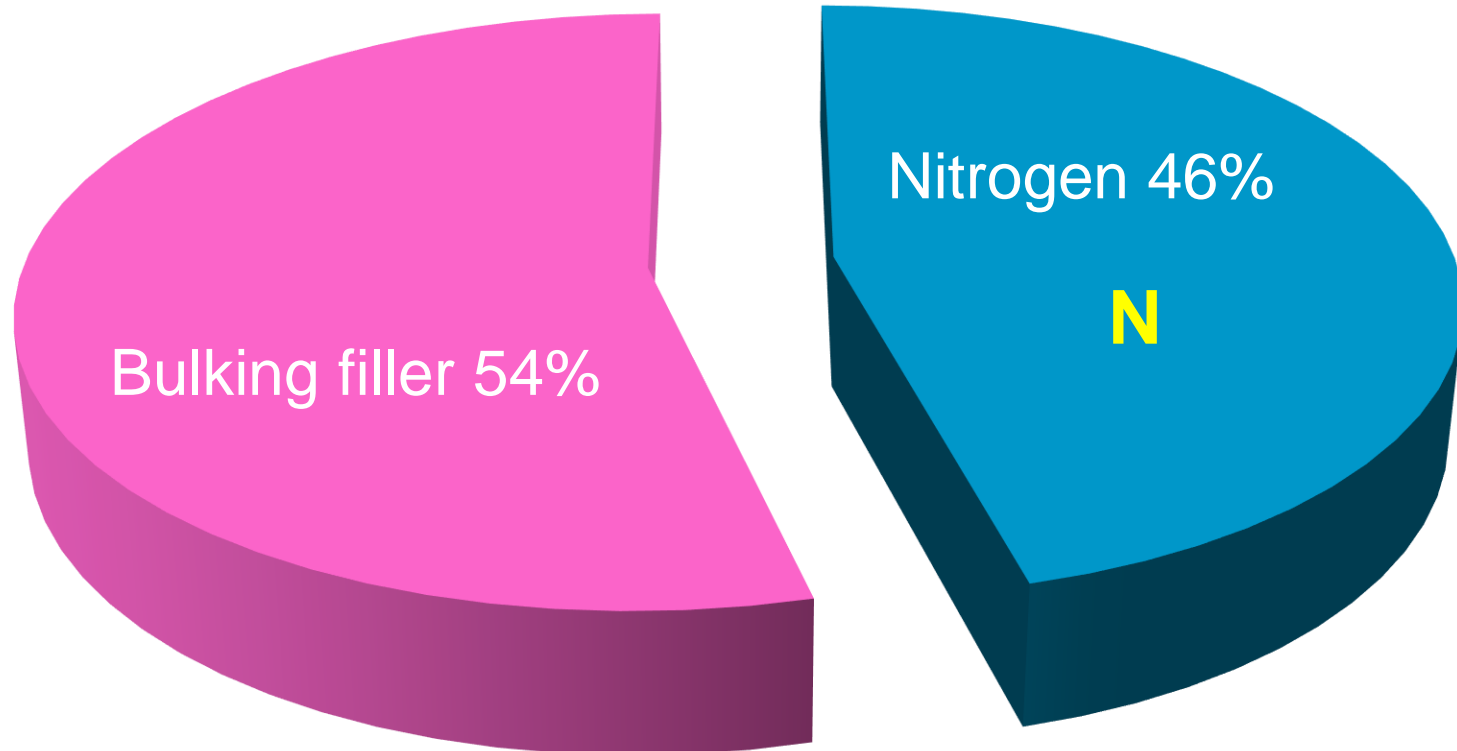
SoA  $[(\text{NH}_4)_2\text{SO}_4]$  (N21%)



# 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

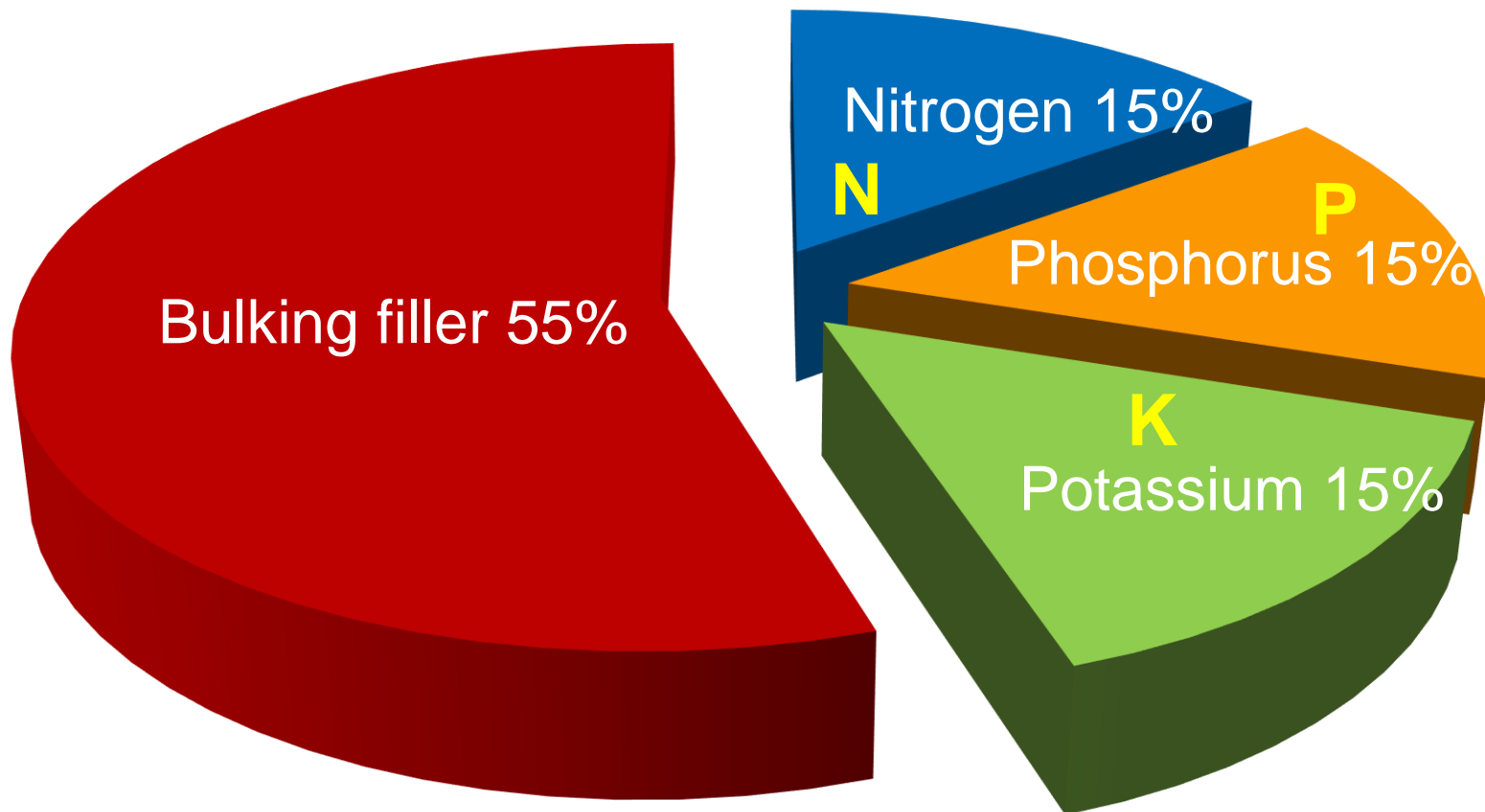
15-15-15, 16-16-16 or 23-10-5



# 5. Compound Fertilizer

Ingredients of chemical fertilizer

N-P-K (15-15-15)



# Amount of applied fertilizer for **1 ha** (10,000m<sup>2</sup>) (60 - 30 - 30)

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

# Amount of applied fertilizer for **1 ha** (10,000m<sup>2</sup>) (60 - 30 - 30)

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

# Amount of applied fertilizer **1 acre** (4,000m<sup>2</sup>) (60 - 30 - 30)

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

# Amount of applied fertilizer **1 acre** (4,000m<sup>2</sup>) (60 - 30 - 30)

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

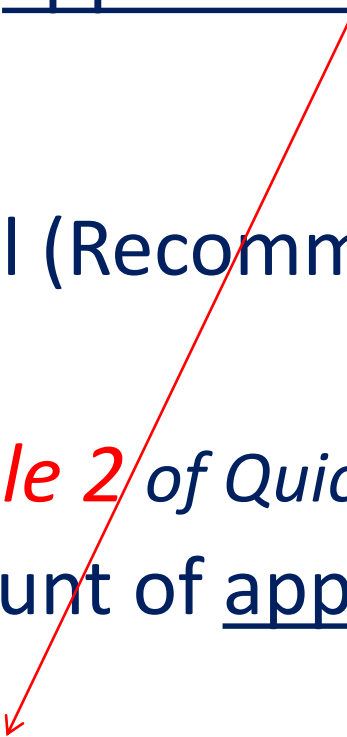
# Amount of applied fertilizer for 1/4 acre (1,000m<sup>2</sup>) (60 - 30 - 30)

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

# Amount of applied fertilizer for 1/4 acre (1,000m<sup>2</sup>) (60 - 30 - 30)

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

# How to get the amount of applied fertilizer ?

- **Step 1** -----> *Table 1* of Quick reference matrix  
Find the amount of applied Nitrogen  
[Parameter]
    - Area size [m<sup>2</sup>]
    - Application level (Recommended Rate) [kg/ha]
  - **Step 2** -----> *Table 2* of Quick reference matrix  
Determine the amount of applied fertilizer  
[Parameter]
    - Amount of applied Nitrogen [kg]
    - Percentage of Nitrogen (%)
- 



# Quick reference matrix of applied Nitrogen

(kg)

Table 1: Amount of applied Nitrogen

| Application level of Nitrogen | Area size                      |                               |                               |                               |                             |
|-------------------------------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|-----------------------------|
|                               | 500 m <sup>2</sup><br>1/8 acre | 1,000m <sup>2</sup><br>¼ acre | 2,000m <sup>2</sup><br>½ acre | 4,000m <sup>2</sup><br>1 acre | 10,000m <sup>2</sup><br>1ha |
| 5 kg/ha                       | 0.25                           | 0.5                           | 1                             | 2                             | 5                           |
| 10 kg/ha                      | 0.50                           | 1.0                           | 2                             | 4                             | 10                          |
| 15 kg/ha                      | 0.75                           | 1.5                           | 3                             | 6                             | 15                          |
| 20 kg/ha                      | 1.00                           | 2.0                           | 4                             | 8                             | 20                          |
| 30 kg/ha                      | 1.50                           | 3.0                           | 6                             | 12                            | 30                          |
| 45 kg/ha                      | 2.25                           | 4.5                           | 9                             | 18                            | 45                          |
| 50 kg/ha                      | 2.50                           | 5.0                           | 10                            | 20                            | 50                          |
| 60 kg/ha                      | 3.00                           | 6.0                           | 12                            | 24                            | 60                          |
| 90 kg/ha                      | 4.50                           | 9.0                           | 18                            | 36                            | 90                          |
| 100 kg/ha                     | 5.00                           | 10.0                          | 20                            | 40                            | 100                         |
| 120 kg/ha                     | 6.00                           | 12.0                          | 24                            | 48                            | 120                         |

# Quick reference matrix of applied Nitrogen

Table 2: Amount of applied fertilizer

(kg)

| Amount of applied Nitrogen | Percentage of Nitrogen (%) |     |     |     |     |
|----------------------------|----------------------------|-----|-----|-----|-----|
|                            | 15 %                       | 16% | 21% | 24% | 46% |
| 3 kg                       | 20                         | 19  | 14  | 13  | 7   |
| 5 kg                       | 33                         | 31  | 24  | 21  | 11  |
| 10 kg                      | 67                         | 63  | 48  | 42  | 22  |
| 15 kg                      | 100                        | 94  | 71  | 63  | 33  |
| 20 kg                      | 133                        | 125 | 95  | 83  | 43  |
| 30 kg                      | 200                        | 188 | 143 | 125 | 65  |
| 50 kg                      | 333                        | 313 | 238 | 208 | 109 |
| 60 kg                      | 400                        | 375 | 286 | 250 | 130 |
| 90 kg                      | 600                        | 563 | 429 | 375 | 196 |
| 100 kg                     | 667                        | 625 | 476 | 417 | 217 |
| 120 kg                     | 800                        | 750 | 571 | 500 | 261 |

My field size is **1/4 acre**.

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



# Way of using quick reference matrix

## 1. Select area size

See “Area size” column of **Table 1**

#Example: 1,000m<sup>2</sup> (1/4 acre)

Table 1: Amount of applied Nitrogen (kg)

| Application level of Nitrogen | Area size                      |                                      |                               |                               |                             |
|-------------------------------|--------------------------------|--------------------------------------|-------------------------------|-------------------------------|-----------------------------|
|                               | 500 m <sup>2</sup><br>1/8 acre | <b>1,000m<sup>2</sup><br/>¼ acre</b> | 2,000m <sup>2</sup><br>½ acre | 4,000m <sup>2</sup><br>1 acre | 10,000m <sup>2</sup><br>1ha |
| 20 kg/ha                      | 1.00                           | <b>2.0</b>                           | 4                             | 8                             | 20                          |
| 30 kg/ha                      | 1.50                           | <b>3.0</b>                           | 6                             | 12                            | 30                          |
| 45 kg/ha                      | 2.25                           | <b>4.5</b>                           | 9                             | 18                            | 45                          |
|                               |                                |                                      |                               |                               |                             |

# Way of using quick reference matrix

## 2. Select application level of Nitrogen

See “*Application level of Nitrogen*” column of Table 1

#Example: 30kg/ha

Table 1: Amount of applied Nitrogen

(kg)

| Application level of Nitrogen | Area size                      |                               |                               |                               |                             |
|-------------------------------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|-----------------------------|
|                               | 500 m <sup>2</sup><br>1/8 acre | 1,000m <sup>2</sup><br>¼ acre | 2,000m <sup>2</sup><br>½ acre | 4,000m <sup>2</sup><br>1 acre | 10,000m <sup>2</sup><br>1ha |
| 20 kg/ha                      | 1.00                           | 2.0                           | 4                             | 8                             | 20                          |
| <b>30 kg/ha</b>               | <b>1.50</b>                    | <b>3.0</b>                    | <b>6</b>                      | <b>12</b>                     | <b>30</b>                   |
| 45 kg/ha                      | 2.25                           | 4.5                           | 9                             | 18                            | 45                          |
|                               |                                |                               |                               |                               |                             |

# Way of using quick reference matrix

## 3. Amount of applied Nitrogen is determined

# Example : Application level 30kg/ha

Area size 1,000 m<sup>2</sup>



Amount of applied Nitrogen 3.0 kg

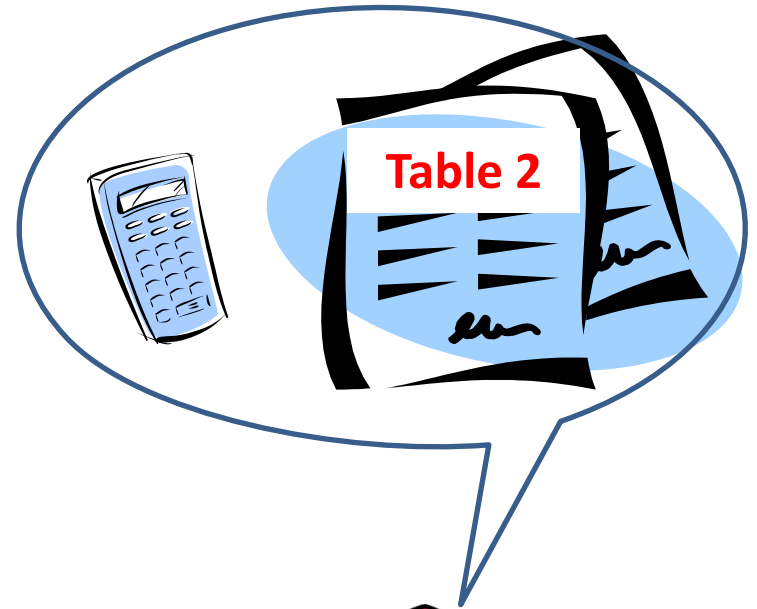
*Go to Table 2*

Table 1: Amount of applied Nitrogen

| Application level of Nitrogen | Area size                      |  |                               |                               |                             |
|-------------------------------|--------------------------------|--|-------------------------------|-------------------------------|-----------------------------|
|                               | 500 m <sup>2</sup><br>1/8 acre | <b>1,000m<sup>2</sup></b><br><b>¼ acre</b> | 2,000m <sup>2</sup><br>½ acre | 4,000m <sup>2</sup><br>1 acre | 10,000m <sup>2</sup><br>1ha |
| 20 kg/ha                      | 1.00                           | 2.0  | 4                             | 8                             | 20                          |
| <b>30 kg/ha</b>               | 1.50                           | <b>3.0</b>                                 | 6                             | 12                            | 30                          |
| 45 kg/ha                      | 2.25                           | 4.5  | 9                             | 18                            | 45                          |
|                               |                                |  |                               |                               |                             |

OK, the amount of applied Nitrogen to my field is **3kg**.

I apply **15-15-15** (NPK).  
How much?



# Way of using quick reference matrix

## 4. Select amount of applied Nitrogen

See “Amount of applied Nitrogen” column of **Table 2**

#Example: 3kg of Nitrogen is applied

Table 2: Amount of applied fertilizer (kg)

| Amount of applied Nitrogen | Percentage of Nitrogen (%) |     |     |     |     |
|----------------------------|----------------------------|-----|-----|-----|-----|
|                            | 15 %                       | 16% | 21% | 24% | 46% |
| 3 kg                       | 20                         | 19  | 14  | 13  | 7   |
| 5 kg                       | 33                         | 31  | 24  | 21  | 11  |
| 10 kg                      | 67                         | 63  | 48  | 42  | 22  |



# Way of using quick reference matrix

5. Select Percentage of Nitrogen of applied fertilizer

See “Percentage of Nitrogen” column of Table 2

#Example: Percentage of Nitrogen of *NPK 15-15-15* is 15%

Table 2: Amount of applied fertilizer (kg)

| Amount of applied Nitrogen | Percentage of Nitrogen (%) |     |     |     |     |
|----------------------------|----------------------------|-----|-----|-----|-----|
|                            | 15 %                       | 16% | 21% | 24% | 46% |
| 3 kg                       | 20                         | 19  | 14  | 13  | 7   |
| 5 kg                       | 33                         | 31  | 24  | 21  | 11  |
| 10 kg                      | 67                         | 63  | 48  | 42  | 22  |

# Way of using quick reference matrix

## 6. Amount of fertilizer application is determined

#Example: Amount of applied Nitrogen 3kg

Percentage of Nitrogen is 15%



Amount of applied fertilizer is 20 kg

Table 2: Amount of applied fertilizer

(kg)

| Amount of applied Nitrogen | Percentage of Nitrogen (%) |     |     |     |     |
|----------------------------|----------------------------|-----|-----|-----|-----|
|                            | 15 %                       | 16% | 21% | 24% | 46% |
| 3 kg                       | 20                         | 19  | 14  | 13  | 7   |
| 5 kg                       | 33                         | 31  | 24  | 21  | 11  |
| 10 kg                      | 67                         | 63  | 48  | 42  | 22  |

# Calculation of applied fertilizer

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

Calculation Formula:

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

# LET'S PRACTICE !

## ***Practice 1***

- a) Area size : 1/2 acre → \_\_\_\_\_m<sup>2</sup>
- b) Application level of N : 30 kg / ha
- c) Percentage of N (%) : Urea → \_\_\_\_\_%
- d) How much kg of Urea to apply?

## ***Calculation***

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

# LET'S PRACTICE !

## *Practice 2*

- a) Area size : 1 acre  $\rightarrow$  \_\_\_\_\_m<sup>2</sup>
- b) Application level of N : 20 kg / ha
- c) Percentage of N (%) : SoA  $\rightarrow$  \_\_\_\_\_%
- d) How much kg of SoA to apply?

## *Calculation*

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

**WORK FOR 5 MINUTES**

# Calculation of applied fertilizer

**ANSWER**

## Practice 1

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

Calculation:

$$\begin{aligned} d \text{ (kg)} &= \frac{(b) 30}{(c) 46} \times 100 \times \frac{(a) 2,000}{10,000} \\ &= 13 \text{ kg} \end{aligned}$$

# Calculation of applied fertilizer

ANSWER

## Practice 2

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

Calculation:

$$\begin{aligned} d \text{ (kg)} &= \frac{(b) 20}{(c) 21} \times 100 \times \frac{(a) 4,000}{10,000} \\ &= 38 \text{ kg} \end{aligned}$$



20 kg



Rubber bucket

1.5 kg



Tin of tomato paste  
Size: 2.2kg

200 kg



80 kg



71 kg



**20 kg**



Rubber bucket

**1.5 kg**



Tin of tomato paste  
Size: 2.2kg

**33 kg**



**29 kg  
(≈30kg)**



**29 kg**



**1.5 kg**



Tin of tomato paste  
Size: 2.2kg

**13 kg**



**6 kg**



**3 kg**



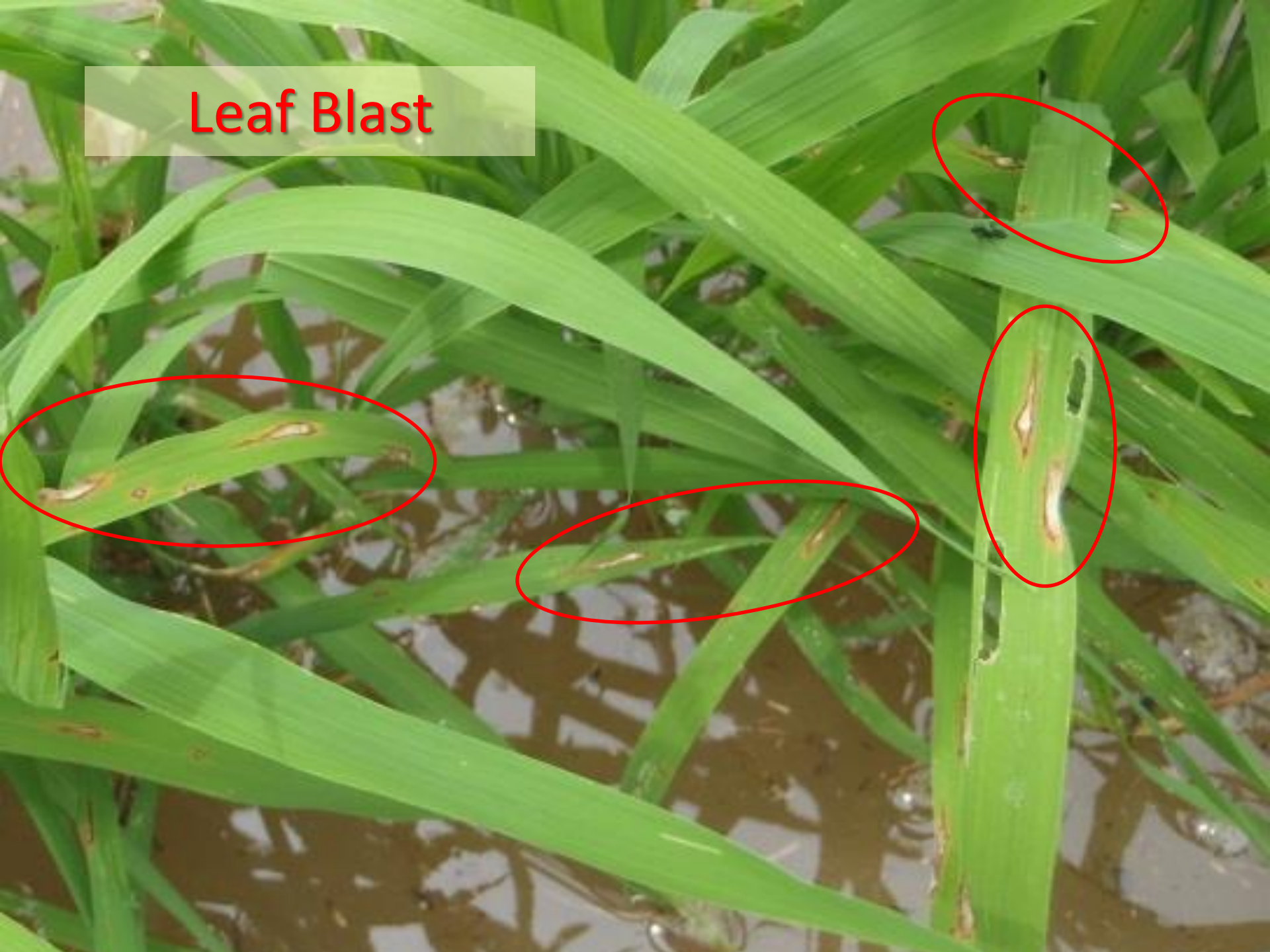


MOFA/JICA TENSUI RICE

Rice  
Cultivation

# 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 seed soaking



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  
(THIPSON 70% WP)



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

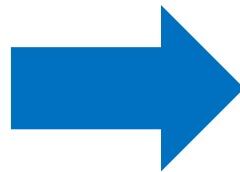
Water  
10 L

Seed

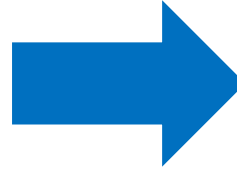
Water

Seed

Seed  
Selection



1st day of seed soaking  
(24 hours)



Seed soaking in water  
(2 - 3 days)

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

- BENDAZIM 50WP 400-fold, 24 hours

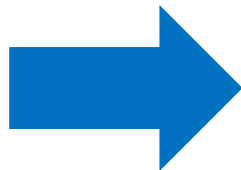


BENDAZIM 50WP  
25 g

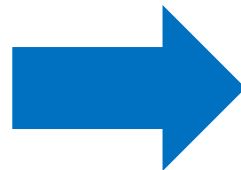
Water  
10 L

Seed

Seed  
Selection



1st day of seed soaking  
(24 hours)



Seed soaking in water  
(2 - 3 days)

# Effective Active Ingredients for Seed Treatment for “Blast”

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

# Chemical Control for Nursery for “Blast”

## • Nursery Application

# if symptoms appear



TOPS-M 70% WP  
(THIOPOSIN 70% WP)

1,000-fold, 5 L / 50 m<sup>2</sup>

Active ingredients: *Thiophanete methyl*



or

BENDAZIM 50WP

1,500-fold, 4 L / 50 m<sup>2</sup>

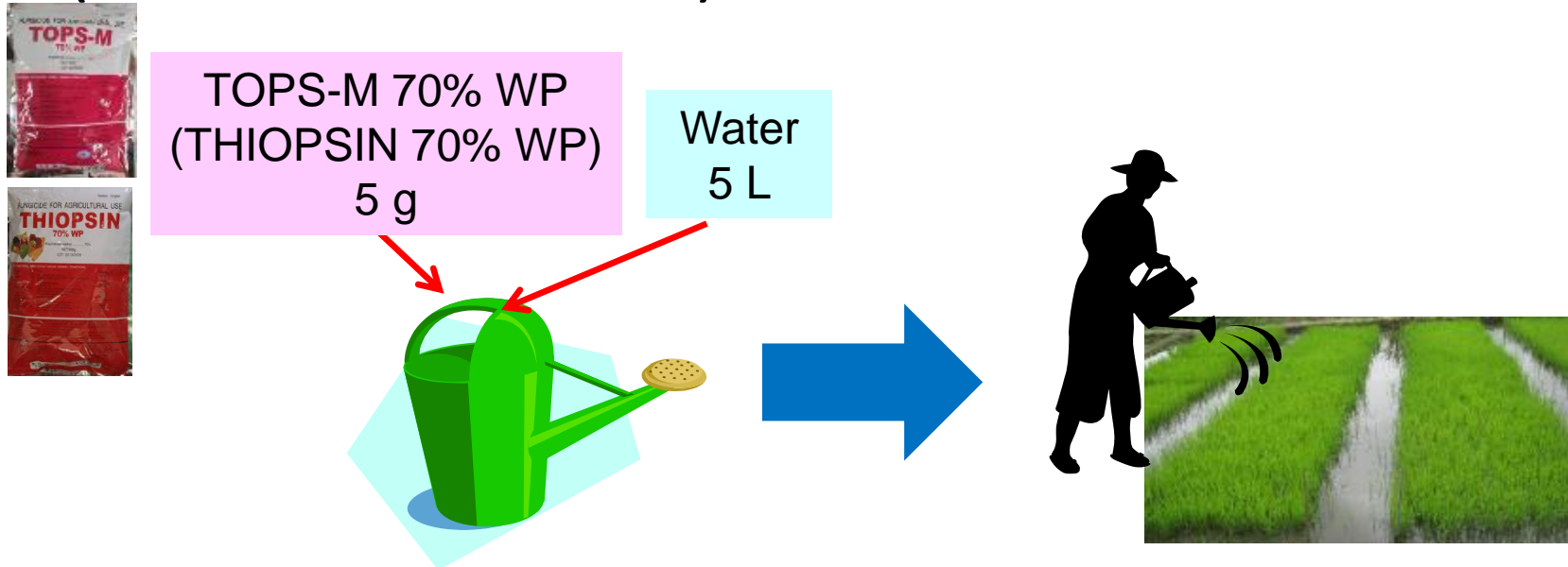
Active ingredients ; *Carbendazim*



# Chemical Control for Nursery for “Blast”

# If symptoms appear

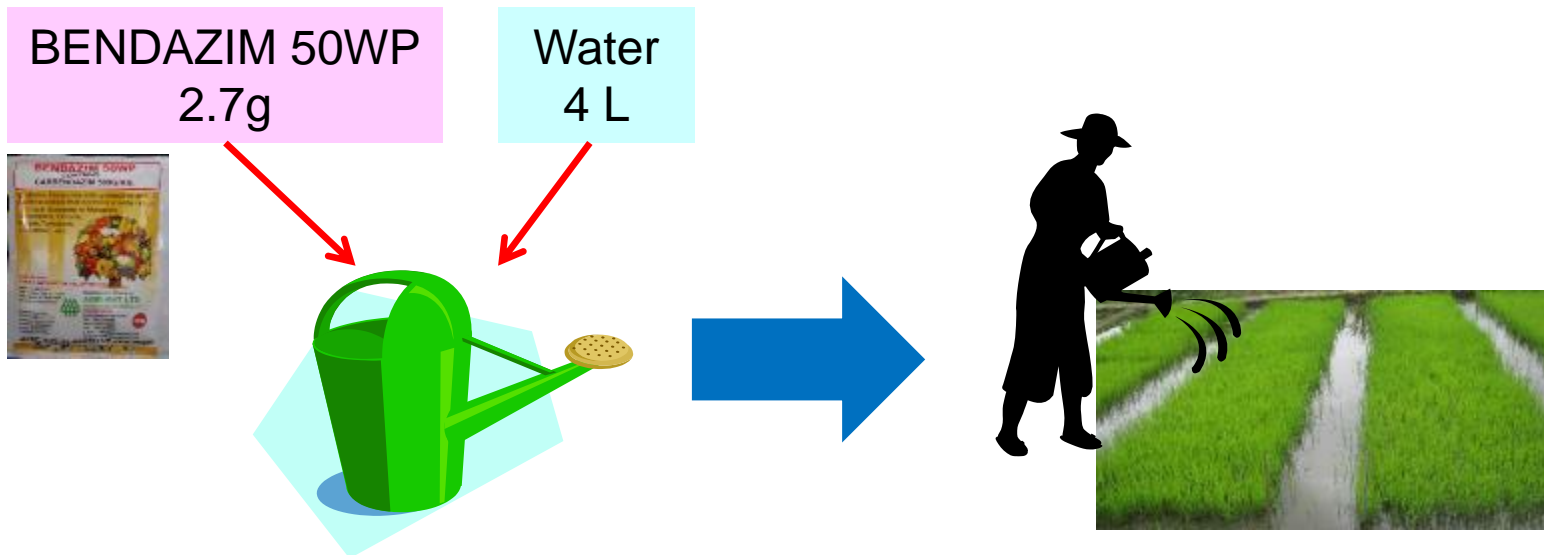
- TOPS-M 70% WP 1,000-fold, 5L / 50m<sup>2</sup>  
(THIOPSIN 70% WP)



# Chemical Control for Nursery for “Blast”

# If symptoms appear

- BENDAZIM 50 WP 1,500-fold, 4L / 50m<sup>2</sup>



# Effective Active Ingredients for Nursery for “Blast”

- Azoxystrobin
- Carbendazim
- Diclocymet
- Orysastrobin
- Probenazole
- Pyroquilone
- Tiadinil
- Thiophanete methyl
- Tricyclazole

# 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.





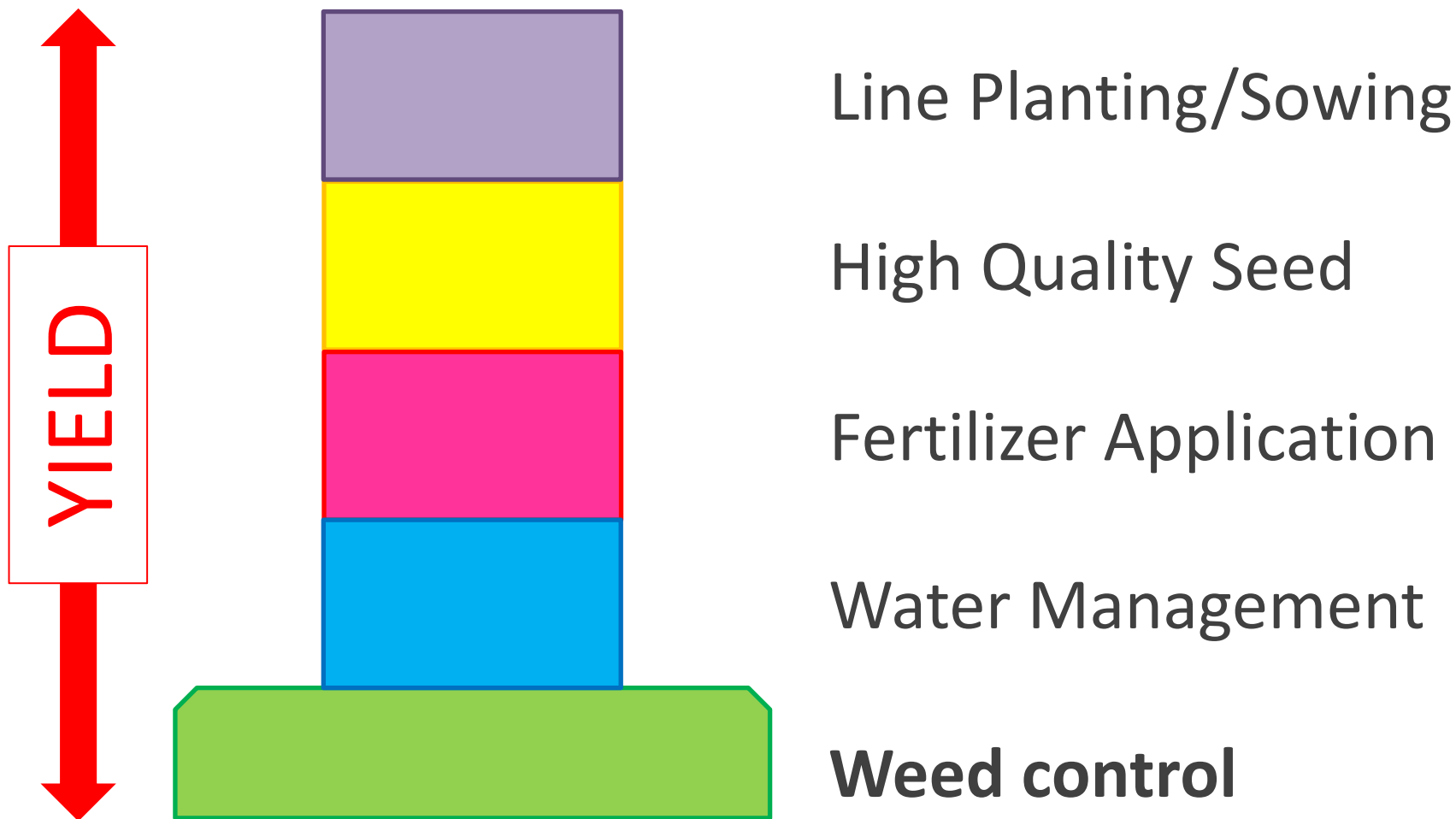


MOFA/JICA TENSUI RICE

Rice  
Cultivation

# Weed Control

# IMAGE OF YIELD



# 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;

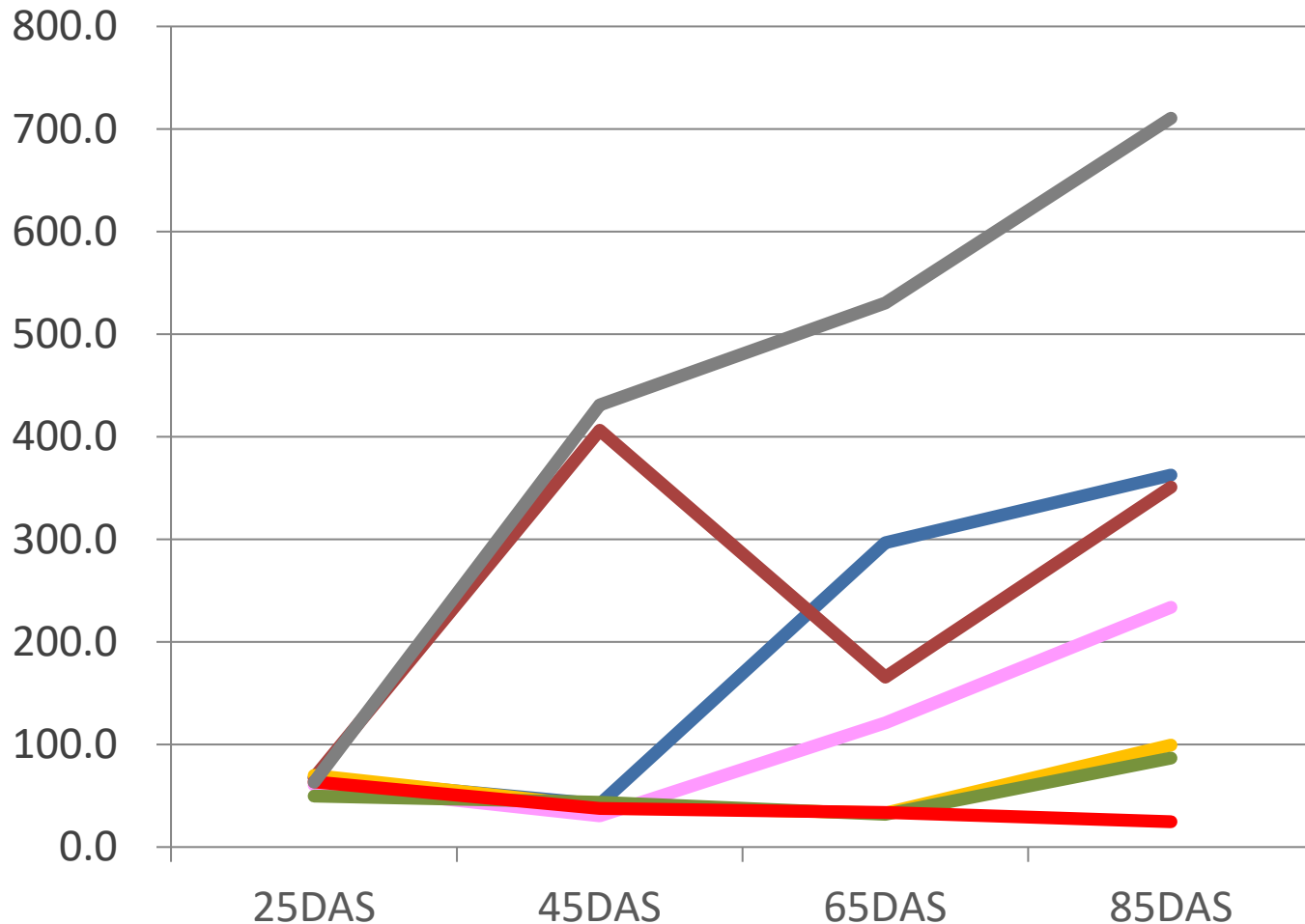
- ❖ Weed seeds germinate at the same time as those of rice.
- ❖ The number of weed in the rice field increases year by year.



Weed control must be ensured every cropping season.



# Weed Dry Matter (Biomass) (g/m<sup>2</sup>)



- 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





# Weeding

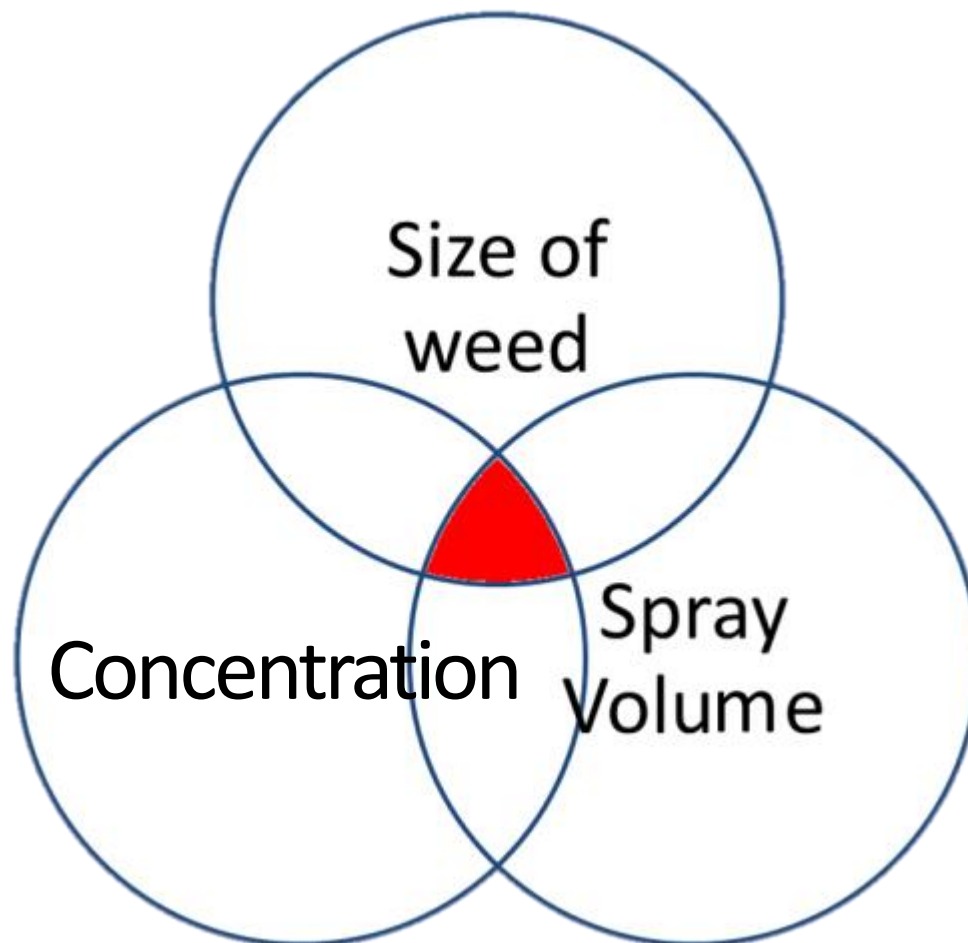
## (Direct sowing)

- At least 2 times  
*3 weeks and 5 weeks after sowing*
- First weeding must be done in time.  
*within 3 weeks 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



# Biochar Trials 2019 (1)

- Biochar is charcoal made from biomass to apply for soil improvement.
- Rice husks are used to produce rice husk biochar because they are abundant as locally available resources.



1 Set fire and cover the fire with the chimney.



2 Heap rice husks around the chimney.



3 Rice husk biochar is ready after one hour (time spent depends on the amount of rice husks).

# Biochar Trials 2019 (2)

- Two different treatments were made in the nursery in Mampong.

Without biochar



With biochar



# Biochar Trials 2019 (3)

Without biochar

The soil is hard and uprooting is difficult. It is also time consuming. The roots of seedlings are seriously damaged.



With biochar

The soil is soft thanks to rice husk biochar and uprooting is easy. The roots of seedlings are not seriously damaged.



# Biochar Trials 2019 (4)

A: Seedlings applied biochar look healthier and greener. And the stem is thick.

Q: What's the difference between the two ?



Without biochar

With biochar

# Biochar Trials 2019 (5)

As of 94 days after sowing, the treatment with biochar in nursery looked better than that without biochar.

Without biochar



With biochar



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

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



# Farm Management and Support System

1<sup>st</sup> TOT

# Contents

1. Introduction to Farm Management and Support System
2. Farm planning
3. Farm management
4. Gender View Point

# 1<sup>st</sup> TOT/Joint training and On-site training

Please prepare these materials at 1<sup>st</sup> 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 applied for the individual plots

# 1<sup>st</sup> TOT/Joint training and On-site training

Please prepare these materials at 1<sup>st</sup> 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)



MOFA/JICA TENSUI RICE PROJECT

# 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?

FM-OST-1

MOFA/JICA TENSUI RICE PROJECT

**Farm management is fun!!**

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

Farm Management

Page 1(Front)

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

**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 will keep improving your Farm management skill!



# 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?

1. Let's get information!

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



# 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.

## 1. Let's get information!

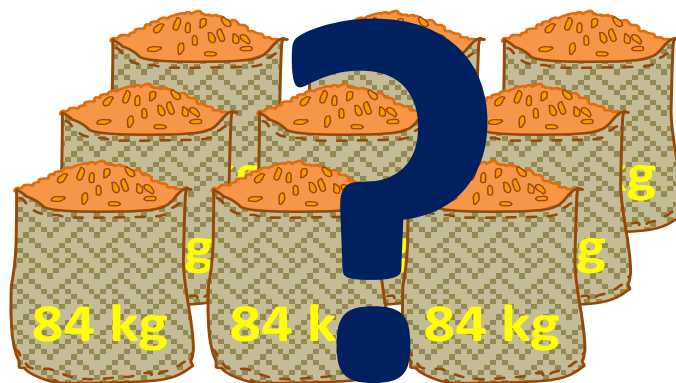
**Which variety is convenient in terms of cultivation period?**



# 1. Let's get information!

How many bags can you produce?

How much money can you earn?



# Discuss with the farmers:

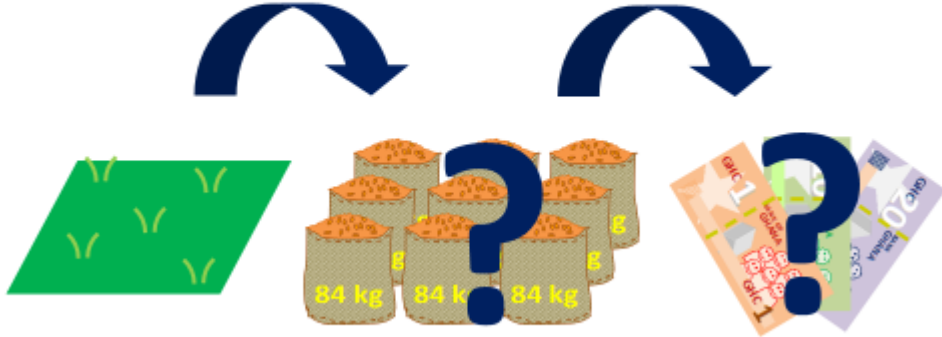
- Do you know how many bags you can harvest per unit area of the variety you want to grow?
- Do you know how much money you can earn from production of the variety you want to grow?

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!

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

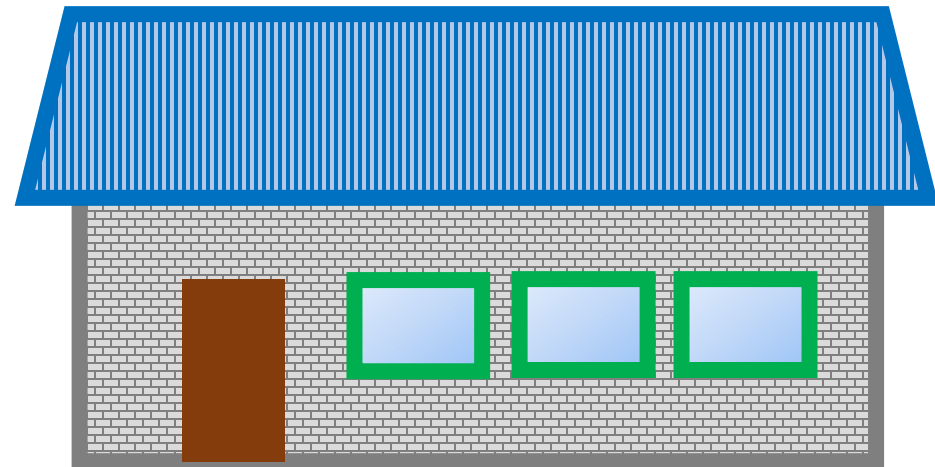
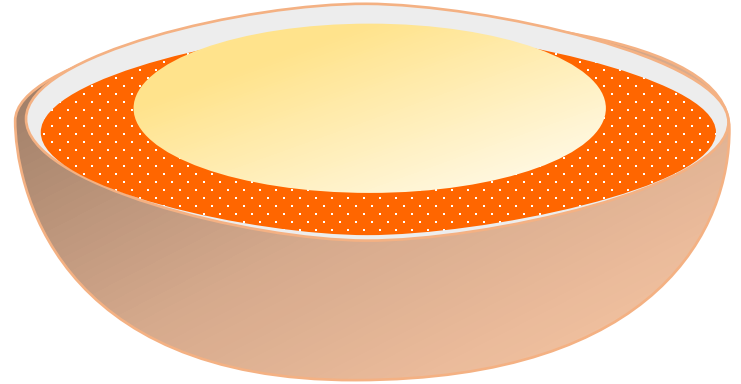
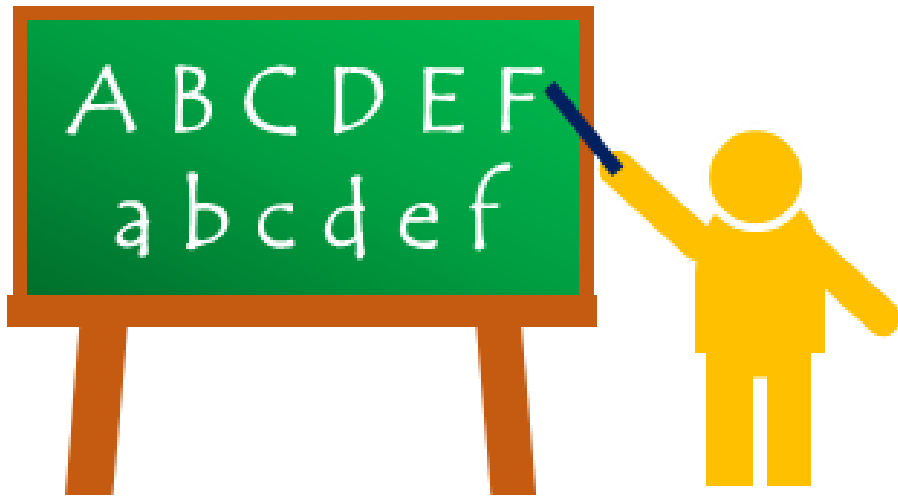
**How many bags can you produce?**  
**How much money can you earn?**



Page 5(Front)

2. Let's set a target!

What is your dream?





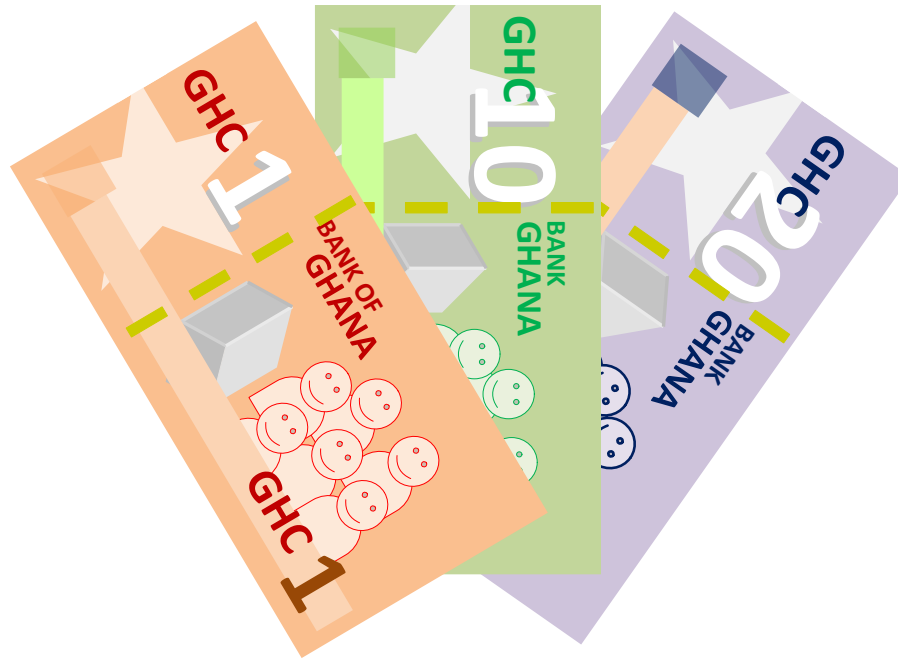
# Discuss with the farmers:

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



## 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?

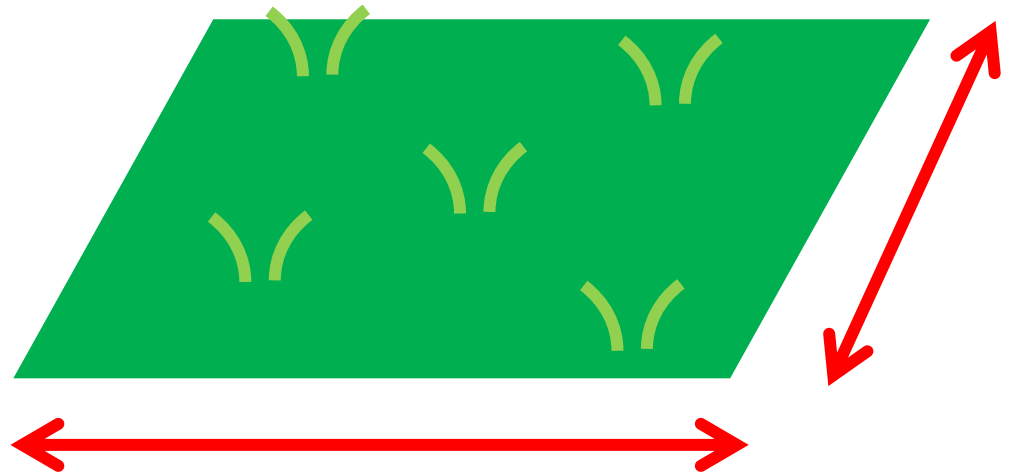
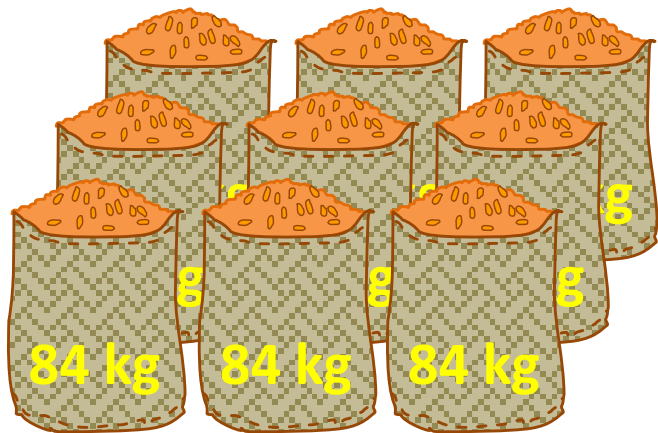
**2. Let's set a target!**

**How much do you need?**



## 2. Let's set a target!

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

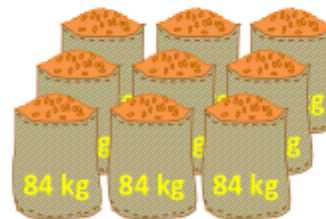


# Discuss with the farmers:

- 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 cultivate?

## 2. Let's set a target!

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



## 2. Let's set a target!

# 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?

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

**How long will it take to attain your dream?**

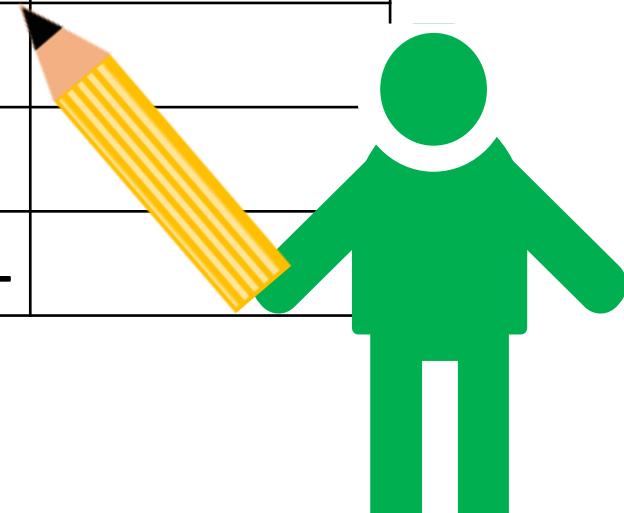
Season 1      Season 2      Season 3      Season ...

Page 9(Back)      Page 9(Front)

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

# Let's budget what you want to do!

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





# Discuss with the farmers:

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

## 3. Let's make a plan!

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

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



### 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?



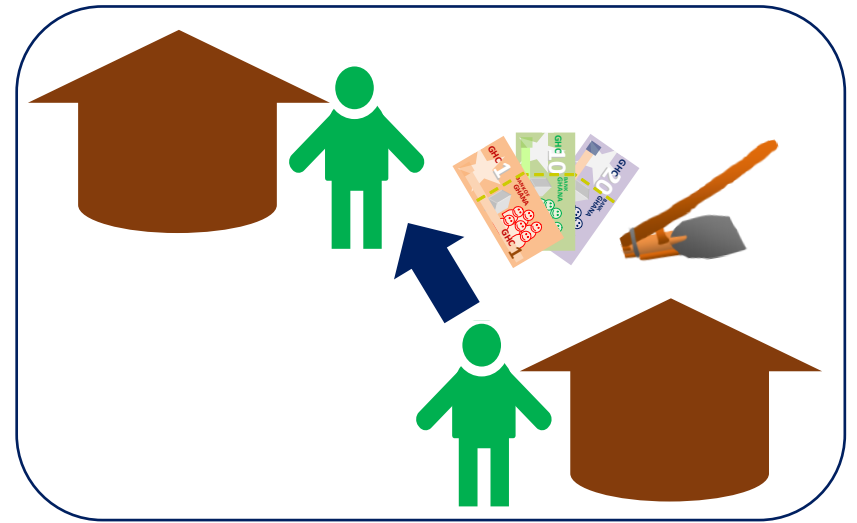
### 3. Let's make a plan!

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

1



OR



2

Micro-finance??

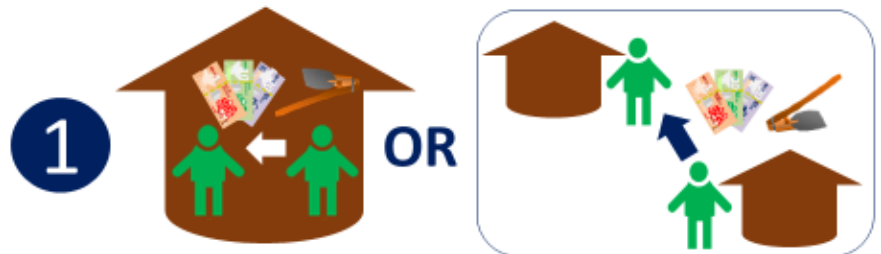
PFJ Programme??

# Discuss with the farmers:

- 1: Get loan from family members or village members
- 2: Make use of micro-finance, take inputs from planting for food and job programme (MOFA)

## 3. Let's make a plan!

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



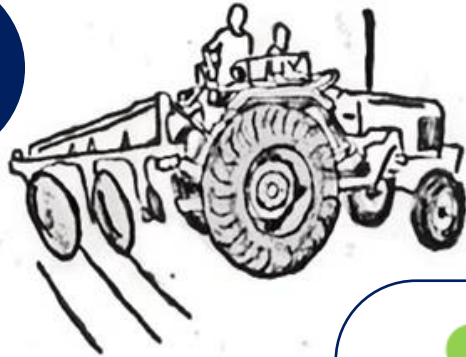
2 Micro-finance??

PFJ Programme ??

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

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

3



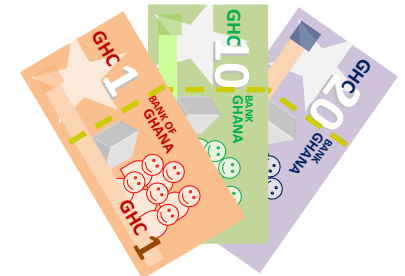
Tractor access



Demo-plot management



Input procurement



Marketing

# Discuss with the farmers:

- What are advantages of working in a group (“Noaboa system” in Ashanti, “Lagm-gbai, lagm-gbiba” in Northern)?
  1. Cooperative work (no cash payment except for food)
  2. Group input acquisition (saving transportation cost)
  3. Group accessing to tractor services (strengthening bargaining power, only for Northern region)
  4. Equipment/tools sharing
  5. Group marketing (strengthening bargaining power, saving transportation cost, etc.)
- Ideal number should be 8-15 members per group



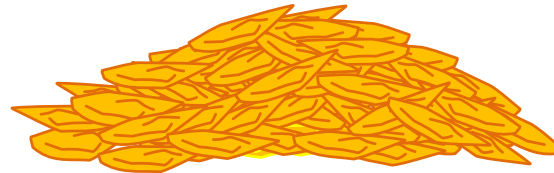
### 3. Let's make a plan!

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

**Production (grain)**

**Self-consumption**

**Seeds for  
the following season**



**Cash income**

**Inputs for  
the following season**



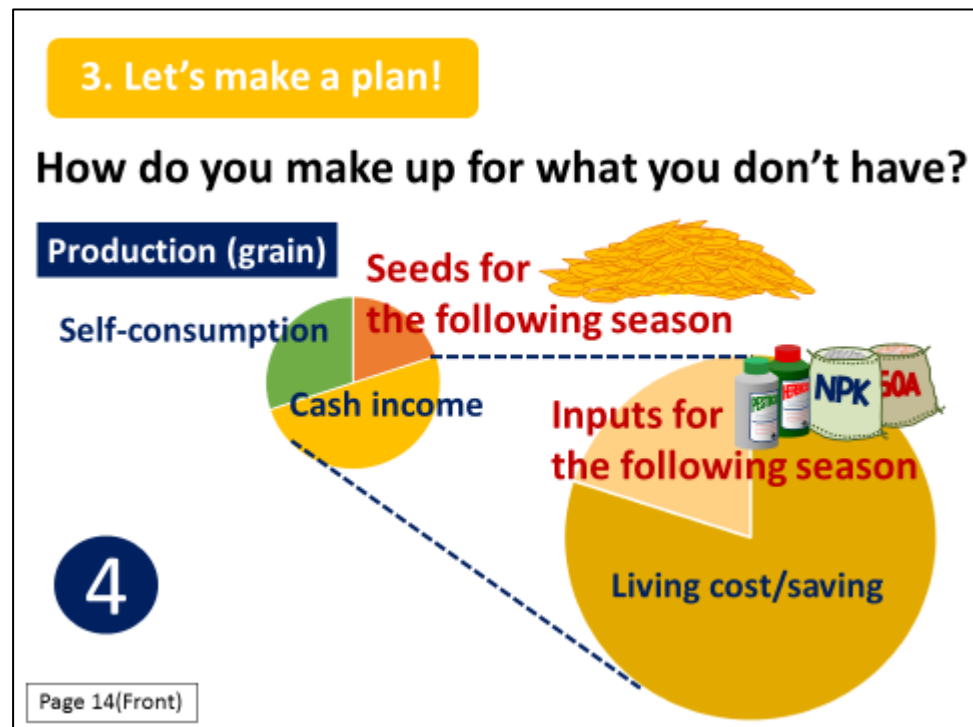
**Living cost/saving**

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 cope with yearly price increase!

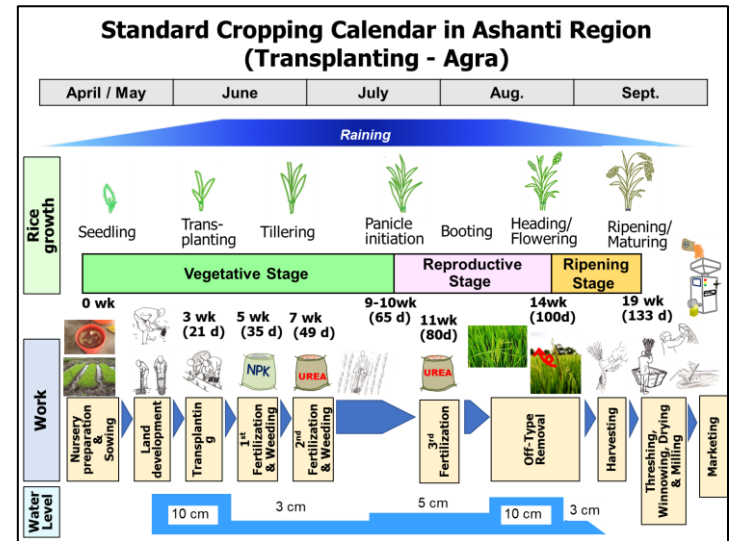


# 3. Let's make a plan!

## 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!

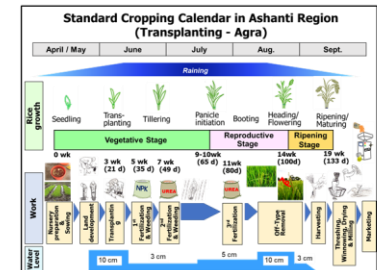
# Discuss with the farmers:

- 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

## 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                          |



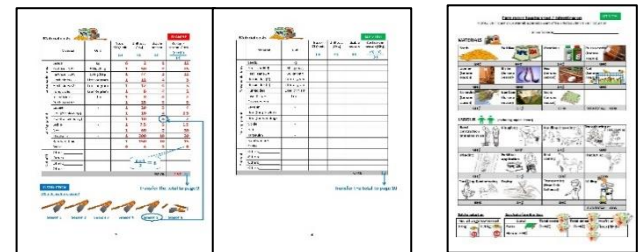
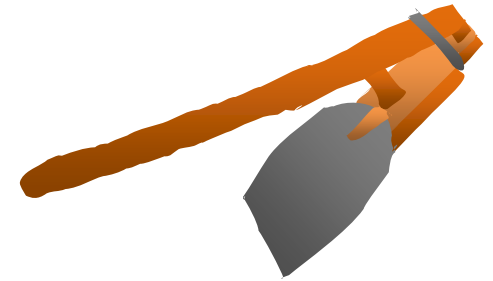
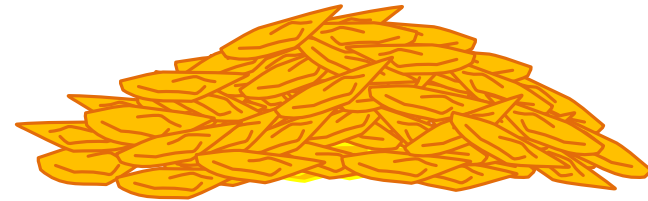
Rice cropping calendar

Sample action plan

Let's prepare Action plan!

## 4. Let's implement!

# Start recording your expenditure



# Discuss with the farmers:

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

4. Let's implement!

Start recording your expenditure

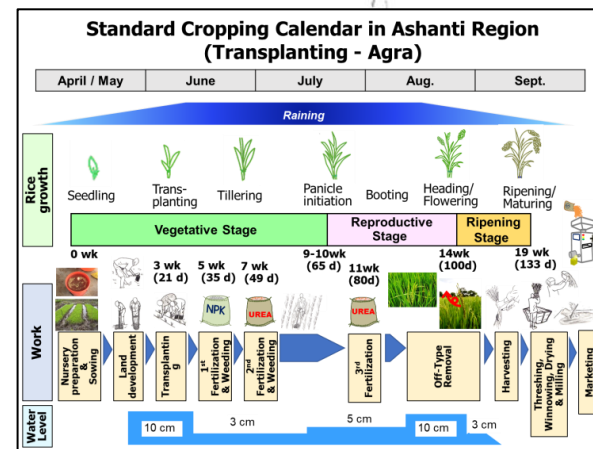
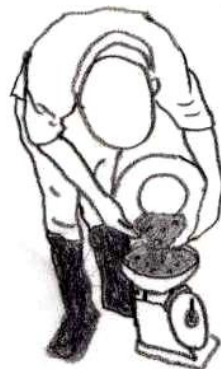
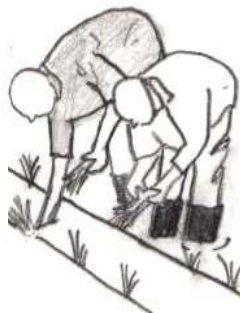
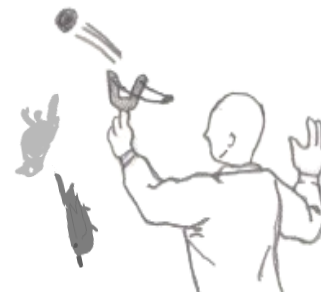
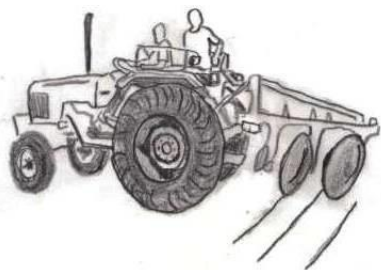


Page 16(Front) Farm record keeping book or sheet



# 4. Let's implement!

## Start cultivation

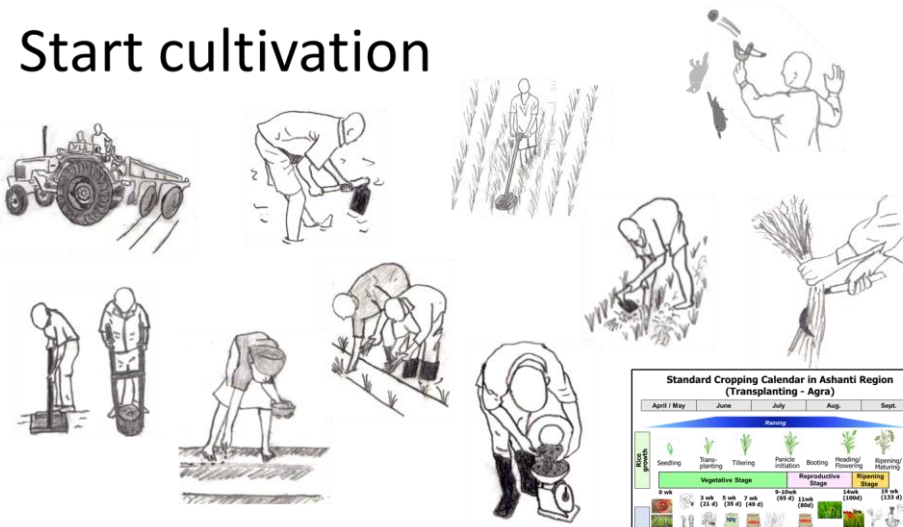


# Discuss with the farmers:

- Start cultivation, following Action plan and Rice cropping calendar

**4. Let's implement!**

## Start cultivation



**Standard Cropping Calendar in Ashanti Region (Transplanting - Agra)**

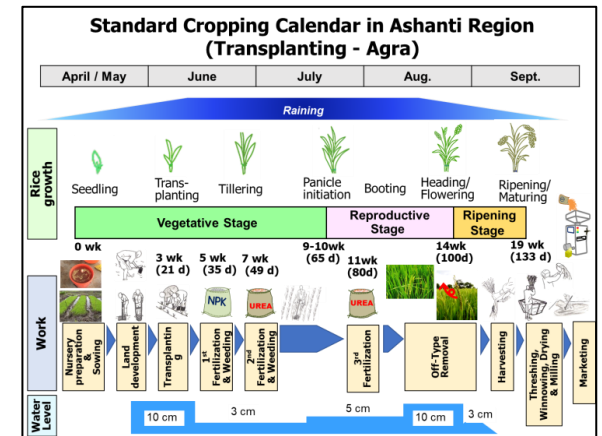
|                           | April / May  | June   | July  | Aug.                               | Sept.                           |
|---------------------------|--|--|---|------------------------------------|---------------------------------|
| <b>Plant Growth</b>       | Seeding  | Transplanting  | Tillering                                   | Panicle initiation                 | Heading / Ripening / Harvesting |
| <b>Vegetative Stage</b>   | 8 wks  | 2 wks (12 wks)   | 5 wks (17 wks)                              | 6-7 wks (13-14 wks)                | 2 wks (14-16 wks)               |
| <b>Reproductive Stage</b> |  |  |   |                                    |                                 |
| <b>Harvesting</b>         |  |  |   |                                    |                                 |
| <b>Work</b>               | Land preparation, Seedling, Transplanting, Weeding, Fertilizer, Irrigation, Harvesting | Transplanting, Weeding, Fertilizer, Irrigation, Harvesting | Weeding, Fertilizer, Irrigation, Harvesting | Fertilizer, Irrigation, Harvesting | Harvesting                      |
| <b>Water</b>              | 1.5 cm   | 3 cm   | 4 cm  | 6 cm                               | 10 cm                           |

Page 17(Front)

Action plan/Rice cropping calendar

# 4. Let's implement!

## Apply post-harvest techniques






# Discuss with the farmers:

- Continue to follow Action plan and Rice cropping calendar

**4. Let's implement!**

## Apply post-harvest techniques



**Standard Cropping Calendar in Ashanti Region (Transplanting - Agra)**

|                           | April / May | June        | July        | Aug.        | Sept.       |
|---------------------------|-------------|-------------|-------------|-------------|-------------|
| <b>Planting</b>           |             |             |             |             |             |
| <b>Vegetative Stage</b>   | 0 wk        | 2 wk (25 d) | 3 wk (30 d) | 4 wk (35 d) | 5 wk (40 d) |
| <b>Reproductive Stage</b> |             |             |             |             |             |
| <b>Harvesting</b>         |             |             |             |             |             |
| <b>Post-harvest</b>       |             |             |             |             |             |
| <b>Water</b>              | 10 cm       | 2 cm        | 5 cm        | 10 cm       | 2 cm        |

Page 18(Front)      Action plan/Rice cropping calendar

## 4. Let's implement!

# Do marketing



**To food vendors?**



**To retailers?**



**To processors?**

# 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!

Do marketing



To food vendors?

To processors?

To processors?

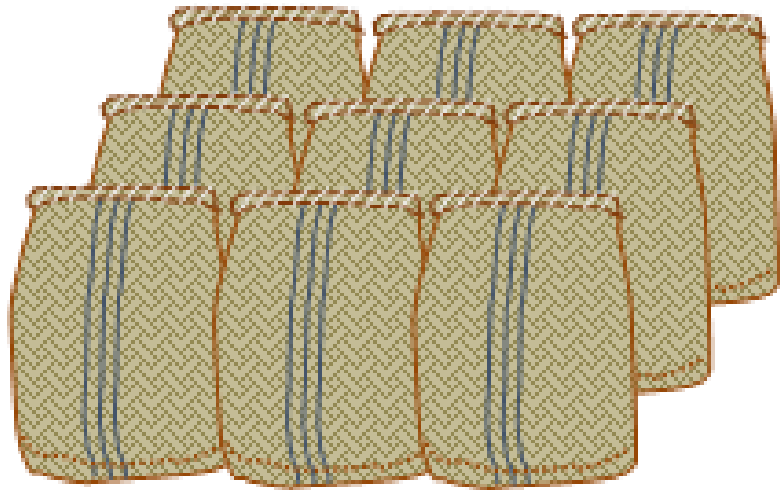
To retailers?

Page 19(Front)

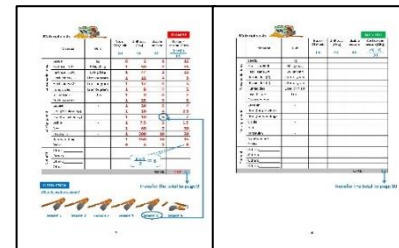
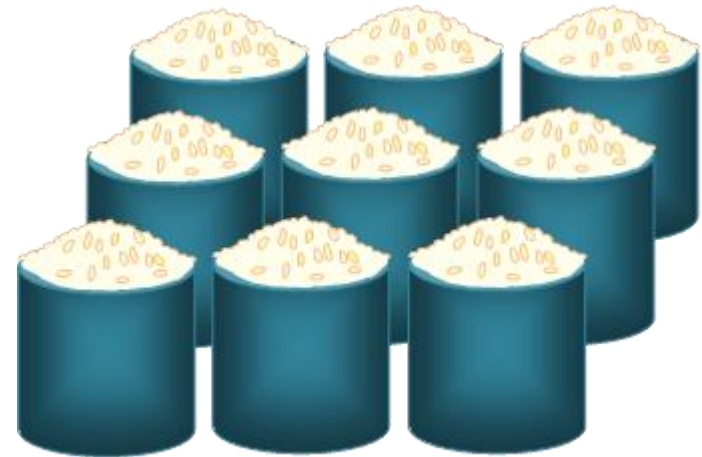
## 4. Let's implement!

# Record your sales

## GH¢ ?



## GH¢ ?



# Discuss with the farmers:

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

4. Let's implement!

Record your sales

**GH¢ ?**



**GH¢ ?**

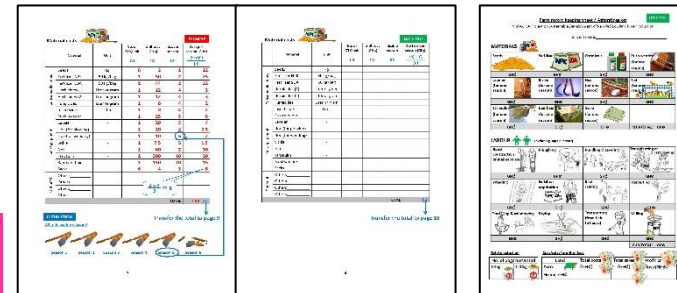


Page 20(Front) Farm record keeping book or sheet



## 5. Let's review!

# Confirm the profit or loss



# Discuss with the farmers:

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

5. Let's review!

Confirm the profit or loss



**Loss** **Profit**

Page 21(Front) Farm record keeping book or sheet

# 5. Let's review!

# Did you attain your planned target?





# Discuss with the farmers:

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

**5. Let's review!**

Did you attain your planned target?

The diagram illustrates a financial review process. On the left, a balance scale is shown with the word "Profit" on the pan. To the right, a bar chart shows three seasons (Season 1, Season 2, Season 3) with increasing heights. A question mark is placed above the bars. A magnifying glass highlights the word "Profit" and the first bar. Euro banknotes are shown flying out of the top of the bars. A fourth bar labeled "Season ..." is shown as an empty box.

Page 22(Front)

# 5. Let's review!

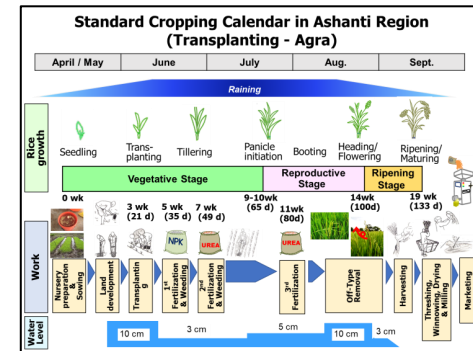
## What went good? What went wrong?

**GOOD?**

**Profit**

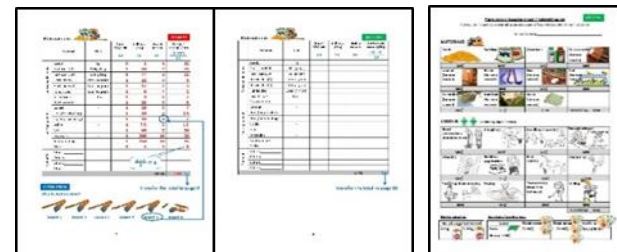
**Loss**

**WRONG?**



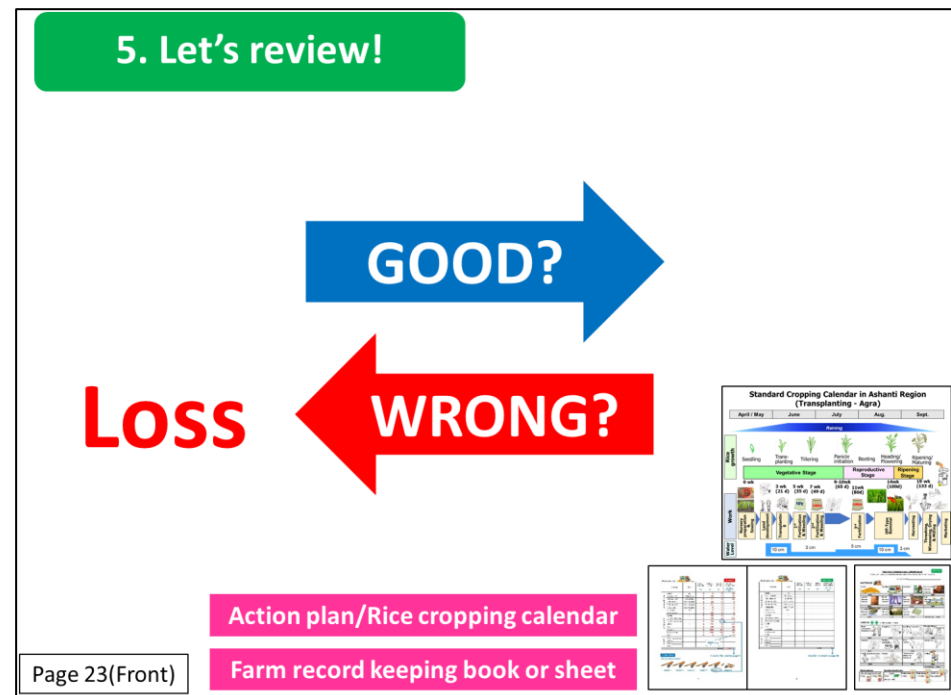
Action plan/Rice cropping calendar

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



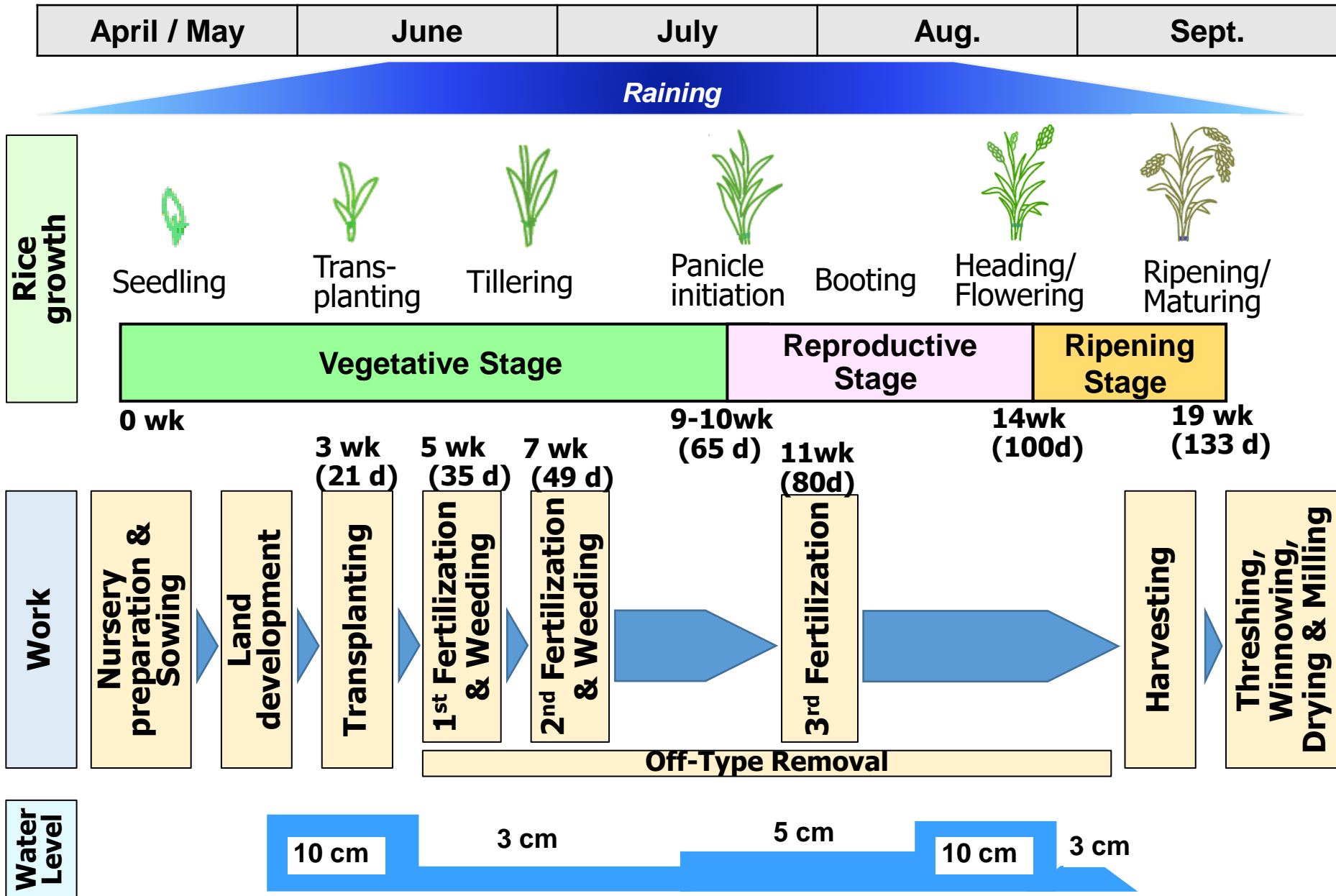
# Discuss with the farmers:

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)...*



# Standard Cropping Calendar in Ashanti Region (Transplanting - Agra)



# Demo-Plot Group Action Plan

## Form 2: AEA Report

### Form 2-1a: Demo-Plot Action Plan & Monitoring Sheet (1) Transplanting

|  |   |  |
|--|---|--|
| Name of AEA: <input type="text"/>      | Number of Group Farmers: M: <input type="text"/> F: <input type="text"/>              | Community: <input type="text"/>              |
| Phone No. of AEA: <input type="text"/> | (Youth: <input type="text"/> Aged: <input type="text"/> PLWDs: <input type="text"/> ) | Size of Demo Plot: <input type="text"/> acre |
| Operational Area: <input type="text"/> | Name of Key Farmer: <input type="text"/>  | Rice Variety: <input type="text"/>           |
| District: <input type="text"/>         | Phone No. of Key Farmer: <input type="text"/>   |  |

| 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,<br>- Evaluate each work whether it is implemented along with the guideline. | Remarks on the field and crop condition, if any |
| 1   | Seed preparation                    | 1 week before sowing                   |                                  | Rice seeds, salt, egg, bucket, sieve, firewood, pot, seed net |                  | M: <input type="text"/><br>F: <input type="text"/> |   |   |
| 2   | Nursery preparation                 | 1 day before sowing                    |                                  | Hoe, cutlass, garden line                                     |                  | M: <input type="text"/><br>F: <input type="text"/> |   |   |
| 3   | Nursery management                  | 1 day before sowing to transplanting   |                                  | Hoe   |                  | M: <input type="text"/><br>F: <input type="text"/> |   |   |
| 4   | <b>Sowing</b>                       | <b>Week 0</b>                          |                                  | String, stick, hoe  |                  | M: <input type="text"/><br>F: <input type="text"/> | Amount of seed: <input type="text"/> kg   |   |
| 5   | Land clearing                       | 3 weeks (or more) before transplanting |                                  | Cutlass   |                  | M: <input type="text"/><br>F: <input type="text"/> |   |   |
| 6   | Bund construction                   | 1 - 2 weeks before transplanting       |                                  | Hoe, spade, garden line                                       |                  | M: <input type="text"/><br>F: <input type="text"/> |   |   |
| 7   | Ploughing                           | 1 week before transplanting            |                                  | Hoe   |                  | M: <input type="text"/><br>F: <input type="text"/> |   |   |
| 8   | Pudding and or Leveling             | 1 day before transplanting             |                                  | Hoe, spade, leveller  |                  | M: <input type="text"/><br>F: <input type="text"/> |   |   |
| 9   | Uprooting and seedlings preparation | 1 day before transplanting             |                                  | Strings   |                  | M: <input type="text"/><br>F: <input type="text"/> |   |   |
| 10  | <b>Transplanting</b>                | <b>3 weeks after sowing</b>            |                                  | String, stick, garden line                                    |                  | M: <input type="text"/><br>F: <input type="text"/> | Line transplanting: <input type="text"/> cm x <input type="text"/> cm   |   |
| 11  | 1st Weeding                         | 5 weeks after sowing                   |                                  | Push weeder   |                  | M: <input type="text"/><br>F: <input type="text"/> |   |   |
| 12  | 1st Fertilizer application          | 5 weeks after sowing                   |                                  | Fertilizer, weighing scale, containers                        |                  | M: <input type="text"/><br>F: <input type="text"/> | Type of fertilizer applied: <input type="text"/><br>Amount applied: <input type="text"/> kg                     |   |
| 13  | 2nd Weeding                         | 7 weeks after sowing                   |                                  | Push weeder   |                  |  |   |   |
| 14  | 2nd Fertilizer application          | 7 weeks after sowing                   |                                  | Fertilizer, weighing scale, containers                        |                  | M: <input type="text"/><br>F: <input type="text"/> | Type of fertilizer applied: <input type="text"/><br>Amount applied: <input type="text"/> kg                     |   |

# Demo-Plot Group Action Plan cont..

| 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,<br>- Evaluate each work whether it is implemented along with the guideline. | Remarks on the field and crop condition, if any |
| 15  | 3rd Weeding                            | 10 weeks after sowing                                  |                                  | Push weeder                                 |                  | M:<br>F:                    |   |   |
| 16  | 3rd Fertilizer application             | 10 weeks after sowing                                  |                                  | Fertilizer, weighing scale, containers      |                  | M:<br>F:                    | Type of fertilizer applied:<br>Amount applied: kg   |   |
| 17  | <b>Heading</b>                         | <b>Heading more than 50% rice plants</b>               |                                  |   |                  |                             |   |   |
| 18  | Off-type removal (for seed production) | 13 weeks, 14 weeks, 15 weeks, 16 weeks after sowing    |                                  | No tool (hand removal)                      |                  | M:<br>F:                    |   |   |
| 19  | Bird scaring                           | 13 - 18 weeks after sowing                             |                                  | Fishing net                                 |                  | M:<br>F:                    |   |   |
| 20  | <b>Maturing</b>                        | <b>Accumulated temperature 950°C from heading date</b> |                                  |   |                  |                             |   |   |
|     | Harvesting                             | 18 weeks after sowing                                  |                                  | Sickle                                      |                  | M:<br>F:                    | Moisture content: %   |   |
|     | Threshing                              |  |                                  | Tarpaulin, Bambam box, sacks, head carriage |                  | M:<br>F:                    | Number of bags:   |   |
| 21  | Winnowing                              | 18 - 19 weeks after sowing                             |                                  | Tarpaulin, sacks                            |                  | M:<br>F:                    |   |   |
|     | Drying                                 |  |                                  |   |                  | M:<br>F:                    | Moisture content: %   |   |
| 22  | Storing                                | 18 weeks after sowing ~                                |                                  | Storage facility, wooden pallets            |                  | M:<br>F:                    |   |   |
| 23  | Milling                                | 18 weeks after sowing ~                                |                                  | Sacks                                       |                  | M:<br>F:                    |   |   |
| 24  | Selling                                | 18 weeks after sowing ~                                |                                  | Sacks                                       |                  | M:<br>F:                    |   |   |




# Farm Record Keeping Book/Sheet

- Open the file
  - FM-Ref-3 Farm record keeping book (Transplanting)
  - FM-Ref-4 Farm record keeping sheet (Transplanting)

## FARM RECORD KEEPING BOOK -Transplanting method-

### Standard Cropping Calendar in Ashanti Region (Transplanting - Agra)

|             | April / May                   | June             | July               | Aug.                     | Sept.             |
|-------------|-------------------------------|------------------|--------------------|--------------------------|-------------------|
| Raining     |                               |                  |                    |                          |                   |
| Rice growth | Seeding                       | Trans-planting   | Tillering          | Panicle initiation       | Booting           |
|             |                               |                  |                    | Heading/Flowering        | Ripening/Maturing |
|             | Vegetative Stage              |                  | Reproductive Stage |                          | Ripening Stage    |
| Work        | Nursery preparation<br>Sowing | Land development | Transplanting      | Fertilizers<br>& Weeding | Harvesting        |
| Water level | 10 cm                         | 3 cm             | 5 cm               | 10 cm                    | 3 cm              |



Name: \_\_\_\_\_

Let's do an exercise!

**INSTRUCTION**

- Costs = Costs for land + Costs for materials + Costs for labour + Costs for milling
- Sales = Number of grawaa or bags sold x Unit price
- Profit or Loss = Sales - Cost

**Farmer A**

Land: GH¢ 100

Materials: GH¢ 110  
Seeds, NPk 50A, Tool/equipment, Fertilizers

Labour: GH¢ 60  
Milling: GH¢ 30

**Total costs: GH¢ 280**  
 $100 + 110 + 60 + 30 = 280$

**EXAMPLE**

|                    | GH¢        |
|--------------------|------------|
| Land               | 100        |
| Materials          | 110        |
| Labour             | 60         |
| Milling            | 30         |
| <b>Total costs</b> | <b>280</b> |
| Total sales        | 450        |
| <b>Profit</b>      | <b>170</b> |

Unit price per grawaa GH¢ 50  
 $50 \times 9 = 450$

**Profit: GH¢ 170**  
 $450 - 280 = 170$

**Farmer B**

Land: GH¢ 100

Materials: GH¢ 150  
Seeds, NPk 50A, Chemicals, Fertilizers

Labour: GH¢ 60  
Milling: GH¢ 50

**Total costs: GH¢ 360**

**LET'S TRY!**

|                    | GH¢ |
|--------------------|-----|
| Land               |     |
| Materials          |     |
| Labour             |     |
| Milling            |     |
| <b>Total costs</b> |     |
| Total sales        |     |
| <b>Profit</b>      |     |

Unit price per grawaa GH¢ 50  
 $50 \times 9 = 450$

**Profit: GH¢ 390**

### Farm record keeping sheet for Transplanting method

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

Farmer's name: \_\_\_\_\_

#### MATERIALS

| Seeds                 | Fertilizer | Chemicals | Push weeder |
|-----------------------|------------|-----------|-------------|
| GH¢                   | GH¢        | GH¢       | GH¢         |
| Leveler               | Sickle     | Hoe       | Net         |
| GH¢                   | GH¢        | GH¢       | GH¢         |
| Tarpaulin             | Bamboo box | Sacks     |             |
| GH¢                   | GH¢        | GH¢       |             |
| <b>SUB-TOTAL: GH¢</b> |            |           |             |

#### LABOUR (excluding unpaid labour)

| Bund construction or maintenance | Ploughing              | Puddling & Leveling                | Transplanting or Direct sowing |
|----------------------------------|------------------------|------------------------------------|--------------------------------|
| GH¢                              | GH¢                    | GH¢                                | GH¢                            |
| Weeding                          | Fertilizer application | Bird scaring                       | Harvesting                     |
| GH¢                              | GH¢                    | GH¢                                | GH¢                            |
| Threshing & Winnowing            | Drying                 | Transporting (from field to house) | Milling                        |
| GH¢                              | GH¢                    | GH¢                                | GH¢                            |
| <b>SUB-TOTAL: GH¢</b>            |                        |                                    |                                |

| Total production      |             | Cost/sales/profit or loss |                   |                      |
|-----------------------|-------------|---------------------------|-------------------|----------------------|
| No. of bags harvested | Land        | Total costs (GH¢)         | Total sales (GH¢) | Profit or loss (GH¢) |
| 84kg                  | Acre:       |                           |                   |                      |
| 4                     | Hiring: GH¢ |                           |                   |                      |



# Gender Viewpoint



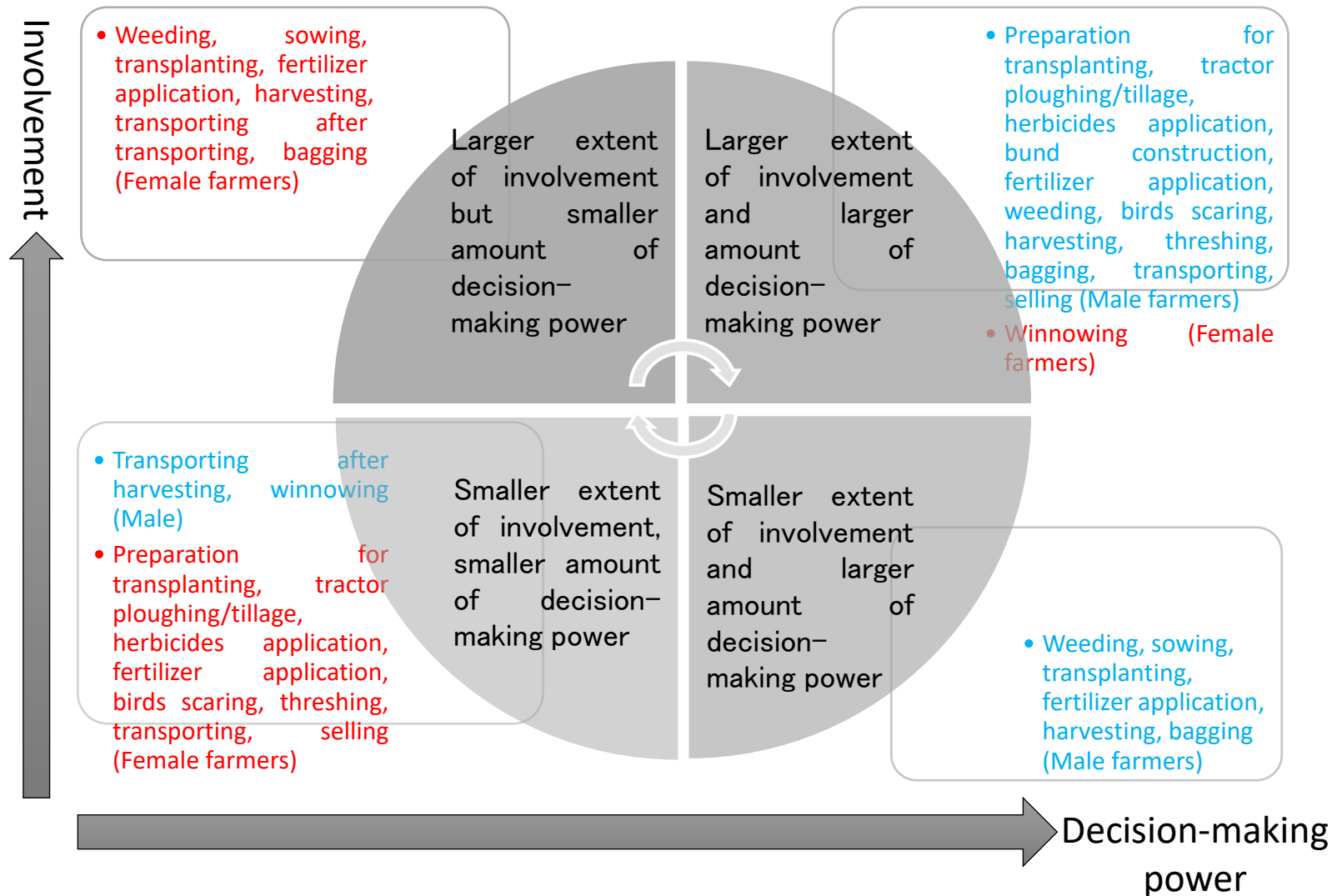
1<sup>st</sup> TOT

## *Factors in the Field...*

- Mainly Christians (Muslims: 10%) and there are other indigenous religious beliefs. Few are polygamy.
- Basically male family members manage household budget.
- Some female farmers rent and manage rice field or farmland. Male and Female farmers help each other for farm activities.
- Without distinction of gender, the person who has a right to the farmland management has all the responsibilities and rights regarding to cultivation and sale.
- Much of wife's income is used for household management such as daily meals and education for their children.

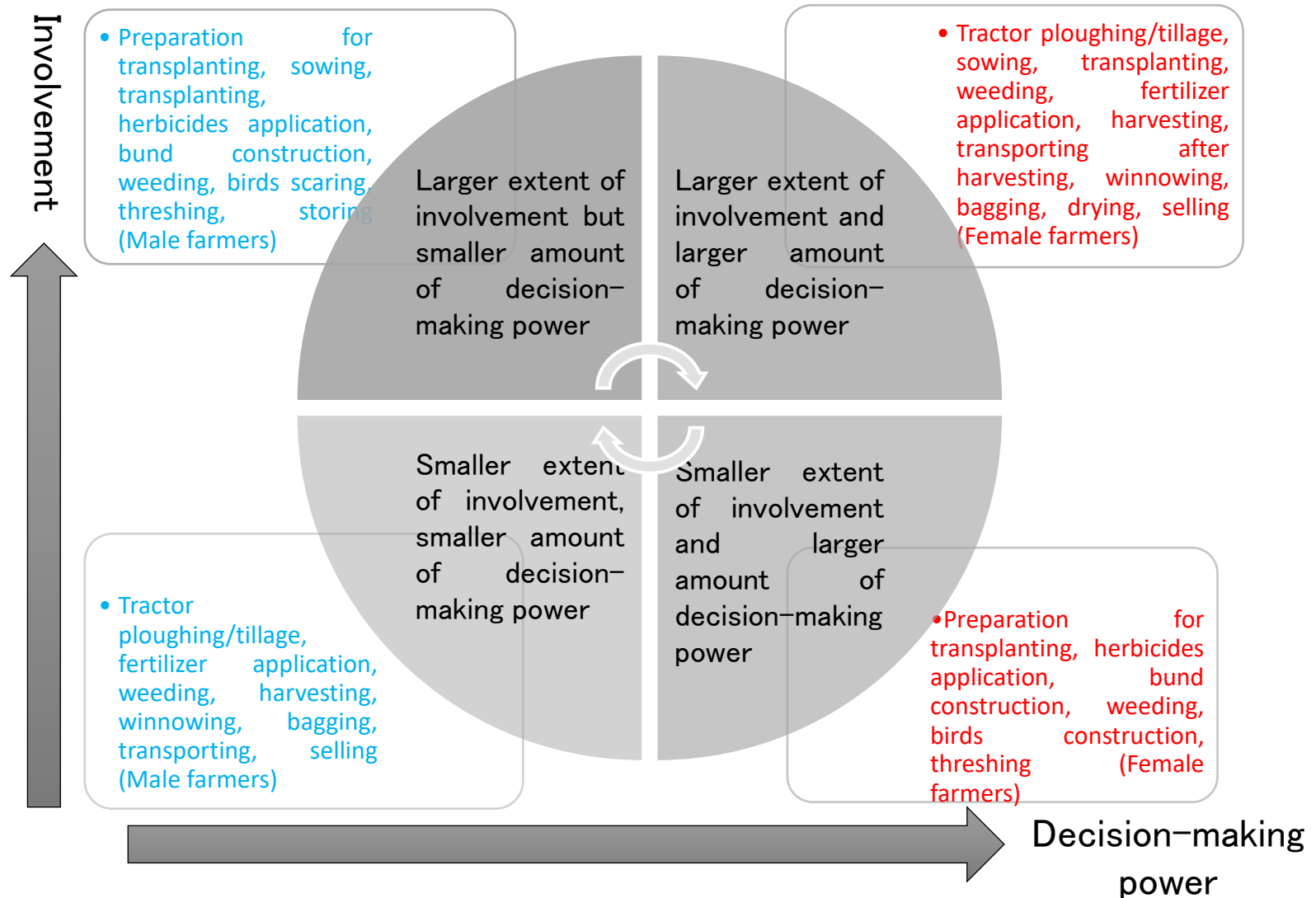
# Roles, Decision Making and Involvement of Female and Male Farmers in Rice Production

## 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 |
|------------------------|--------|------|
| Land clearing          |        |      |
| Burning                |        |      |
| Herbicide application  |        |      |
| Ploughing              |        |      |
| Bund construction      |        |      |
| Seed preparation       |        |      |
| Sowing / transplanting |        |      |
| Fertilizer application |        |      |
| Manual weeding         |        |      |
| Birds scaring          |        |      |
| Harvesting             |        |      |
| Threshing              |        |      |
| Drying                 |        |      |
| Bagging                |        |      |
| Storing                |        |      |
| Transporting           |        |      |
| Selling                |        |      |
| Record keeping         |        |      |

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

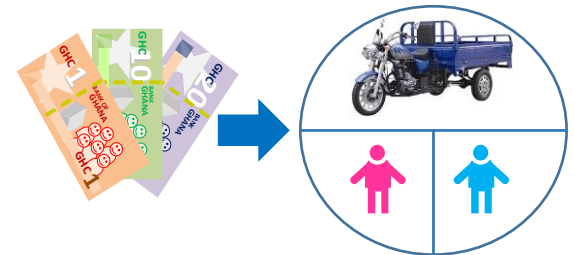
# Good practices in the field

*Lydia of Juansa, Asante Akyem North*

I own land that I use to cultivate cocoyam by myself and rice with my husband. I solely control the income from cocoyam while the income from rice is controlled by him. However, I am involved in decision making for use of the income from rice.

For example, in 2016, we discussed and decided to use the income from rice to purchase a tricycle to use for our farming activities and we shared the remaining money. In addition, whenever I need money, I can ask my husband for it to use for household activities as well as for my own (clothes, cosmetics, etc.).

We work together in a fair way not because I am the land owner but because of the mutual understanding/trust to each other. Even if my husband was the land owner, we could do the same!



# *Good practices in the field*

## *Nana of Juansa, Asante Akyem North*

I own land that I used to cultivate rice, chili, plantain and cassava with my husband. I solely control the income from all the products including rice!! Whenever he needs money, he asks me to use for household activities as well as for his own. In addition, he owns land that we cultivate cocoa together and the income is shared between us. Because we have many children who are in school, we have to control the money very carefully. My husband trusts me and leaves all the income with me to manage. For example, after he comes back from the market with money from the sales of the agricultural products, he brings all of it to me to keep.

As for the On-site training, I am the one who participate in also with Lydia because our husbands are busy working in the field. They never prevent us to attend the training. We share the outcome of the training with our husbands at home and apply it in the field. If we hesitate to speak in front of the male participants during the training? Never!! We always feel free to ask questions and say our opinions there!



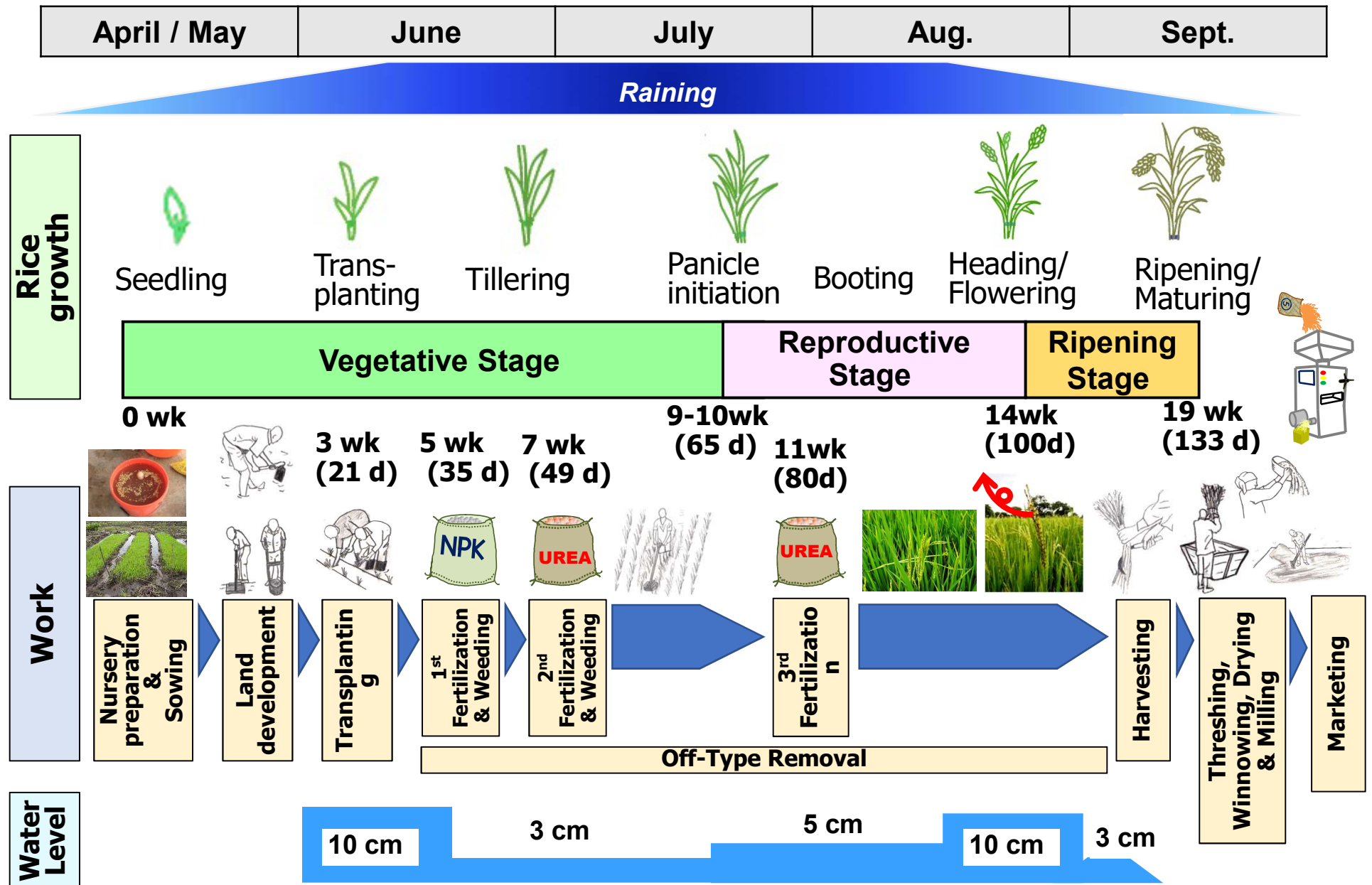


*If you know any other different story, please share with us. They can be compiled in this material as good practices.*

# *Tips for AEsAs for better involvement of female farmers*

- When you invite farmers to the On-site training based on activity, please invite them based on activities. 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 at market days. Avoid such days to implement the On-site Training.

# Standard Cropping Calendar in Ashanti Region (Transplanting - Agra)



## Form 2-1a: Demo-Plot Action Plan & Monitoring Sheet (1) Transplanting

|                   |   |  |
|-------------------|---|--|
| Name of AEA:      | Number of Group Farmers: M:                      F: | Community:                                   |
| Phone No. of AEA: | (Youth (18-29):      Aged (60>):      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   | Seed preparation                    | 1 week before sowing                                  |                                  | Rice seeds, salt, egg, bucket, sieve, firewood, pot, seed net |                  | M:<br>F:                    |   |   |
| 2   | Nursery preparation                 | 1 day before sowing                                   |                                  | Hoe, cutlass, garden line                                     |                  | M:<br>F:                    |   |   |
| 3   | Nursery management                  | from 1 day before sowing to the day for transplanting |                                  | Hoe   |                  | M:<br>F:                    |   |   |
| 4   | <b>Sowing</b>                       | <b>Week 0</b>   |                                  | String, stick, hoe  |                  | M:<br>F:                    | Quantity of seeds:                      kg  |   |
| 5   | Land clearing                       | 3 weeks (or more) before transplanting                |                                  | Cutlass   |                  | M:<br>F:                    |   |   |
| 6   | Bund construction                   | 1 - 2 weeks before transplanting                      |                                  | Hoe, spade, garden line                                       |                  | M:<br>F:                    |   |   |
| 7   | Ploughing                           | 1 week before transplanting                           |                                  | Hoe   |                  | M:<br>F:                    |   |   |
| 8   | Puddling and or Leveling            | 1 day before transplanting                            |                                  | Hoe, spade, leveller  |                  | M:<br>F:                    |   |   |
| 9   | Uprooting and seedlings preparation | 1 day before transplanting                            |                                  | Strings   |                  | M:<br>F:                    |   |   |
| 10  | <b>Transplanting</b>                | <b>3 weeks after sowing</b>                           |                                  | String, stick, garden line                                    |                  | M:<br>F:                    | Row transplanting:                      cm x                      cm  |   |
| 11  | 1st Weeding                         | 5 weeks after sowing                                  |                                  | Push weeder   |                  | M:<br>F:                    |   |   |
| 12  | 1st Fertilizer application          | 5 weeks after sowing                                  |                                  | Fertilizer, weighing scale, containers                        |                  | M:<br>F:                    | Type of fertilizer applied:<br>Quantity applied:                      kg                                    |   |
| 13  | Off-type removal                    | From 5 weeks after sowing to the day for harvesting   |                                  | No tool (hand removal)  |                  | M:<br>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 |
| 14  | 2nd Weeding                | 7 weeks after sowing                                   |                                  | Push weeder                                 |                  |                             |   |   |
| 15  | 2nd Fertilizer application | 7 weeks after sowing                                   |                                  | Fertilizer, weighing scale, containers      |                  | M:<br>F:                    | Type of fertilizer applied:<br>Quantity applied: kg   |   |
| 16  | 3rd Weeding                | 10 weeks after sowing                                  |                                  | Push weeder                                 |                  | M:<br>F:                    |   |   |
| 17  | 3rd Fertilizer application | 10 weeks after sowing                                  |                                  | Fertilizer, weighing scale, containers      |                  | M:<br>F:                    | Type of fertilizer applied:<br>Quantity applied: kg   |   |
| 18  | <b>Heading</b>             | <b>Heading more than 50% rice plants</b>               |                                  |   |                  |                             |   |   |
| 19  | Bird scaring               | 13 - 18 weeks after sowing                             |                                  | Fishing net                                 |                  | M:<br>F:                    |   |   |
| 20  | <b>Maturing</b>            | <b>Accumulated temperature 950°C from heading date</b> |                                  |   |                  |                             |   |   |
|     | Harvesting                 | 19 weeks after sowing (determined by observation)      |                                  | Sickle                                      |                  | M:<br>F:                    | Moisture content: %   |   |
|     | Threshing                  |  |                                  | Tarpaulin, Bambam box, sacks, head carriage |                  | M:<br>F:                    |   |   |
| 21  | Winnowing                  | 19 weeks after sowing                                  |                                  | Tarpaulin, sacks                            |                  | M:<br>F:                    |   |   |
|     | Drying                     |  |                                  |   |                  | M:<br>F:                    | Moisture content: %<br>Number of bags:  | Bag size:                                       |
| 22  | Storing                    | 19 weeks after sowing ~                                |                                  | Storage facility, wooden pallets            |                  | M:<br>F:                    |   |   |
| 23  | Milling                    | 19 weeks after sowing ~                                |                                  | Sacks                                       |                  | M:<br>F:                    |   |   |
| 24  | Selling                    | 19 weeks after sowing ~                                |                                  | Sacks                                       |                  | M:<br>F:                    |   |   |

### Onsite Training (OST) Record

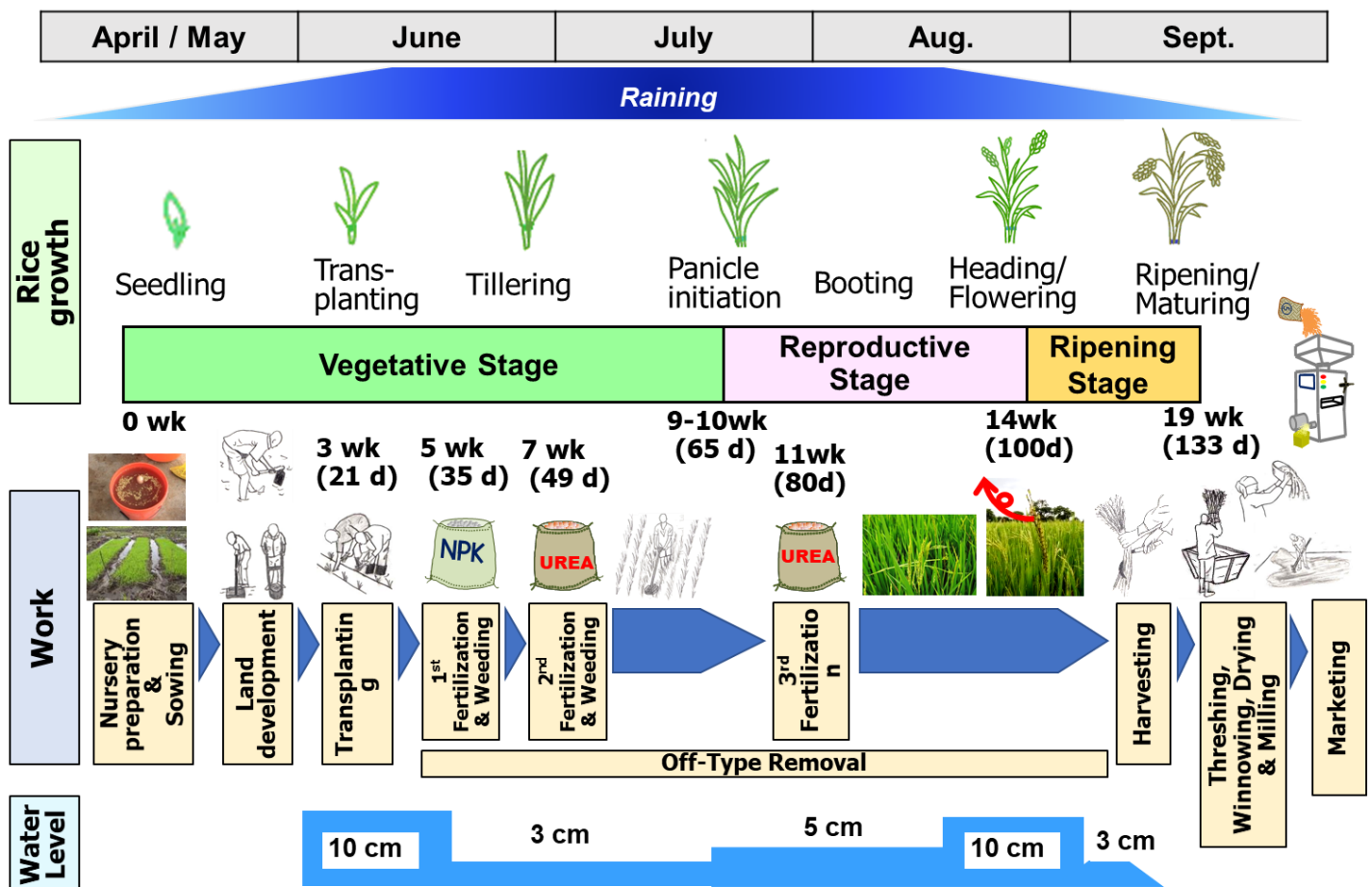
| <u>1<sup>st</sup> OST</u>                       | <u>2<sup>nd</sup> OST</u>                       | <u>3<sup>rd</sup> OST</u>                       | <u>4<sup>th</sup> OST</u>                       | <u>5<sup>th</sup> OST</u>                       |
|---|---|---|---|---|
| Date:   | Date:   | Date:   | Date:   | Date:   |
| Participants: M      F<br>(Youth, Aged, PLWDs ) | Participants: M      F<br>(Youth, Aged, PLWDs ) | Participants: M      F<br>(Youth, Aged, PLWDs ) | Participants: M      F<br>(Youth, Aged, PLWDs ) | Participants: M      F<br>(Youth, Aged, PLWDs ) |
| Topics trained:                                 | Topics trained:                                 | Topics trained:                                 | Topics trained:                                 | Topics trained:                                 |



# FARM RECORD KEEPING BOOK

## -Transplanting method-

### Standard Cropping Calendar in Ashanti Region (Transplanting - Agra)



Let's do an exercise!

**INSTRUCTION**

- Costs = Costs for land + Costs for materials + Costs for labour + Costs for milling
- Sales = Number of grawaa or bags sold x Unit price
- Profit or Loss = Sales – Cost

**Farmer A**

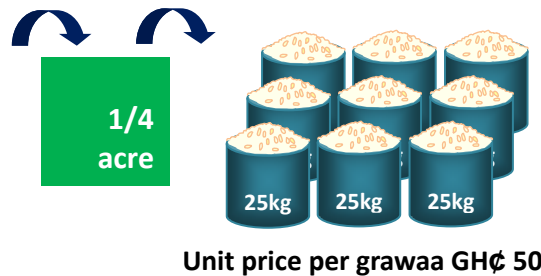
**Land hiring: GH¢ 100**

**Materials: GH¢ 110**

Seeds, Tool/equipment, Fertilizers (NPK 50A)

**Labour: GH¢ 40**

**Milling: GH¢ 30**



**Total costs: GH¢ 280**

$100 + 110 + 40 + 30 = 280$

**Total sales: GH¢ 450**

$50 \times 9 = 450$

**Profit: GH¢ 170**

$450 - 280 = 170$

**EXAMPLE**

| Farmer A    |             | GH¢ |
|-------------|-------------|-----|
| COSTS       | Land        | 100 |
|             | Materials   | 110 |
|             | Labour      | 40  |
|             | Milling     | 30  |
|             | Total costs | 280 |
| Total sales |             | 450 |
| Profit      |             | 170 |

**Farmer B**

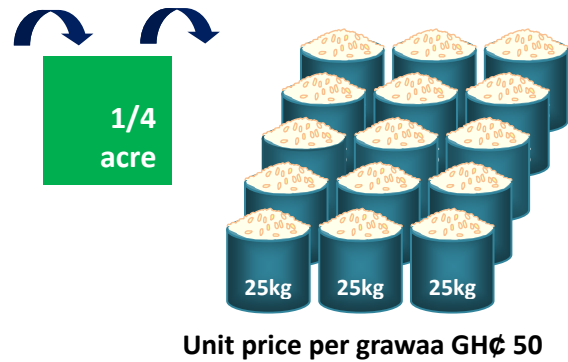
**Land hiring: GH¢ 100**

**Materials: GH¢ 150**

Tool/equipment, Seeds, Chemicals (PESTICIDE, HERBICIDE), Fertilizers (NPK 50A)

**Labour: GH¢ 60**

**Milling: GH¢ 50**



**Total costs: GH¢ 360**

**Total sales: GH¢ 750**

**Profit: GH¢ 390**

**LET'S TRY!**

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



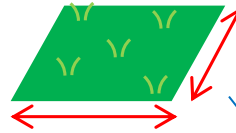
**EXAMPLE**

Rice cropping season:

**Major season, 2014**

Area size:

**1/4 acre**



Land hiring cost:

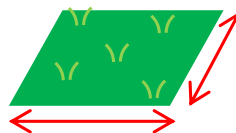
**GH¢ 100 (A) → Transfer the cost to page 9**

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

**LET'S TRY!**

Rice cropping season:

Area size:



Land hiring cost:

**GH¢ (A) → Transfer the cost to page 10**

## Material costs



## EXAMPLE

|                  | Material          | Unit          | No. or QTY/unit | Unit cost (GH¢) | Usable season | Cost per season (GH¢)        |
|------------------|-------------------|---------------|-----------------|-----------------|---------------|------------------------------|
|                  |                   |               | (B)             | (C)             | (D)           | $\frac{(B) \times (C)}{(D)}$ |
| Consumable items | Seeds             | kg            | 6               | 2               | 1             | 12                           |
|                  | Fertilizer NPK    | 50 kg/bag     | 1               | 50              | 2             | 25                           |
|                  | Fertilizer SOA    | 50 kg/bag     | 1               | 44              | 2             | 22                           |
|                  | Herbicides (1)    | Liter or gram | 1               | 12              | 4             | 3                            |
|                  | Herbicides (2)    | Liter or gram | 1               | 12              | 4             | 3                            |
|                  | Fungicides        | Liter or gram | 1               | 8               | 4             | 2                            |
|                  | Insecticides      | Liter         | 1               | 8               | 4             | 2                            |
| Tool/equipment   | Push weeder       | -             | 1               | 25              | 5             | 5                            |
|                  | Leveler           | -             | 1               | 20              | 5             | 4                            |
|                  | Hoe (for plowing) | -             | 1               | 10              | 4             | 2.5                          |
|                  | Hoe (for weeding) | -             | 1               | 10              | 5             | 2                            |
|                  | Sickle            | -             | 1               | 7.5             | 5             | 1.5                          |
|                  | Net               | -             | 1               | 60              | 2             | 30                           |
|                  | Tarpaulin         | -             | 1               | 300             | 10            | 30                           |
|                  | Bambam box        | -             | 1               | 150             | 10            | 15                           |
|                  | Sacks             | -             | 6               | 4               | 3             | 8                            |
| Optional         | Others _____      |               |                 |                 |               |                              |
|                  | Others _____      |               |                 |                 |               |                              |
|                  | Others _____      |               |                 |                 |               |                              |
|                  | Others _____      |               |                 |                 |               |                              |
| <b>TOTAL</b>     |                   |               |                 |                 |               | <b>167 (E)</b>               |

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

## INSTRUCTION

What is usable season?



Transfer the total to page 9

## Material costs



LET'S TRY!

|                  | Material          | Unit          | No. or QTY/unit | Unit cost (GH¢) | Usable season | Cost for one season (GH¢)    |
|------------------|-------------------|---------------|-----------------|-----------------|---------------|------------------------------|
|                  |                   |               | (B)             | (C)             | (D)           | $\frac{(B) \times (C)}{(D)}$ |
| Consumable items | Seeds             | kg            |                 |                 |               |                              |
|                  | 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   | Push weeder       | -             |                 |                 |               |                              |
|                  | Leveler           | -             |                 |                 |               |                              |
|                  | Hoe (for plowing) | -             |                 |                 |               |                              |
|                  | Hoe (for weeding) | -             |                 |                 |               |                              |
|                  | Sickle            | -             |                 |                 |               |                              |
|                  | Net               | -             |                 |                 |               |                              |
|                  | Tarpaulin         | -             |                 |                 |               |                              |
|                  | Bambam box        | -             |                 |                 |               |                              |
|                  | Sacks             | -             |                 |                 |               |                              |
| Optional         | Others _____      |               |                 |                 |               |                              |
|                  | Others _____      |               |                 |                 |               |                              |
|                  | Others _____      |               |                 |                 |               |                              |
|                  | Others _____      |               |                 |                 |               |                              |
| <b>TOTAL</b>     |                   |               |                 |                 |               | <b>(E)</b>                   |



Transfer the total to page 10

## Labour costs



Tick activities you actually did.

**EXAMPLE**

|                     | Activity  | Date                 | No. of free/family labour | No. of paid labour | Unit cost (GH¢) | Total cost (GH¢) |
|---------------------|---|----------------------|---------------------------|--------------------|-----------------|------------------|
|                     |   |                      |                           | (F)                | (G)             | (F) X (G)        |
| Preparation period  | Seed preparation  | April 20             | 1                         | -                  | -               | -                |
|                     | Nursery preparation: <input checked="" type="checkbox"/> Yes or No <input type="checkbox"/> No        | Tick April 23        | 2                         | 1                  | 10              | 10               |
|                     | Sowing on nursery: <input checked="" type="checkbox"/> Yes or No <input type="checkbox"/> No          | Tick April 24        | 1                         | -                  | -               | -                |
|                     | Land clearing   | April 27-29          | 3                         | 2                  | 14              | 28               |
|                     | De-stumping   | April 30-May 1       | 2                         | 1                  | 12              | 12               |
|                     | Bund construction or maintenance: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Tick May 3-7         | 4                         | 1                  | 50              | 50               |
|                     | Ploughing   | May 7                | 3                         | 2                  | 30              | 60               |
|                     | Puddling or Leveling: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No             | Tick May 14          | 3                         | 1                  | 47              | 47               |
|                     | Transplanting or Direct sowing: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No   | Tick May 15-20       | 2                         | 2                  | 15              | 30               |
| Cultivation period  | Weeding: 1st  | May 29               | 2                         | -                  | -               | -                |
|                     | Fertilizer application: 1 <sup>st</sup> (NPK)   | May 29               | 1                         | -                  | -               | -                |
|                     | Weeding: 2nd  | June 12              | 2                         | -                  | -               | -                |
|                     | Fertilizer application: 2 <sup>nd</sup> (SOA)   | June 12              | 1                         | -                  | -               | -                |
|                     | Weeding: 3rd  | July 5               | 2                         | -                  | -               | -                |
|                     | Fertilizer application: 3 <sup>rd</sup> (SOA)   | July 5               | 1                         | -                  | -               | -                |
|                     | Fertilizer application: 4 <sup>th</sup> (SOA)   | July 20              | 1                         | -                  | -               | -                |
|                     | Off-type removal: 1 <sup>st</sup>   | July 23              | 1                         | -                  | -               | -                |
|                     | Off-type removal: 2 <sup>nd</sup>   | July 30              | 1                         | -                  | -               | -                |
|                     | Off-type removal: 3 <sup>rd</sup>   | August 6             | 1                         | -                  | -               | -                |
|                     | Off-type removal: 4 <sup>th</sup>   | August 13            | 1                         | -                  | -               | -                |
|                     | Bird scaring  | July 23 to August 22 | 2                         | -                  | -               | -                |
|                     | Harvesting  | August 22            | 3                         | -                  | -               | -                |
| Post-harvest period | Threshing   | August 22            | 1                         | -                  | -               | -                |
|                     | Winnowing   | August 24            | 1                         | -                  | -               | -                |
|                     | Drying  | August 24            | 1                         | -                  | -               | -                |
|                     | Transporting (from field to house)  | August 25            | 1                         | -                  | -               | -                |
| Optional            | Chemical spraying   | April 27             | 1                         | -                  | -               | -                |
|                     | Chemical spraying   | July 20              | 1                         | -                  | -               | -                |
|                     | Chemical spraying   | August 1             | 1                         | -                  | -               | -                |
| <b>TOTAL</b>        |   |                      |                           |                    |                 | <b>237 (H)</b>   |

$$2 \times 30 = 60$$

Transfer the total to page 9

## Labour costs



LET'S TRY!





|                     | Activity                                      | Date | No. of free/family labour | No. of paid labour | Unit cost (GH¢) | Total cost (GH¢) |
|---------------------|---|------|---------------------------|--------------------|-----------------|------------------|
|                     |   |      |                           | (F)                | (G)             | (F) X (G)        |
| Preparation period  | Seed preparation                              |      |                           |                    |                 |                  |
|                     | Nursery preparation: Yes or No                |      |                           |                    |                 |                  |
|                     | Sowing on nursery: Yes or No                  |      |                           |                    |                 |                  |
|                     | Land clearing                                 |      |                           |                    |                 |                  |
|                     | De-stumping                                   |      |                           |                    |                 |                  |
|                     | Bund construction or maintenance              |      |                           |                    |                 |                  |
|                     | Ploughing                                     |      |                           |                    |                 |                  |
|                     | Puddling or Leveling                          |      |                           |                    |                 |                  |
|                     | Transplanting or Direct sowing                |      |                           |                    |                 |                  |
| Cultivation period  | Weeding: 1st                                  |      |                           |                    |                 |                  |
|                     | Fertilizer application: 1 <sup>st</sup> (NPK) |      |                           |                    |                 |                  |
|                     | Weeding: 2nd                                  |      |                           |                    |                 |                  |
|                     | Fertilizer application: 2 <sup>nd</sup> (SOA) |      |                           |                    |                 |                  |
|                     | Weeding: 3rd                                  |      |                           |                    |                 |                  |
|                     | Fertilizer application: 3 <sup>rd</sup> (SOA) |      |                           |                    |                 |                  |
|                     | Fertilizer application: 4 <sup>th</sup> (SOA) |      |                           |                    |                 |                  |
|                     | Off-type removal: 1 <sup>st</sup>             |      |                           |                    |                 |                  |
|                     | Off-type removal: 2 <sup>nd</sup>             |      |                           |                    |                 |                  |
|                     | Off-type removal: 3 <sup>rd</sup>             |      |                           |                    |                 |                  |
|                     | Off-type removal: 4 <sup>th</sup>             |      |                           |                    |                 |                  |
|                     | Bird scaring                                  |      |                           |                    |                 |                  |
|                     | Harvesting                                    |      |                           |                    |                 |                  |
| Post-harvest period | Threshing                                     |      |                           |                    |                 |                  |
|                     | Winnowing                                     |      |                           |                    |                 |                  |
|                     | Drying  |      |                           |                    |                 |                  |
|                     | Transporting (from field to house)            |      |                           |                    |                 |                  |
| Optional            | Chemical spraying                             |      |                           |                    |                 |                  |
|                     | Chemical spraying                             |      |                           |                    |                 |                  |
|                     | Chemical spraying                             |      |                           |                    |                 |                  |
| <b>TOTAL</b>        |   |      |                           |                    |                 | <b>(H)</b>       |



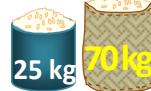



Transfer the total to page 10

## Milling costs (including transportation and handling)

**EXAMPLE**

|       | Unit  | INSTRUCTION | Date                           |            |             |            |    |
|-------|---|-------------|--------------------------------|------------|-------------|------------|----|
|       |   |             | September 15                   | October 23 | December 20 | January 10 |    |
| COSTS | Transport from house to mill (I)               | GH¢         | -                              | 0          | 3           | 3          | 3  |
|       | Labour for loading/unloading (J)               | GH¢         | -                              | 3          | 0           | 3          | 0  |
|       | No. of grawaa or bag used for milled rice (K)  | No.         | $0 + 3 + (4 \times 3) = 15$    | 4          | 5           | 5          | 3  |
|       | Milling charge/grawaa or bag (L)               | GH¢         | -                              | 3          | 3           | 3          | 3  |
|       | Total milling costs   | GH¢         | $(I) + (J) + [(K) \times (L)]$ | 15         | 18          | 21         | 12 |

|       |  |     |                  |     |     |     |     |
|-------|--|-----|------------------|-----|-----|-----|-----|
| SALES | Unit price of milled rice per grawaa or bag (M)  | GH¢ | -                | 48  | 49  | 50  | 49  |
|       | Sales   | GH¢ | $(K) \times (M)$ | 192 | 245 | 250 | 147 |
|       | Size (weight) of grawaa or bag (N)              | kg  | -                | 25  | 25  | 25  | 25  |
|       | Quantity of sold rice                           | kg  | $(K) \times (N)$ | 100 | 125 | 125 | 75  |

$$4 \times 25 = 100$$

Total milling costs per season (GH¢): **66 (O)**

$$15 + 18 + 21 + 12 = 66$$

Transfer the total to page 9

Total sales per season (GH¢): **834 (P)**

$$192 + 245 + 250 + 147 = 834$$

Transfer the total to page 9



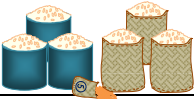

Total quantity of sold rice per season (kg): **425 (Q)**



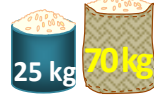

$$100 + 125 + 125 + 75 = 425$$

Transfer the total to page 9

## Milling costs (including transportation and handling)

LET'S TRY!

|       | Unit  | INSTRUCTION | Date                           |  |  |  |  |
|-------|---|-------------|--------------------------------|--|--|--|--|
|       |   |             |                                |  |  |  |  |
| COSTS | Transport from house to mill (I)               | GH¢         | -                              |  |  |  |  |
|       | Labour for loading/unloading (J)               | GH¢         | -                              |  |  |  |  |
|       | No. of grawaa or bag used for milled rice (K)  | No.         | -                              |  |  |  |  |
|       | Milling charge/grawaa or bag (L)               | GH¢         | -                              |  |  |  |  |
|       | Total milling costs   | GH¢         | $(I) + (J) + [(K) \times (L)]$ |  |  |  |  |

|       |  |     |                  |  |  |  |  |
|-------|--|-----|------------------|--|--|--|--|
| SALES | Unit price of milled rice per grawaa or bag (M)  | GH¢ | -                |  |  |  |  |
|       | Sales   | GH¢ | $(K) \times (M)$ |  |  |  |  |
|       | Size (weight) of grawaa or bag (N)              | kg  | -                |  |  |  |  |
|       | Quantity of sold rice                           | kg  | $(K) \times (N)$ |  |  |  |  |

Total milling costs per season (GH¢): \_\_\_\_\_ (O)

Transfer the total to page 10

Total sales per season (GH¢): \_\_\_\_\_ (P)





Transfer the total to page 10

Total quantity of sold rice per season (kg): \_\_\_\_\_ (Q)

Transfer the total to page 10

## Total costs/sales and profit or loss

Unit: GH¢

|                            |  | INSTRUCTION           | EXAMPLE |
|----------------------------|--|-----------------------|---------|
| COSTS                      | Land hiring cost (A)                | See page 2            | 100     |
|                            | Material costs (E)                  | See page 3            | 167     |
|                            | Labour costs (H)                    | See page 5            | 237     |
|                            | Total milling costs per season (O)  | See page 7            | 66      |
|                            | Total costs (R)  | (A) + (E) + (H) + (O) | 560     |
| Total sales per season (P) |  | See page 7            | 834     |
| Profit or loss             |  | (P) – (R)             | 274     |

$$100 + 167 + 237 + 66 = 560$$

$$834 - 560 = 274$$

## Total production (supplementary record)

|                                    | Unit | INSTRUCTION | EXAMPLE |
|------------------------------------|------|-------------|---------|
| Size of bag (S)                    | kg   |             | 84      |
| Total number of bags harvested (T) | -    | -           | 9       |
| Total production                   | kg   | (S) x (T)   | 756     |

$$84 \times 9 = 756$$

Compare quantity of sold rice, consumed rice and rice given as gift, plus quantity of seeds in stock.





## Use of milled rice (supplementary record)

|                                    | Unit | INSTRUCTION | EXAMPLE |
|------------------------------------|------|-------------|---------|
| Total quantity of sold rice (Q)    | kg   | See page 7  | 425     |
| Quantity consumed (milled rice)    | kg   | -           | 20      |
| Quantity for gift (milled rice)    | kg   | -           | 10      |
| Quantity of seeds in stock (paddy) | kg   | -           | 6       |



### Total costs/sales and profit or loss

Unit: GH¢

|                            |  | INSTRUCTION             | LET'S TRY! |
|----------------------------|--|-------------------------|------------|
| COSTS                      | Land hiring cost (A)                | See page 2              |            |
|                            | Material costs (D)                  | See page 4              |            |
|                            | Labour costs (G)                    | See page 6              |            |
|                            | Total milling costs per season (O)  | See page 8              |            |
|                            | Total costs (R)  | $(A) + (E) + (H) + (O)$ |            |
| Total sales per season (P) |  | See page 8              |            |
| Profit or loss             |  | $(P) - (R)$             |            |

### Total production (supplementary record)

|                                    | Unit | INSTRUCTION      | LET'S TRY! |
|------------------------------------|------|------------------|------------|
| Size of bag (S)                    | kg   |                  |            |
| Total number of bags harvested (T) | -    | -                |            |
| Total production                   | kg   | $(S) \times (T)$ |            |

### Use of milled rice (supplementary record)

|                                    | Unit | INSTRUCTION | LET'S TRY! |
|------------------------------------|------|-------------|------------|
| Total quantity of sold rice (Q)    | kg   | See page 8  |            |
| Quantity consumed (milled rice)    | kg   | -           |            |
| Quantity for gift (milled rice)    | kg   | -           |            |
| Quantity of seeds in stock (paddy) | kg   | -           |            |



**Ministry of Food & Agriculture  
Republic of Ghana**



**Japan International  
Cooperation Agency**

# Farm record keeping sheet / Transplanting method

**EXAMPLE**

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

Farmer's name: \_\_\_\_\_

## MATERIALS



|  |   |                                      |  |
|--|---|--------------------------------------|--|
| <b>Seeds</b><br>                         | <b>Fertilizer</b><br>                     | <b>Chemicals</b><br>                 | <b>Push weeder</b><br>(for one season)<br> |
| GH¢ 12                                   | GH¢ 45                                    | GH¢ 10                               | GH¢ 25                                     |
| <b>Leveler</b><br>(for one season)<br>   | <b>Sickle</b><br>(for one season)<br>     | <b>Hoe</b><br>(for one season)<br>   | <b>Net</b><br>(for one season)<br>         |
| GH¢ 20                                   | GH¢ 2                                     | GH¢ 20                               | GH¢ 15                                     |
| <b>Tarpaulin</b><br>(for one season)<br> | <b>Bambam box</b><br>(for one season)<br> | <b>Sacks</b><br>(for one season)<br> |  |
| GH¢ 45                                   | GH¢ -                                     | GH¢ 6                                | <b>SUB-TOTAL: GH¢ 200</b>                  |

$\frac{GH¢ 18}{3 \text{ seasons}} = GH¢ 6 \text{ per season}$

## LABOUR



(excluding unpaid labour)

|   |                                   |   |   |
|---|-----------------------------------|---|---|
| <b>Bund construction or maintenance</b><br> | <b>Ploughing</b><br>              | <b>Puddling &amp; Leveling</b><br>            | <b>Transplanting or Direct sowing</b><br> |
| GH¢ 50                                      | GH¢ 60                            | GH¢ 47  | GH¢ 30                                    |
| <b>Weeding</b><br>                          | <b>Fertilizer application</b><br> | <b>Bird scaring</b><br>                       | <b>Harvesting</b><br>                     |
| GH¢ 10                                      | GH¢ -                             | GH¢ -   | GH¢ -                                     |
| <b>Threshing &amp; Winnowing</b><br>        | <b>Drying</b><br>                 | <b>Transporting (from field to house)</b><br> | <b>Milling</b><br>                        |
| GH¢ -                                       | GH¢ -                             | GH¢ -   | GH¢ 63                                    |
|   |                                   |   | <b>SUB-TOTAL: GH¢ 260</b>                 |

## Total production

|                              |       |
|------------------------------|-------|
| <b>No. of bags harvested</b> |       |
| 84kg                         | 120kg |
| 9                            | 5     |

## Cost/sales/profit or loss

|                 |                          |                          |                             |
|-----------------|--------------------------|--------------------------|-----------------------------|
| <b>Land</b>     | <b>Total costs (GH¢)</b> | <b>Total sales (GH¢)</b> | <b>Profit or loss (GH¢)</b> |
| Acre: 1/4       | 560                      | 950                      | 390                         |
| Hiring: GH¢ 100 |                          |                          |                             |

$100 + 200 + 260 = 560$

$950 - 560 = 390$

# Farm record keeping sheet / Transplanting method

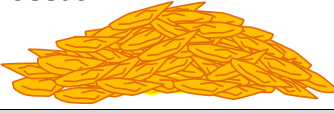
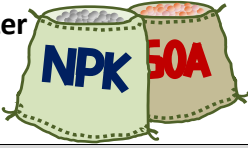








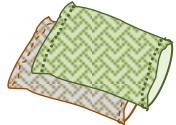
LET'S TRY!

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






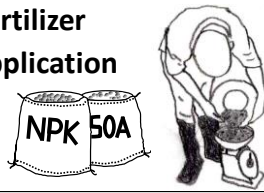






Farmer's name: \_\_\_\_\_

## MATERIALS

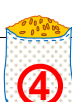



|  |   |   |  |
|--|---|---|--|
| <b>Seeds</b><br><br>GH¢                          | <b>Fertilizer</b><br><br>GH¢                     | <b>Chemicals</b><br><br>GH¢                 | <b>Push weeder</b><br>(for one season)<br><br>GH¢ |
| <b>Leveler</b><br>(for one season)<br><br>GH¢   | <b>Sickle</b><br>(for one season)<br><br>GH¢     | <b>Hoe</b><br>(for one season)<br><br>GH¢   | <b>Net</b><br>(for one season)<br><br>GH¢         |
| <b>Tarpaulin</b><br>(for one season)<br><br>GH¢ | <b>Bambam box</b><br>(for one season)<br><br>GH¢ | <b>Sacks</b><br>(for one season)<br><br>GH¢ | SUB-TOTAL: GH¢   |




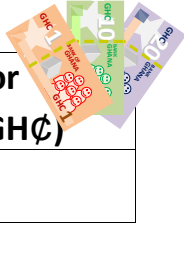
## LABOUR (excluding unpaid labour)

|   |   |  |   |
|---|---|--|---|
| <b>Bund construction or maintenance</b><br><br>GH¢ | <b>Ploughing</b><br><br>GH¢              | <b>Puddling &amp; Leveling</b><br><br>GH¢            | <b>Transplanting or Direct sowing</b><br><br>GH¢ |
| <b>Weeding</b><br><br>GH¢                          | <b>Fertilizer application</b><br><br>GH¢ | <b>Bird scaring</b><br><br>GH¢                       | <b>Harvesting</b><br><br>GH¢                     |
| <b>Threshing &amp; Winnowing</b><br><br>GH¢        | <b>Drying</b><br><br>GH¢                 | <b>Transporting (from field to house)</b><br><br>GH¢ | <b>Milling</b><br><br>GH¢                        |
|   |   |  | SUB-TOTAL: GH¢  |

### Total production

|  |   |
|--|---|
| <b>No. of bags harvested</b>   |   |
| 84kg  | 120kg  |

### Cost/sales/profit or loss

|   |  |   |   |
|---|--|---|---|
| <b>Land</b>   | <b>Total costs</b>   | <b>Total sales</b>  | <b>Profit or loss</b>   |
| Acre:  | (GH¢)  | (GH¢)  | (GH¢)  |
| Hiring: GH¢   |  |   |   |