

**Ministry of Agriculture
The Republic of Sierra Leone**

**Sustainable Rice Production Project
in the Republic of Sierra Leone**

Project Completion Report

**Annex 2:
Guidelines on the Dissemination of
the Technical Package on Rice Production
through Farmer Field School**

July 2022

JAPAN INTERNATIONAL COOPERATION AGENCY

RECS International Inc.

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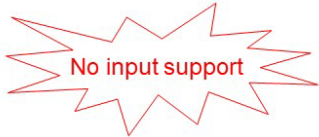
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Introduction: A new approach for the TP-R dissemination

Despite the FFS being the activity in only one season in principle, it has been found rather difficult for the farmers to fully absorb all technical recommendations and master them accurately in a single season when they are learning the techniques for the first time in apprenticeship. The farmers can better understand and be able to "own" the techniques correctly through the continuous application in a larger scale by themselves with additional support and continuous guidance for a few more cropping seasons. The new approach with the additional support after FFS has thus been proposed as depicted in Table 1 below, for effective dissemination of the TP-R while ensuring sustainable adoption of the learned techniques.

Table 1: An approach for dissemination of the TP-R

	Year 1 FFS	(Year 2) (Follow-up FFS)	Year 2 (or 3) (Graduate FBO)	Year 3 (or 4) & onward (Independent FBO)
Technical Support	FFS on the TP-R	<i>FFS on the TP-R</i>	<ul style="list-style-type: none"> • Refresher training and follow-up guidance on the TP-R • Training on seed multiplication techniques 	Follow-up monitoring and guidance on the TP-R application including seed multiplication
Input Support	Farming tools, seed, fertilizer, leveling boards, tarpaulin sheets, rice bags etc. for demo plots	<i>Seed and fertilizer for demo plots</i>	Seed, fertilizer, additional leveling boards for the demonstration farm (maximum of 1 acre)	 No input support
FBOs' Obligations	<ul style="list-style-type: none"> • To attend the FFS to learn the TP-R • To try to apply the TP-R in the members' individual plots 	<ul style="list-style-type: none"> • <i>To attend the FFS to learn the TP-R</i> • <i>To apply the TP-R in the members' individual plots</i> 	<ul style="list-style-type: none"> • To cultivate rice by applying the TP-R in demonstration farm (in their group farm) • To promote application of the TP-R by the members in their individual farms • To disseminate the TP-R to the neighboring FBO 	<ul style="list-style-type: none"> • To continue applying and demonstrating the TP-R in the group farm • To facilitate the members to apply the TP-R in their individual farms • To continue disseminating the TP-R to the neighboring FBO

Source: JICA-SRPP

Farmer Field School:

In the initial year of the intervention, the FBOs will undergo the FFS on the TP-R in accordance with the designated schedule, with a total of 11 sessions to be conducted in a cropping season. The FBOs are to be provided with tools and inputs for the activities in the FFS demonstration plot, while the members will learn the TP-R through the sessions and field activities.

Follow-up FFS

Any FBO who has undergone the FFS but could not obtain the expected result may be given another chance to repeat the FFS in the following season. Input support to those "Follow-up FFS" is limited to the seeds and fertilizer only, as the tools have already been given to them in the initial FFS, while the same guidance in FFS sessions with monitoring as the new FFS are to be provided.

Graduate FBO

Once an FBO graduated from the FFS, the FBO is expected to be a showcase by exhibiting the benefits obtained from adopting the TP-R and playing a vital role in disseminating the TP-R to the other farmers. The "Graduate FBOs" are to apply the TP-R in the demonstration farm established in their group farm on a larger scale than the FFS demo plot to produce more rice and multiply rice seeds for the following seasons. Their demo farms will serve as the field to transfer the TP-R to other FBO farmers (Farmer-to-Farmer dissemination). The "Graduate FBOs" will be provided with necessary technical and materials support, including refresher training with seed multiplication techniques, rice seed, fertilizer, and monitoring with technical guidance throughout the cropping season. Also, season-end review meetings will be held with the Graduate FBOs at the end of the cropping season. The FBO farmers will formulate the plan to continuously apply the TP-R by using the seed obtained from the seed multiplication plot as well as a part of the proceeds from the demo farm that will be sold to acquire the fertilizer for the coming season.

Independent FBO

Further, the FBOs supported as the Graduate FBOs in the previous season will become the "Independent FBOs". In accordance with the plan to sustainably apply the TP-R, they will continue cultivating rice with the TP-R, while securing the seeds and fertilizer by themselves. The rice cultivation activities in the TP-R demo farms and the seed multiplication plots will still be monitored on a regular basis, and technical guidance will be provided whenever needs arise.

Through these step-by-step processes from the initial FFS, an FBO can evolve into an independent FBO, who has already acquired technical proficiency on the TP-R and been enabled to obtain the inputs required for the TP-R application in a sustainable manner. This approach also includes a mechanism of farmer-to-farmer dissemination, which will contribute to the wider dissemination of the TP-R than trying to cover more FBOs only with new FFS. It is obvious that farmers can be convinced more by observing the techniques adopted and the benefits realized by other farmers, rather than trying any new technique by themselves without experience.

PART I: Farmer Field School (FFS) on the TP-R

The guidelines are meant for the FFS on the TP-R in the rainy season cropping and composed of the following two parts, i.e., Part I on the Farmer Field School (FFS) on the TP-R, and Part II on the continuous support for the Graduate FBOs and Independent FBOs. Both parts describe in detail the contents of the support, modalities and procedures of implementation, and cautions to take. Part I of the guidelines is devoted to describe what are to be done for and during the FFS on the TP-R, from the preparatory stage throughout the implementation stage.

1. Preparatory Activities

Before starting an FFS, a series of preparatory activities are to be conducted to ensure smooth and effective implementation of the FFS, as described below. These activities will foster the preparedness among the FBO farmers and minimize the risk of any possible challenge in implementation of the FFS.

1-1. FFS site selection

The TP-R is the standard package of rice cultivation in the IVS environment of Sierra Leone. However, it is essential to carefully select the IVS and the FBO to implement the FFS with, to ensure that the demonstrated techniques will bring about the expected results, thus that the farmers can clearly understand the benefit of application of recommended techniques. Following conditions are to be considered as the basic criteria of selecting the FBO;

BOX 1: Criteria for FFS site selection

- (1) Location of the IVS:
Located in upper or middle reach of the catchment, distance between the IVS and the village where the members of the FBO cultivating in the IVS dwell, accessibility even in the peak rainy season, etc.
- (2) Development status of the IVS:
Preferably be a developed IVS where water can be controlled and where there is no fear of flood or inundation even during the peak rainy season
- (3) Water regime of the IVS:
Water availability in the IVS preferably for more than 9 months a year, the area not marshy or poorly drained, etc.
- (4) Topography and soils:
The width of the IVS at least 30 meters, the soils not be dominantly of organic or coarse sand, homogeneous soil texture and depth, etc.
- (5) Qualification of the FBO who utilizes the IVS for rice cultivation
 - The FBO has its group farm in the IVS where they cultivate rice (the land of the group farm belongs to the FBO as a group, or the leader, or any member of the FBO).
 - The FBO has substantial experience of working as a group (group working day, regular

meetings, group fund, etc.)

- The FBO was established at least 10 years ago.
- The FBO is registered to NaFFSL MAF, and/or District Council.
- The FBO has good reputation for cohesiveness.
- More than half of the members of the FBO are the youths and more than 20% of the members are women.

Site selection may be done through the initial listing and then field investigation by the extension staff. Several candidate sites will initially be selected, the detailed information of each of which will be collected through field investigation, including the detailed breakdown of the criteria above. The sample format of the summary table of information regarding the candidate sites for thorough examination by the authorities concerned is shown below.

Table 2: Summary Table of Candidate FFS Sites

Sl. No. of the candidate site			1	2	3	4	5
Name of the Chiefdom							
Name of the Village							
Name of the IVS site							
Location	Coordinates of the IVS (main drainage)		Latitude: N				
			Longitude: W				
	Distance from the village		Less than 20 minutes' walk Yes / No				
	Accessibility	Accessible in peak rainy season	Yes/No				
Development Status of Swamp	Developed / un-developed						
	Developed	Development body and year	Dev't project / dev't year				
		water can be controlled	Yes / No				
		fear of flood in rainy season	Yes / No				
Undeveloped	flood depth	less than 30cm	Yes / No				
Water regime	No. of months when water is available		Number				
	Seepage water stops in dry season		Yes / No				
	Drainage condition		Good / Poor				
Land area	Size of IVS		ha/acre/bu				
Land use	Crops in rainy season	Crops	Main rice variety				
		Cropping calendar	month of sowing - month of harvest				
	Crops in dry season	Crops	Main crops: (identify the variety in case of rice)				
		Cropping calendar	month of sowing - month of harvest				
Topography/soils	Location of IVS: Upper / middle / down stream of the catchment		Upper / Middle / Down				
	Width of IVS in meters		Number				
	Topogra-phy of IVS		Sloping / flat				
	Organic soils		Yes / No				
	Coarse sandy soils		Yes / No				
Homogeneous soils		Yes / No					
Information on FBOs	Name of FBO		Name				
	Group farm		Yes / No				
	Ownership of group farm		FBO (or its member)/ Other (landlord)				
	Frequency of group work per week		none / once / twice / more than twice				
	Year of establishment		Year				
	Regular meeting		Yes/No (times/ month)				
	Group fund		Yes/ No				
	Registration to NaFFSL		Yes / No				
	Registration to MAF		Yes / No				
	Good reputation for cohesiveness		Yes / No				
	No. of FBO members		Number				
	No. of youth members		Number				
	No.of female members		Number				
	Conflict / dispute among the members		Yes / No				
Conflict / dispute with others		Yes / No					

1-2. Explanatory meeting

Once the FFS sites are identified, an explanatory meeting with each of the selected FBOs will be organized. Not only the leaders of the FBOs but also the members who will participate in the FFS should attend this meeting where the terms and conditions of the support, responsibility of extension staff, and the obligations of the FBO farmers will be explained in accordance with the Memorandum of Understanding (MOU) to be signed by the concerned parties including the FBO representative as described in the section 1-3 below. It is very important to clarify in the meeting what will be and what will NOT be provided to the FBOs during the implementation of the FFS, to level off the over-expectation and avoid future complains. At this meeting, the day of the groups work for the FFS sessions will also be agreed upon to confirm the schedule of the first day of the session to commence the FFS.

During this explanatory meeting, it is also essential to request the FBO to discuss and agree among themselves on the rules to be applied regarding the attendance to the FFS sessions and the group work in the demonstration plot, as it has often been a problem once the activities would be carried out.

After discussions on the main agenda, it is also necessary for the FBO to identify a specific location in their group farm in the IV where the FFS demonstration plot will be established. The conditions of the demonstration plot will be explained and the investigation by the FFS facilitator together with the FBO members may possibly be conducted after the meeting.

The standard agenda for the explanatory meeting is as follows:

<p style="text-align: center;">Box 2: Agenda for the explanatory meetings in preparation for the FFS</p> <ol style="list-style-type: none">1. Silent prayer2. Introduction3. Announcement of the selection of the FBO for the FFS4. Explanation of the terms and conditions5. Explanation of the provision for the FBO6. Explanation of the roles and responsibilities of all concerned parties7. Explanation of the MOU and Agreement to be signed8. Discussion on the commencement of the FFS session9. Explanation of the conditions of FFS demonstration plot10. Site visit for investigation of candidate site of the FFS demonstration plot

1-3. Signing of MOU and provision of tools and inputs

As mentioned in 1-2 above, a Memorandum of Understanding (MOU) should be signed between the FBO and the extension authorities prior to the commencement of the FFS. The MOU clearly stipulates all the requirements, provisions for the FFS, roles to be played and responsibilities to be borne by extension staff and the FBO farmers, and other points of concerns.

The selected FBO will be provided with a set of farm tools and inputs such as seed and fertilizer to effectively carry out the farming activities in the FFS demonstration plot. Since the farm tools will be the property of the FBO, an agreement on the tools provided, in addition to the MOU on the support to the FBO for the FFS above, should also be prepared and signed by the concerned parties to ensure that those tools will properly be maintained and utilized for FFS as well as for any group activities in future.

A sample MOU and agreement on the tools are shown in the Boxes 3 and 4 below.

After signing these documents, a set of basic farm tools will be distributed to each FBO before the first session of FFS. On the other hand, the inputs such as seed and fertilizer as well as some additional tools or gadgets will later be provided just before the sessions when respective inputs and gadgets are required to avoid unexpected breakage or loss before the time to use them.

Box 3: Sample format of the MOU on the support to the FBO with FFS on the TP-R



MEMORANDUM OF UNDERSTANDING
ON THE SUPPORT TO FARMER BASED ORGANIZATION
BETWEEN
(Name of the FBO)
AND
MINISTRY OF AGRICULTURE AND FORESTRY (MAF)

This Memorandum of Understanding is made to clarify the role of each of the concerned parties regarding the support to the FBO *(name of the FBO)* (hereinafter referred to as "the FBO") in *(name of the village)* Village, Block *(block number)*, *(name of the district)* District.

1. Objective

The Farmer Field School (FFS) on the Technical Package of Rice Production (TP-R) aims to disseminate the improved techniques and recommendations of rice production to the FBO farmers cultivating rice in Inland Valley Swamps (IVS) in *(name of the district)* Districts.

2. Position of the FBOs supported

The FBOs supported by this programme are those who are expected to be a showcase for other FBOs as well as for extension staff to exhibit the effect of the TP-R and to play a vital role in disseminating knowledge and techniques of the TP-R among farmers in the future.

3. Duration of support

The support of MAF (through input supply with technical guidance) to the FBO for the FFS under this Agreement will last till the end of the rainy season in *(year of FFS implementation)*.

4. Roles of each party concerned

4.1 The member farmers of the FBO are to:

- (1) Set the demonstration plot for FFS in the FBO's group farm to cultivate rice using the TP-R (with clear agreement with the landowner on the payment after harvesting if the land is rented) ,
- (2) Participate in all the FFS sessions regularly conducted by MAF extension staff to learn the TP-R in the rainy season *(year of FFS implementation)*, the attendance of which shall duly be recorded by the executive members of the FBO,

- (3) Discuss and establish the rules among the members regarding the penalty for the absence in the group work to be conducted for the FFS demonstration plots,
- (4) Maintain the demonstration plot in good conditions to be able to control and manage water so that the TP-R can realize its maximum effect, the proceeds of which shall be the property of the FBO,
- (5) Apply the techniques of the TP-R learned through the FFS to the individual farms, and,
- (6) Allow MAF extension staff to take photographs and/or videos of the FBO members during the FFS activities and to use them for the purposes of further dissemination of the TP-R, reporting and public relations.

4.2 MAF is to:

- (1) Procure and provide fertilizer and seed rice to the FBO farmers,
- (2) Implement FFS sessions regularly to disseminate the key techniques of the TP-R to the FBO farmers,
- (3) Make regular visits to the FBO's rice field in IVS to monitor the growth of rice as well as the farming activities, and provide necessary advice on rice production throughout the cropping season, and,
- (4) Conduct yield survey at harvest time.

Following the above terms and conditions, I endorse my signature below in conformity to this Memorandum.

Name
Group Head
The FBO
Date:

(name of the FFS Facilitator)
FFS Facilitator
MAF- *(name of the district)* District
Date:

(name of the BES)
BES, MAF- *(name of the district)* District
Date:

(name of the DAO)
District Agricultural Officer
MAF- *(name of the district)* District
Date:

Box 4: Sample format of the Agreement on the tools to be provided to the FBO



Sierra Leone Government - Ministry of Agriculture and Forestry (MAF)

Date -----, (*name of the district*) District

**AGREEMENT ON THE FARMING TOOLS PROVIDED FOR
FARMER FIELD SCHOOL (FFS)**

I, (*Name of the FBO representative*) with Phone no (*telephone number*) as the Head of FBO, named (*Name of the FBO*), in (*Name of the Village*), in Block (*block number*), on behalf of the members of my FBO, have today collected the (*number of farm tool set*) sets of farming tools, comprised of (*items of farm tools, e.g. large hoes, harvesting knives, cutlasses, head pans and shovels*), for cultivation of demonstration plot to be established in the FBO's group farm for Farmer Field School (FFS) under the following terms and conditions:

1. Our FBO is responsible, with the support of MAF (*Name of the district*), to establish and well maintain the demonstration plots for FFS in our group farm using the farming tools,
2. Our FBO is responsible for keeping these tools in good conditions as the properties of the group, and will ensure internal arrangement to replace the tools in case of losses and damages thereof;
3. The executive members of our FBO are responsible to ensure that the tools are always available for the group work of FFS and other activities of the group, and,
4. The members of the FBO will implement the TP-R in the demonstration plot as well as in the individual farms and disseminate its recommended practices to other farmers and the neighboring FBOs as well.

Following the above terms and conditions, I endorse my signature below in conformity to this statement.

Signed

(*Name of the FBO Representative*)
FBO Group Head

Confirmed by signature

(*Name of the FFS Facilitator*)
FFS Facilitator
MAF (*Name of the District*)

Witnessed by Signature

(*Name of the BES*)
Block Extension Supervisor
MAF (*Name of the District*)

Approved by Signature

(*Name of the DAO*)
District Agriculture Officer
MAF (*Name of the District*)

2. Implementation and Monitoring of the FFS

2-1. Schedule and contents of the FFS sessions

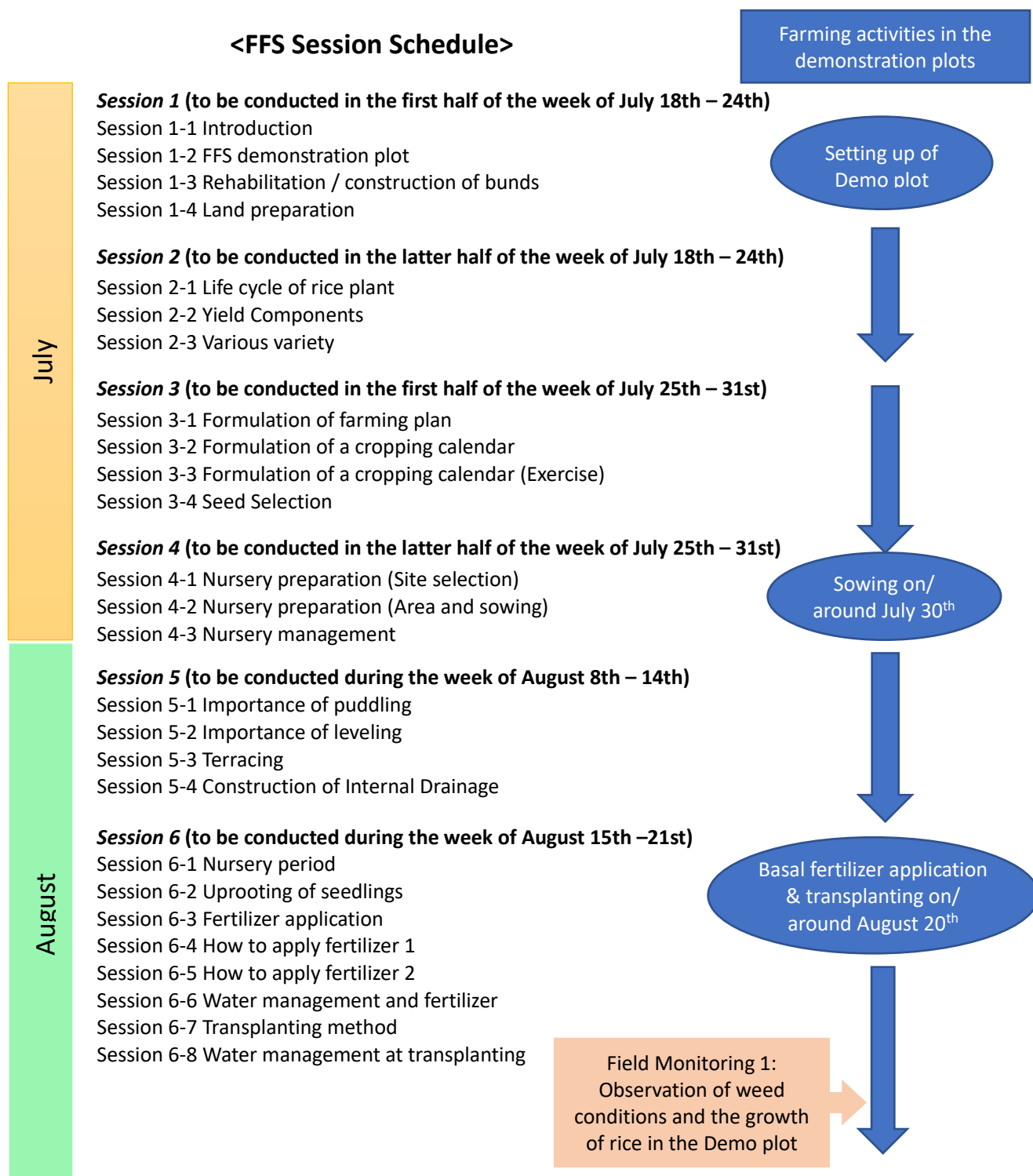
The FFS on the TP-R is composed of 11 sessions, each of which covers specific topics and techniques along with the cropping calendar. The session schedules are set to carry out various farming activities at specific and the most appropriate timing to maximize the growth of rice plants, hence the yield performance. The first session should be organized at about three (3) weeks prior to the expected date of sowing, followed by the subsequent sessions, which are conducted with some intervals. The contents and timing of each session is shown in Table 2 below.

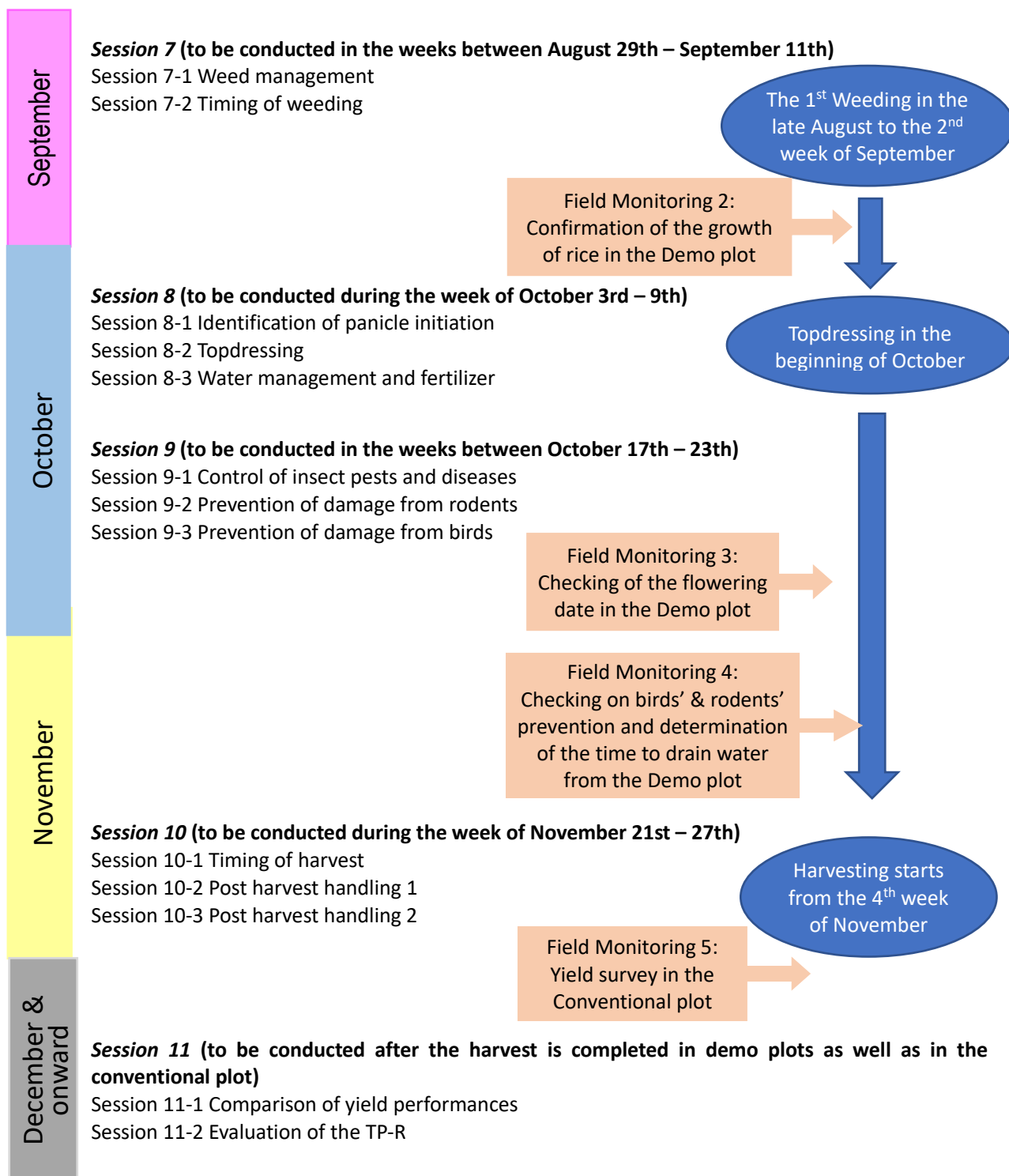
Table 3: Schedule and contents of the FFS sessions

Session	Topics to be covered in the session	Schedule
1	Session 1-1 Introduction Session 1-2 FFS demonstration plot Session 1-3 Rehabilitation / construction of bunds Session 1-4 Land preparation	To be conducted three (3) weeks before planned date of sowing
2	Session 2-1 Life cycle of rice plant Session 2-2 Yield Components Session 2-3 Various variety	To be conducted in the following week of Session 1
3	Session 3-1 Formulation of farming plan Session 3-2 Formulation of a cropping calendar Session 3-3 Formulation of a cropping calendar (Exercise) Session 3-4 Seed Selection	To be conducted in the following week of Session 2
4	Session 4-1 Nursery preparation (Site selection) Session 4-2 Nursery preparation (Area and sowing) Session 4-3 Nursery management	To be conducted in the following week of Session 3
5	Session 5-1 Importance of puddling Session 5-2 Importance of leveling Session 5-3 Terracing Session 5-4 Construction of Internal Drainage	To be conducted after 1 week interval from Session 4
6	Session 6-1 Nursery period Session 6-2 Uprooting of seedlings Session 6-3 Fertilizer application Session 6-4 How to apply fertilizer 1 Session 6-5 How to apply fertilizer 2 Session 6-6 Water management and fertilizer Session 6-7 Transplanting method Session 6-8 Water management at transplanting	To be conducted in the following week of Session 5
7	Session 7-1 Weed management Session 7-2 Timing of weeding	To be conducted after 1-2 weeks interval from Session 6 (judging from the emergence of weeds)
8	Session 8-1 Identification of panicle initiation Session 8-2 Topdressing Session 8-3 Water management and fertilizer	To be conducted after 3 weeks interval from Session 7 (at panicle identification)
9	Session 9-1 Control of insect pests and diseases Session 9-2 Prevention of damage from rodents Session 9-3 Prevention of damage from birds	To be conducted after 2-3 weeks interval from Session 8

10	Session 10-1 Timing of harvest Session 10-2 Post harvest handling 1 Session 10-3 Post harvest handling 2	To be conducted after 2-3 weeks interval from Session 9 (at optimal timing for harvesting)
11	Session 11-1 Comparison of yield performances Session 11-2 Evaluation of the TP-R	To be conducted after the harvesting in all plots are completed

A Sample schedule of sessions with field monitoring activities (the sample for the Rainy Season in 2021) is shown in the following.





2-2. Implementation and monitoring of FFS on the TP-R

(1) Basic understanding

a. Composition of the FFS sessions:

FFS sessions consist of plenary session and field work. In the former, the FFS facilitators explain the TP-R recommendations and discuss with farmers, and the latter will be carried out in the demo plot established in the FBO's group farm.

b. Venue of the FFS sessions:

The FFS sessions are to be organized in a shed where farmers can get together, which will be set up near the demo plot in the IVS. The demo plot should be set up in a part of the FBO's group farm, which will be divided into two sub-plots, i.e., the plot with the application of fertilizer and without. Another plot where the farmers apply their conventional practices should also be delineated and closely monitored together with the demo plot, so that the farmers compare the performance at the end of the cropping season.

c. Preliminary arrangement:

A few days before each session, the FFS facilitators should contact the leaders of the FBO to remind the schedule and time of session, as well as to request them to inform the members to ensure their attendance on time. If any farm tools are needed in the session, it is necessary to specify the tools and request the leaders to make them available on site on the day of the session.

The facilitators should review the contents of the session to be conducted, referring to the extension materials and the prototype flow of activities. The extension materials to be used in the respective session will be reconfirmed and made ready to bring to the session. The facilitators should also prepare necessary tools and input items, if any, to be brought to the session.

d. General tips for facilitation

- From the second session, the facilitators should always start with the review of the previous session to discuss what the farmers had learnt, especially when there are some intervals between the sessions.
- Facilitators should NOT explain what to do ONLY. Explanation of the REASON WHY it should be done is more important for the farmers to understand.
- When demonstrating any technique, facilitators should explain and do it first. When the facilitators demonstrate the technique, not only good examples but also bad examples should be shown to the farmers as comparison and make sure the farmers understand the right way. After that, some farmers will be asked to practice the technique and the other farmers will tell if the way that farmer did was correct or not.
- Facilitators should NOT PREACH or LECTURE only. The sessions should be conducted in a participatory manner, asking farmers to express their experience and/or opinions.

(2) How to conduct the FFS sessions

Each session of the FFS deals with specific topics as explained in 2-1 above. The facilitators are to follow the prototype flow of activities in each session, which summarizes the suggested time allocation, methodology, what to do, and the cautions to take. In the sessions, the extension materials on the TP-R are to be shown to the FBO farmers while explaining the important messages on each topic.

The prototype flow of activities and the extension materials to be used in the FFS sessions are presented below.

Prototype Flow of Activities in FFS Session 1

Tools & materials prepared (brought to the FBO or arranged to be available on site)

a) Extension Material on the TP-R 1-1, 1-2, 1-3, and 1-4

b) Flipchart & markers

c) Farm tools to work in the plot

Time	Topic	Methodology	Contents	What to do and cautions to be made
0900 – 0930	General Introduction	Plenary discussion	<ul style="list-style-type: none"> - Mutual introduction of the extension staff and FBO members - Explanation on the FFS and role of FBO 	<ul style="list-style-type: none"> - In explanation of FFS, also agree to set up shed for the session and select some members to take lead in the FFS
0930 – 1000	Introduction to FFS	Plenary discussion using Material 1-1	<ul style="list-style-type: none"> - Objectives of the FFS - Overall schedule of FFS in rainy season 2019 	<ul style="list-style-type: none"> - Emphasize the importance of attendance of FBO members in ALL sessions - Confirm the days of the FBO's group work
1000 – 1030	Explanation on the Demo Plot	Plenary discussion using Material 1-2	<ul style="list-style-type: none"> - Purpose of setting up a demo plot for FFS - Site selection for demo plot - Size of demo plot (discuss and agree) 	<ul style="list-style-type: none"> - Emphasize that the FBO members are expected to learn the techniques at FFS demo plot and also use them in their individual farms. - Demo plot is divided into two sub-plots, i.e. TP-R with fertilizer and TP-R without fertilizer. Another plot adjacent to the demo plot where farmers' conventional techniques are practiced should also be delineated as "conventional plot" for comparison.
1030 – 1100	Construction / rehabilitation of bunds	Explanation using Material 1-3	<ul style="list-style-type: none"> - Importance of water management as key factor for the TP-R to be effective 	<ul style="list-style-type: none"> - Emphasize the importance of water management as essential factor for the TP-R to take effects. - Explain the proper way of construction / rehabilitation of bunds
1030 – 1100	Explanation on the Land Preparation	Explanation using Material 1-4	<ul style="list-style-type: none"> - Importance of proper land preparation - Importance of early land preparation 	
1100 – 1300	Establishment of the Demo Plot with brushing, clearing and digging in the FBO farm	Group work in the FBO Farm	<ul style="list-style-type: none"> - Demonstration in the FBO's Group Farm - FBO members work to do brushing, clearing and digging 	<ul style="list-style-type: none"> - Try to complete all three activities in the Demo Plot. If time does not allow, let the members work on a part of the plot to be able to learn proper way of doing all three activities.
1300 – 1330	Wrap up & Way Forward	Plenary discussion	<ul style="list-style-type: none"> - Review the important points of the Session 1 - Confirmation of the schedule of next FFS session and work to be done by the FBO until next session 	<ul style="list-style-type: none"> - Ask if the farmers would try the land preparation as they have learnt in their individual farms and record in the FFS report. - If the entire work in the demo plot has not finished, confirm that they have to finish up to digging until next session. - At the end of the session, extend appreciation for active participation in the very first FFS session, and encourage them to continue.

Cautions to be made in facilitating Session 1:

- When farmers ask for provisions which ARE NOT included in the programme, such as Food for Work or inputs for individual members, the facilitators should ask if the person who raises such question or comment has attended the Explanatory Meeting where all the provision and responsibilities of stakeholders were explained. Also, **ask the FBO leaders to explain what was agreed in the MOU to the members** of the FBO. (Facilitators should not be the one to explain first. If the explanation of the leaders is not sufficient, facilitators should augment.)
- If the land preparation in the demo plot could not be finished on the day of the session, the facilitators should **discuss and agree on the date when farmers will continue and complete the work** before Session 2. (Or make agreement that the work will be completed on the day of Session 2 after classroom discussion, since there is no field work to be done in Session 2.)

Extension Material on Technical Package on Rice Production



Sustainable Rice Production Project in Sierra Leone (JICA-MOA)

July 2022

1-1

Session 1-1 Introduction

Important messages:

- 1) The farmer field school (FFS) provides the farmers with an opportunity to learn how to obtain higher yields and profit with the use of improved farming techniques.
- 2) This FFS is organized so that farmers can learn the Technical Package on Rice Production (TP-R) developed by JICA. The FFS consists of 11 sessions which will be conducted throughout this cropping season. In each session, the farmers are the main players while MAF and extension workers are the facilitators.

How to facilitate the session

1) General introduction to the FFS on the TP-R

- Tell the farmers about the objectives of the FFS, which provides an opportunity for the farmers to discuss issues on their agricultural activities among them to find out the solution to overcome the issues through field observation, consultation, and trials.
- Explain to the farmers that the farmers will learn the Technical Package on Rice Production (TP-R) developed by JICA. It has been proven that the package can attain a yield of 3.0 ton/ha (48 bushels/acre) if recommended techniques including application of fertilizer are properly applied. Also, explain briefly about three yield components.
- Emphasize that FFS is a practical learning process thus farmers' participation in all sessions is very important.

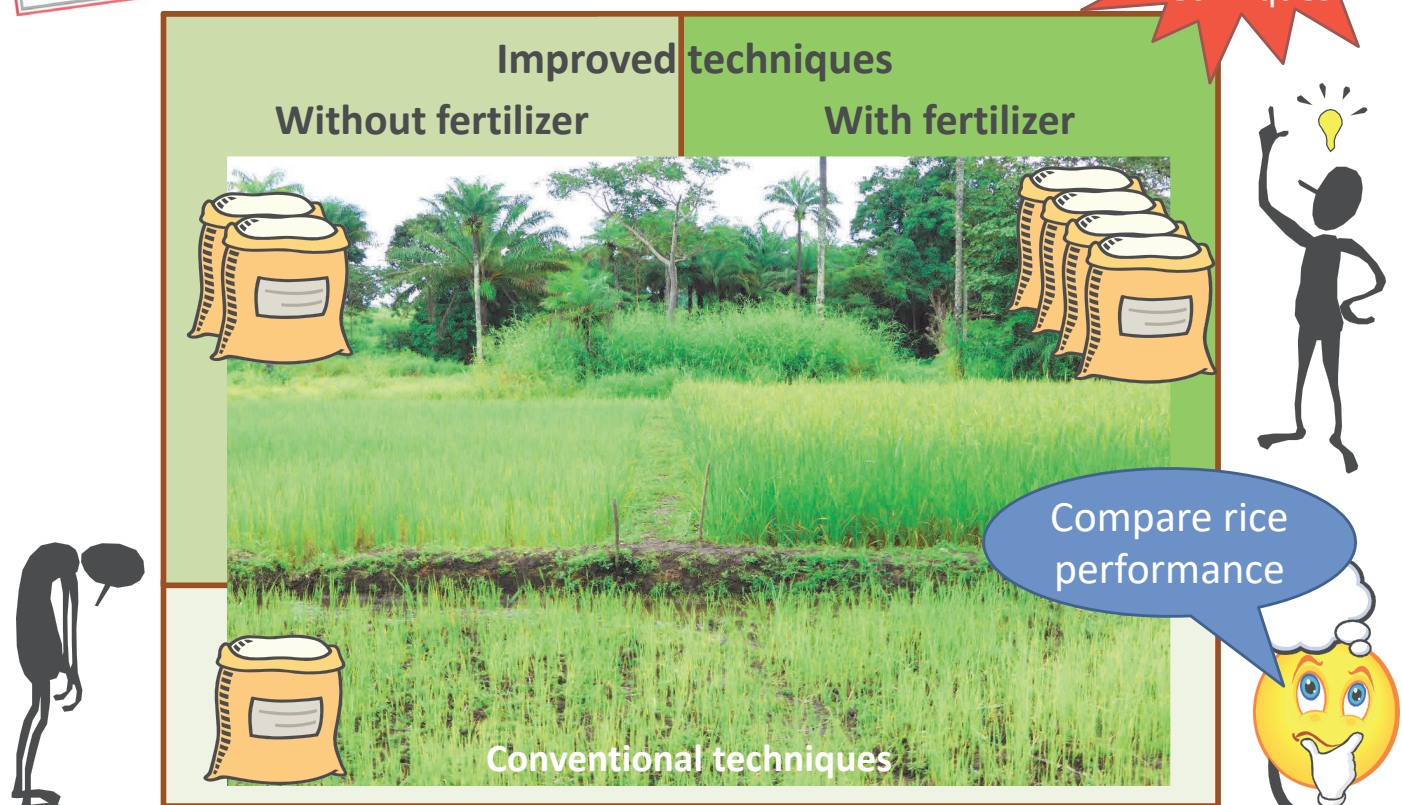
2) Schedule of FFS

- Show the farmers the overall schedule of an FFS and the subject in each session as follows:
 1. Introduction, setting of the demonstration plot, and land preparation
 2. Yield components, the life cycle of the rice plant, and various variety
 3. Formulation of a farming plan and cropping calendar, and seed selection
 4. Nursery preparation
 5. Construction of bunds, puddling, and leveling
 6. Fertilizer application and transplanting
 7. Weed management
 8. Topdressing and water management
 9. Prevention of pest and diseases, and damage from rodents and birds
 10. Harvesting and post-harvest handling
 11. Evaluation of TP-R

- Also explain that the FFS sessions will be held on the days of their group work.

FFS Demonstration Plot

New Techniques



1-2

Session 1-2 FFS Demonstration Plot

Important message:

- 1) The FFS demonstration plot provides the farmers with opportunities to verify the value of new technologies on rice production.
- 2) New technologies should be adopted when their effectiveness or values are proven in the plot.
- 3) In establishing the FFS demonstration plot, homogenous land in terms of topography, soil, and water conditions should be selected.
- 4) The FFS demonstration plot consists of 2 sub-plots: the TP-R with fertilizer and the TP-R without fertilizer. A conventional plot where farmers' traditional rice farming is practiced is also selected for comparison.

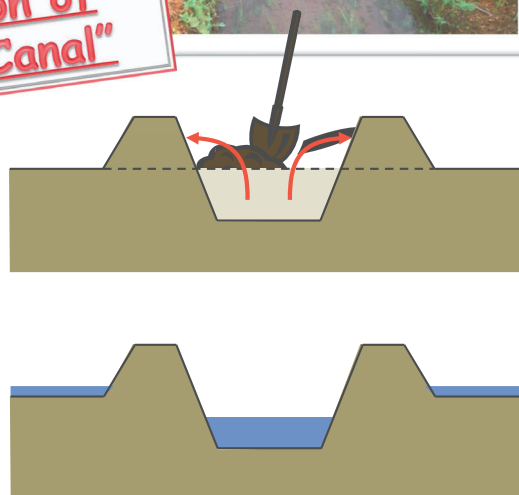
How to facilitate the session:

- 1) Introduction of the FFS demonstration plot
 - Tell the farmers that extension workers are going to introduce a set of new farming techniques based on the TP-R, which will contribute to a higher rice yield.
 - However, the farmers may hesitate to adopt all the new techniques without seeing their effectiveness because they may have ideas on other farming practices or techniques that they want to try.
 - Therefore it is proposed to the farmers in this FFS to prepare a plot (FFS demonstration plot) to try those new farming practices or techniques to see their effectiveness.
 - Explain to the farmers that they will implement new techniques learned from FFS at this demonstration plot.
- 2) Selection of appropriate site for FFS demonstration plot
 - Select the site suitable for the FFS demonstration plot (demo plot) with the farmers. The FFS demonstration plot should be within or nearby the FBO group farm for all the member farmers to be able to observe the plots.
 - FFS demonstration plots should be as homogeneous as possible in topography, soil, water condition.
- 3) Establishment of FFS demonstration plot
 - FFS demo plot has two sub-plots: one for the TP-R with fertilizer, another for the TP-R without fertilizer. Another area adjacent to the demo plot with conventional practices is to be delineated for comparison.
 - The standard size of the FFS demonstration plot is 1,000 m², which is divided into 2 sub-plots of 500 m² (20 m by 25 m) each, but the size and shape may be adjusted depending on site conditions. (Respect the existing bunds in case of developed swamps, while assuring that the two sub-plots should clearly be divided by a strong bund in-between. It is also essential to set the demo plot with fertilizer in the downstream and the plot without fertilizer in the upstream in order to ensure that the fertilizer applied in the sub-plot with fertilizer should not affect the plot without fertilizer, even in case of flooding.)
 - Visit the site for the FFS demonstration plot and confirm that its condition is suitable for the purpose. If the site condition is acceptable, set up the plot using measuring tapes and sticks.

Tools and materials to be prepared: poles, measuring tapes (2), pegs (many)



Construction of "Drainage Canal"



1-3

Session 1-3 Construction / Rehabilitation of Bunds

Important messages:

- 1) Water control is a key to promote rice growth. Without water control, iron toxicity cannot be avoided, or fertilizer utilization by rice plants cannot be enhanced.
- 2) Paddy fields should be divided into plots by bunds so that water can be settled.

How to facilitate the session

- 1) Introduction
 - Ask the farmers about the present water condition of their lowland rice fields: for example, surface water (running or stagnant), water depth (high and low), shortage of water, presence of water seepage, etc.
 - Ask the farmers if they have iron toxicity in their fields. If they do, ask them to describe its symptoms (where they are observed and how they look).
 - Tell the farmers that they can reduce their iron toxicity problems by making drainage ditches in the plot and by making raised beds on which rice is planted.
 - Tell the farmers that water control is an important farming practice for the healthy growth of rice plants.
- 2) Importance of bunds
 - To make water conditions uniform and stable, bund construction is recommended. The plot surrounded by bund and leveled in soil surface is preferable.
- 3) Methods of constructing bunds
 - Explain to the farmers the following points;
 - A bund is a small earth dike constructed around a rice field or in the field to divide it into plots. They keep water in the field (or the plots) for a while to prevent nutrients of fertilizer from escaping with water from the field.
 - The standard size of the bunds is about 20cm in height and 50 cm in width, although it can be adjusted depending on the site conditions.
 - Earth of the bunds should be compacted to be strong enough to sustain the structure even if people walk on the bunds and to prevent the water in the field from escaping through horizontal seepage.
 - Division of the plots by bunds should be made so that each of the plots is leveled to keep water level uniform assuring the uniform growth of rice plants.
 - A simple inlet and outlet should be established to draw in or drain out water.



Brushing, Clearing & Digging



1-4

Session 1-4 Land Preparation (Brushing, Cleaning and Digging)

Important messages:

- 1) Brushing, clearing, and digging are to eliminate obstacles (weeds including roots) against rice seedlings when they are transplanted.
- 2) Brushed materials should be collected and brought out of the field or dried and burned in the field.
- 3) First digging (correspond to plowing) aims also at turning over and breaking soils and cutting roots of weeds.
- 4) Brushing, clearing, and digging should be finished before nursery preparation.
- 5) Digging should be done as deeply as possible.

How to facilitate the session:

- 1) Introduction
 - Ask the farmers about their land preparation procedure including brushing, clearing, and digging.
 - Ask the farmers when they prepare their fields, before or after sowing in the nursery.
- 2) Brushing, Clearing, and Digging
 - Explain the following points to farmers;
 - Weeds should be brushed just above the ground to remove as much organic matter from the field as possible.
 - Deeper digging (at least 10cm) is recommended to turn over the soil to control weeds by cutting and drying their roots; however, the subsoil should not be exposed.
 - Brushing, clearing, and digging should be finished before sowing in the nursery, not to delay transplanting. Because the nursery period is short (2-3 weeks only) and also there would be other works to be done such as puddling, leveling, and maintenance of bunds and drainage channels, first digging should be finished at the earliest time.
 - Emphasize the following points to farmers while working in the FFS demonstration plot;
 - Leave brushed weeds on the ground to dry for a while until they are lighter and easier to work with
 - Collect dried weeds and take them out of the field or burn them on the ground
 - If the soil of the plot is marshy, do not leave the organic matter in the field as it exacerbates iron toxicity
 - For digging, the use of work oxen may save time and cost

Prototype Flow of Activities in FFS Session 2

Tools & materials prepared (brought to the FBO or arranged to be available on site)

- a) Extension Material on the TP-R 2-1, 2-2, and 2-3
- b) Flipchart & markers
- c) Seed rice of mixed varieties, container, water
- d) Plate, absorbent, water, seed rice

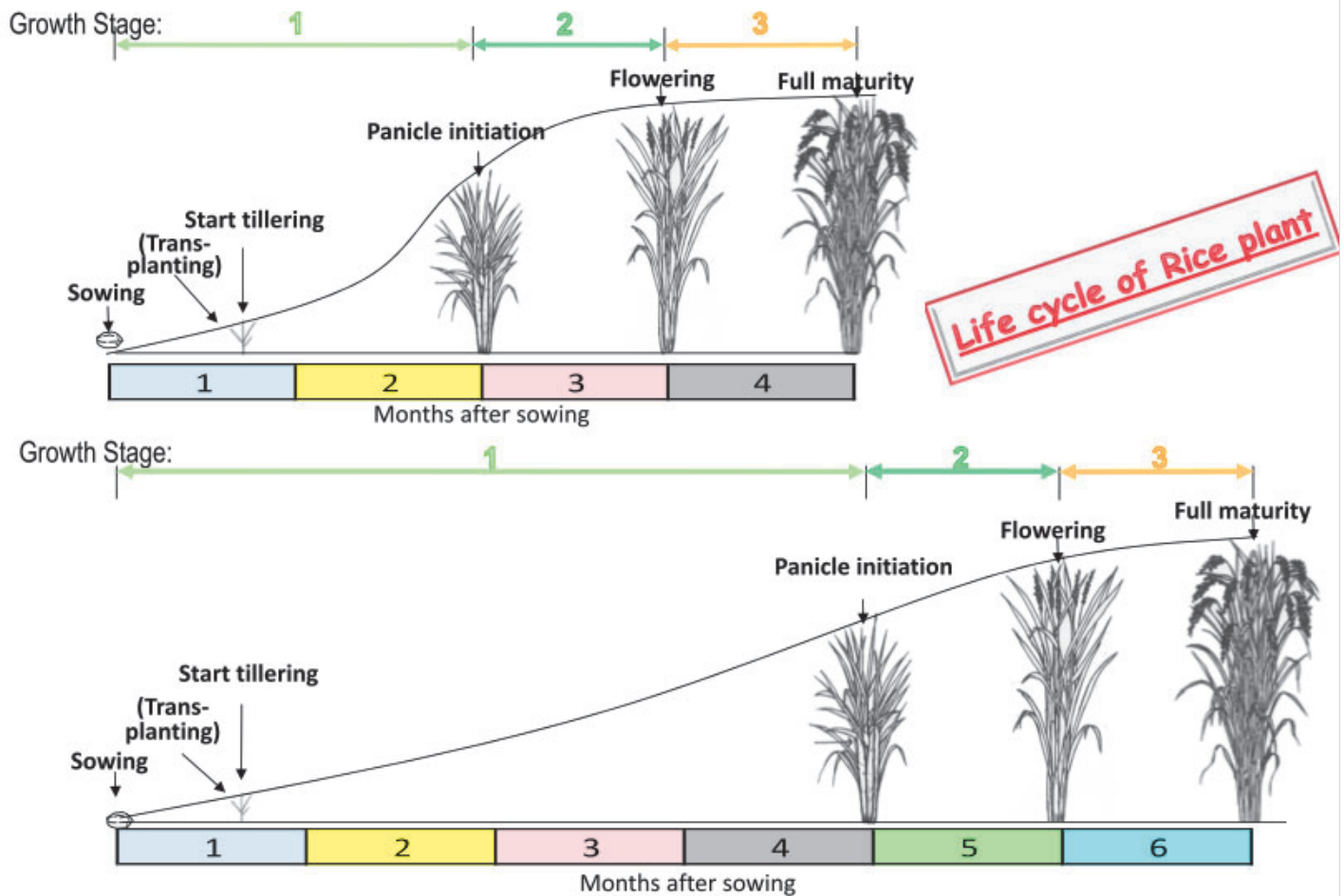
Time	Topic	Methodology	Contents	What to do and cautions to be made
0900 – 0930	Introduction to Session 2	Explanation in plenary meeting	<ul style="list-style-type: none"> - Recapitulation of the previous Session 1 - Confirmation of the work that was to be completed since last session, if any - Introduction of the topics to be covered in the Session 2 	<ul style="list-style-type: none"> - If any due work has not been completed, ask the reason why and decide the time to complete the task within the current week.
0930 – 1000	Life Cycle of Rice Plant	Plenary discussion using Material 2-1	<ul style="list-style-type: none"> - Three stages in the life cycle of rice plant - Determination of growth duration 	<ul style="list-style-type: none"> - Emphasize that the yield components are determined corresponding with the specific stages of the rice growth thus that it is important to plan the activities to be conducted at the right timing.
1000 – 1030		Plenary discussion using Material 2-2	<ul style="list-style-type: none"> - Three yield components - Yield components correspond with the stage of growth of rice plant 	
1030 – 1100	Various Varieties	Plenary discussion using Material 2-3	<ul style="list-style-type: none"> - Different varieties with different characteristics 	<ul style="list-style-type: none"> - Ask the farmers about some locally popular varieties and ask about their growth duration and characteristics.
1200 – 1230	Wrap up & Way Forward	Plenary discussion	<ul style="list-style-type: none"> - Review of the important points of Session 2. - Confirmation of the schedule of next FFS session and work to be done by the FBO until next session. 	

Cautions to be made in facilitating Session 2:

To effectively teach the farmers about seed selection, the facilitators should:

- prepare some seed with admixture of different varieties for sorting exercise
- prepare the germination test materials and **start the germination test at the house of the executive members of the FBO** and ask them to bring it to the session

Technical Package on Rice Production - SRPP



2-1

Session 2-1 Life Cycle of Rice Plant

Important message:

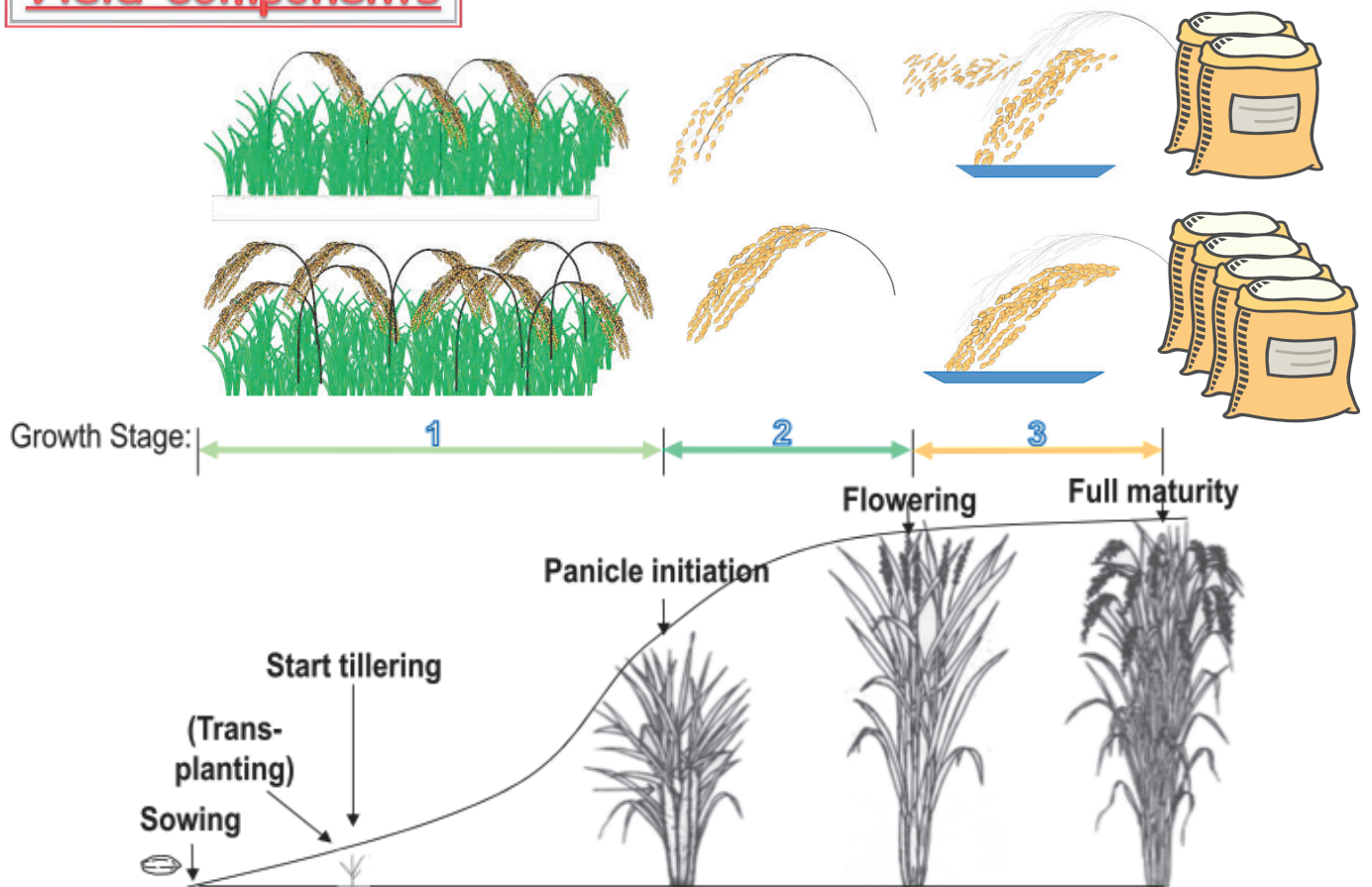
- 1) The entire life of rice plants is broadly divided into three growth stages.
- 2) The first stage (vegetative growth stage) is from sowing to panicle initiation, the second stage (reproductive stage) is from panicle initiation to flowering, and the third stage (ripening stage) is from flowering to maturity.
- 3) The duration of both the second stage and the third stage is almost the same with about 30 days irrespective of the varieties.

How to facilitate the session:

- 1) The life cycle of rice plant
 - Tell the farmers the following:
 - Tillering normally starts about two to three weeks after sowing (transplanting time) when the rice plant starts to develop the fifth leaf. During the period between the start of tillering and panicle initiation (vegetative growth stage), the number of panicles per unit area is determined.
 - Panicle initiation normally starts about one month before flowering. During the period between the start of panicle initiation and flowering (reproductive stage), the number of grains per panicle is determined.
 - After flowering, it will take about another one month for rice plants to mature for harvest. During the period between the flowering and full maturity (ripening stage), the ratio of grain filling is determined.
- 2) Three growth stages
 - Tell the farmers that the entire life cycle of rice is divided into the following three growth stages:

Growth stages	Vegetative growth	Reproductive	Ripening
Period (from A to B)	Sowing to panicle initiation	Panicle initiation to flowering	Flowering to maturity
Duration	Variable	Constant (About 30 days)	Constant (About 30 days)
Yield Component	Number of panicles	Number of grains	Rate of grain-filling

Yield components



2-2

Session 2-2 Yield Components

Important messages:

- 1) The three main components that affect rice yield are the following:
 - The number of panicles per unit area (more the panicles, higher the yield),
 - The number of grains per panicle (more the grains, higher the yield), and
 - The rate of grain-filling (more the grain-filling, higher the yield).
- 2) The value of each component is determined in a particular rice growth stage.
- 3) The farmers can improve these components and obtain higher yield through better farming practices.

How to facilitate the session

- 1) Three components that determine rice yield
 - Explain to farmers the three components that determine rice yield which are:
 - The number of panicles per unit area,
 - The number of grains per panicle, and
 - The rate of grain-filling.
- 2) The period that determines each component
 - Show the farmers the life cycle of the rice plant.
 - Explain to farmers that each component that contributes to the grain yield is determined in a particular growth stage.
 - The number of panicles per unit area: Vegetative Growth Stage
 - The number of grains per panicle: Reproductive Stage
 - The rate of grain-filling: Ripening Stage
- 3) To obtain a higher yield
 - Tell the farmers that a higher yield can be obtained by improving the value of yield components through better farming practices.
 - More panicles per unit area
 - More grains per panicle
 - More filled grains

Various varieties



☐ Long duration
(6 months)

1 2 3 4 5 6

☐ Medium duration
(5 months)

1 2 3 4 5

☐ Medium duration
(4 months)

1 2 3 4

☐ Short duration
(3-3.5 months)

1 2 3

☐ Tall (130 cm)

☐ Medium (115 cm)

☐ Medium

☐ Short



☐ Photosensitive

☐ Tolerant to Fe toxicity

2-3

Session 2-3 Various Varieties

Important messages:

- 1) The difference between long-duration and short-duration varieties is its difference in the duration of the vegetative growth stage. Long-duration varieties have a long vegetative growth stage, while the short duration varieties have a short vegetative growth stage.
- 2) Each variety has its own characteristic in terms of plant height, grain color, resistance to disease, suitability for agroecology, etc.

How to facilitate the session:

- 1) Growth duration of various varieties
 - Take one variety (long or short duration) as an example. Ask the farmers to answer the growth duration (from sowing till full maturity) of that variety. The table below provides some information on the growth duration of several varieties commonly cultivated in the target areas of SRPP.

Variety	Growth duration	Remarks
NERICA L19	4 months (120 days/17 weeks)	
Pa Kiamp	4.5 months (135days/19 weeks)	Grow in both lowland and upland
ROK 5	4.5 months (135days/19 weeks)	For IVS and mangrove swamp
ROK 10	6 month (180 days/29 weeks)	Adapted to IVS, boliland, and mangrove swamp
ROK 24	5 months (145 days/20 weeks)	Tolerant to iron toxicity
Butter Cup	3-3.5 months (95-105 days/13-14 weeks)	

- Explain that the different growth duration among varieties is attributed to the differences in the duration of their vegetative growth stage.
- 2) Different characteristics of various varieties
 - Tell the farmers that each variety has its own characteristics such as;
 - Growth duration: short, medium, or long duration
 - Tillering habit: high or low
 - Plant height: tall or short
 - Suitability for agroecology
 - Grain color: white, yellow, red, etc.
 - Tolerance to diseases

Prototype Flow of Activities in FFS Session 3

Tools & materials prepared (brought to the FBO or arranged to be available on site)

a) Extension Material on the TP-R 3-1, 3-2, 3-3, and 3-4

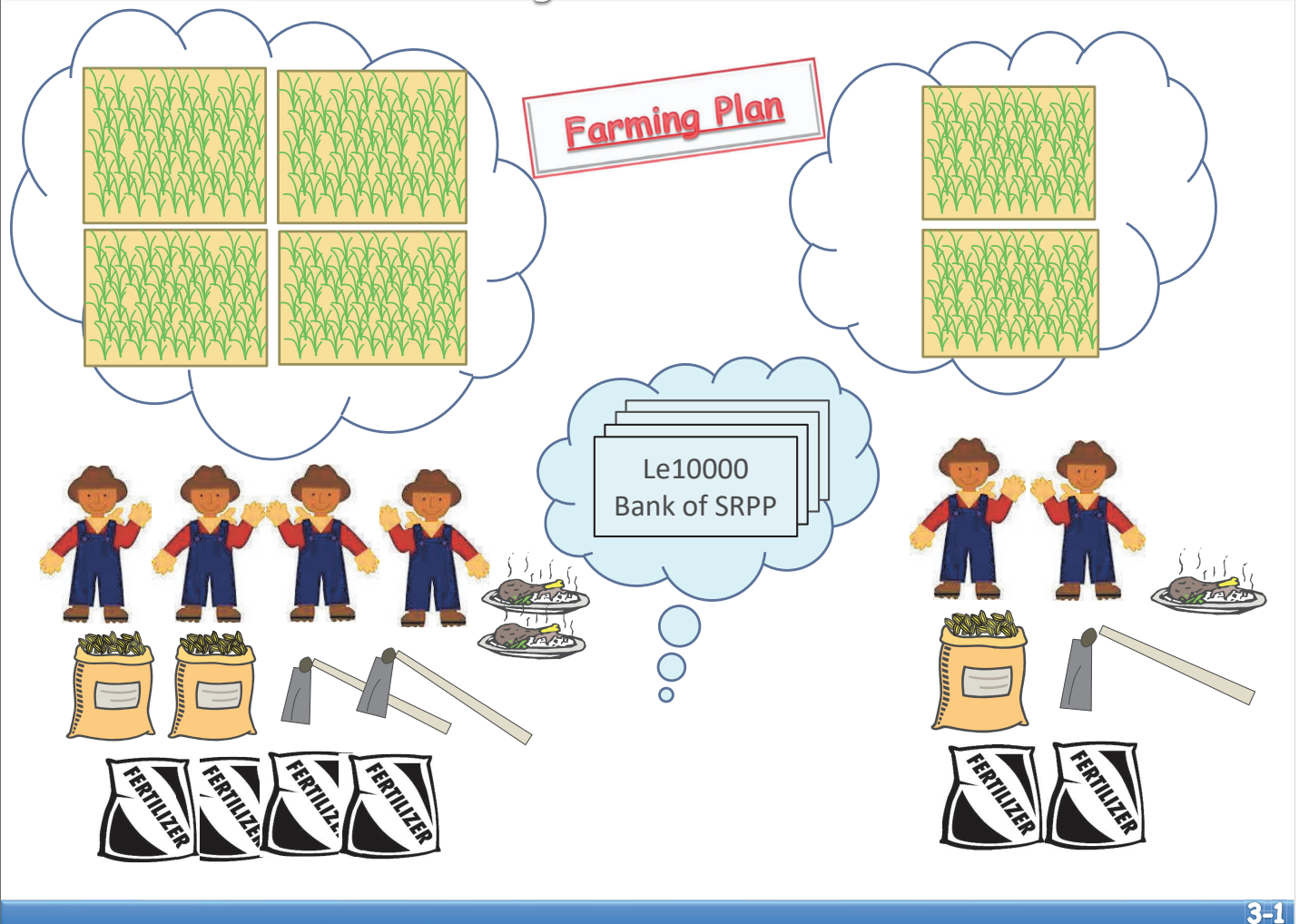
b) Cropping calendar format on flipchart (enlarged copy of the Extension Material on the TP-R 3-3)

c) Markers

Time	Topic	Methodology	Contents	What to do and cautions to be made
0900 – 0930	Introduction to Session 3	Explanation in plenary meeting	- Recapitulation of the previous Session 2 - Introduction of the topics to be covered in the Session 3	
0930 – 1030	Formulation of Farming Plan	Plenary discussion using Material 3-1	- Importance of a farming plan - Components of the farming plan - Example of the component of farming plan (1) – (9)	- Create awareness on the profitability of rice farming. - If there be any farmer who does any sort of planning, ask the person to share his/her experience.
1030 – 1100	Formulation of a cropping calendar	Plenary discussion using Material 3-2	- Importance of a cropping calendar - Cultivation activities at proper timing to address critical growth of rice plants - How to prepare the cropping calendar	- Emphasize that each cultivation activity has optimal timing to maximize the yield performance.
1100 – 1200	Exercise on formulation of a cropping calendar	Group exercise using the enlarged copy of Material 3-3	- How to prepare the cropping calendar - Exercise with farmers to fill in the blank calendar in accordance with the variety to be grown in the demo plot	- Ask farmers to determine the date of each activity, calculating backward from the date of expected harvest, while considering the availability of water. - At the end of exercise, encourage the farmers to prepare the cropping calendar for their individual farms.
1100 – 1200	Seed Selection	Plenary discussion using Material 3-4	- Importance of seed selection	- Emphasize the benefits of using seeds that are pure (not mixed) and viable.
		Exercise on seed selection	- Farmers' exercise on sorting - Farmers' exercise on seed selection by floating - Demonstration of the method of germination test	- Ask the farmers what differences among seed rice they noticed in sorting - At the end of the exercise, encourage the farmers to do the seed selection for their individual plots as well.
1200 – 1230	Wrap up & Way Forward	Plenary discussion	- Review of the important points of Session 3. - Confirmation of the schedule of next FFS session and work to be done by the FBO until next session.	- Ask if the farmers would try what they have learnt in their individual farms and record in the FFS report.

Cautions to be made in facilitating Session 3:

- Farmers often complain that schedule of FFS is too strict. To avoid such complains, the facilitators should emphasize in this session the importance of doing any farming activity at a specific time otherwise **the yield component will be disturbed.**



Session 3-1 Formulation of Farming Plan

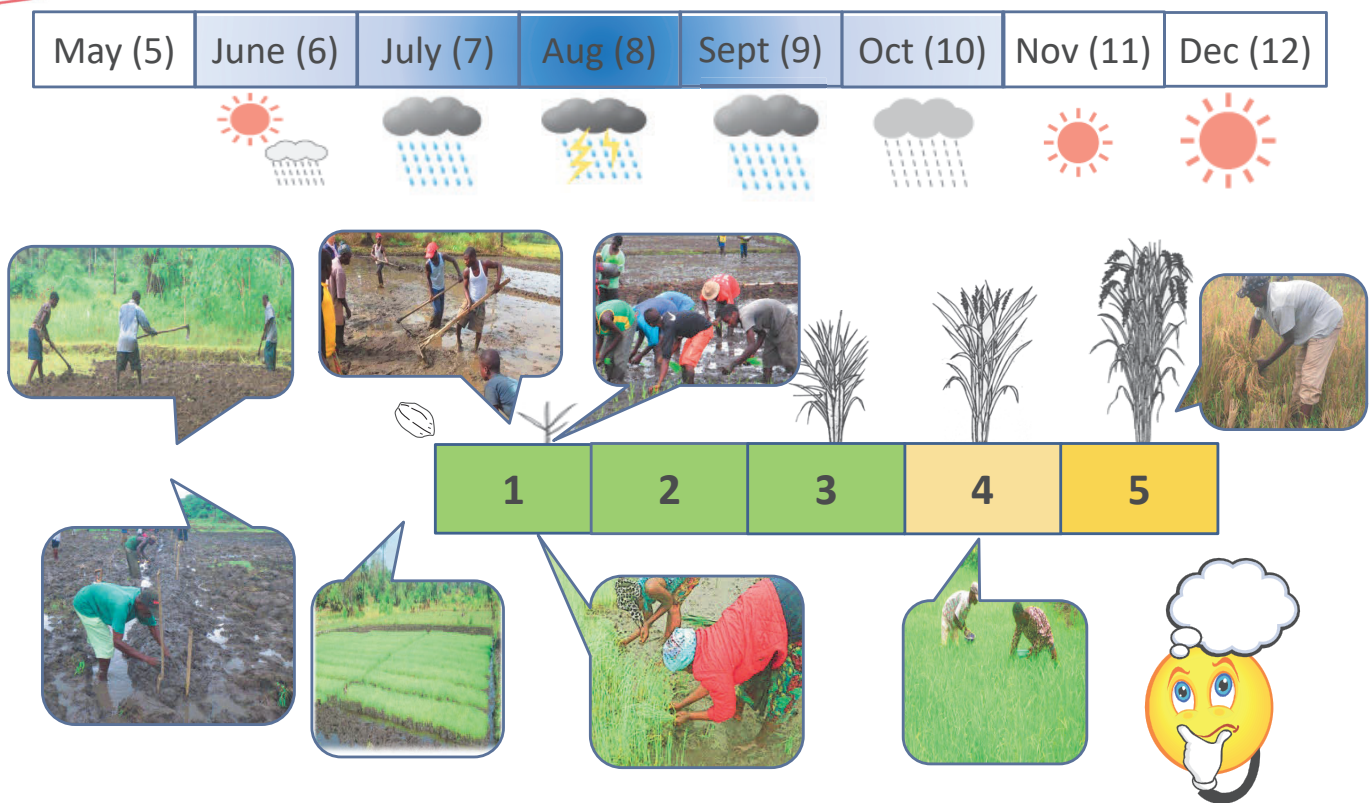
Important messages:

- 1) Farmers should prepare a farming plan before starting a cropping season. According to the plan, they should prepare required resources for farming in the season.
- 2) Farmers should secure farm inputs (land, seed, laborers, etc.) according to the scale of farming and expected production.

How to facilitate the session:

- 1) Introduction
 - Ask the farmers to list up necessary inputs to be used for rice farming and write them down on flipcharts (e.g., seed rice, fertilizer, laborers, small hoes, large hoes, shovels, head pans, buckets, rice bags, tarpaulin sheets, winnower, etc.)
 - Ask the farmers if they have clear idea on the balance of payment of their rice farming (whether the expenditure is covered by the value of the rice produced)
- 2) Farming plan
 - A farming plan is worked out in the following manner:
 - (1) Determine the location and area of the farm
 - (2) Decide the rice variety to cultivate
 - (3) Make sure that viable seed of the variety to be used is available
 - (4) Calculate the required amount and quantities of inputs
 - (5) Secure laborers and fund
 - (6) Make sure the necessary tools and materials are available
 - (7) Make sure that seed rice is viable
 - (8) Procure fertilizer, seeds, and other necessary inputs
 - (9) Prepare the cropping calendar
 - Tell the farmers to make a feasible plan based on the availability of labor and fund, which may often become constraints to the farming scale.
 - Tell the farmers to prepare fertilizer and seed rice well before a farming season starts because they are also sometimes hard to find

Cropping Calendar



3-2

Session 3-2 Formulation of a Cropping Calendar

Important messages:

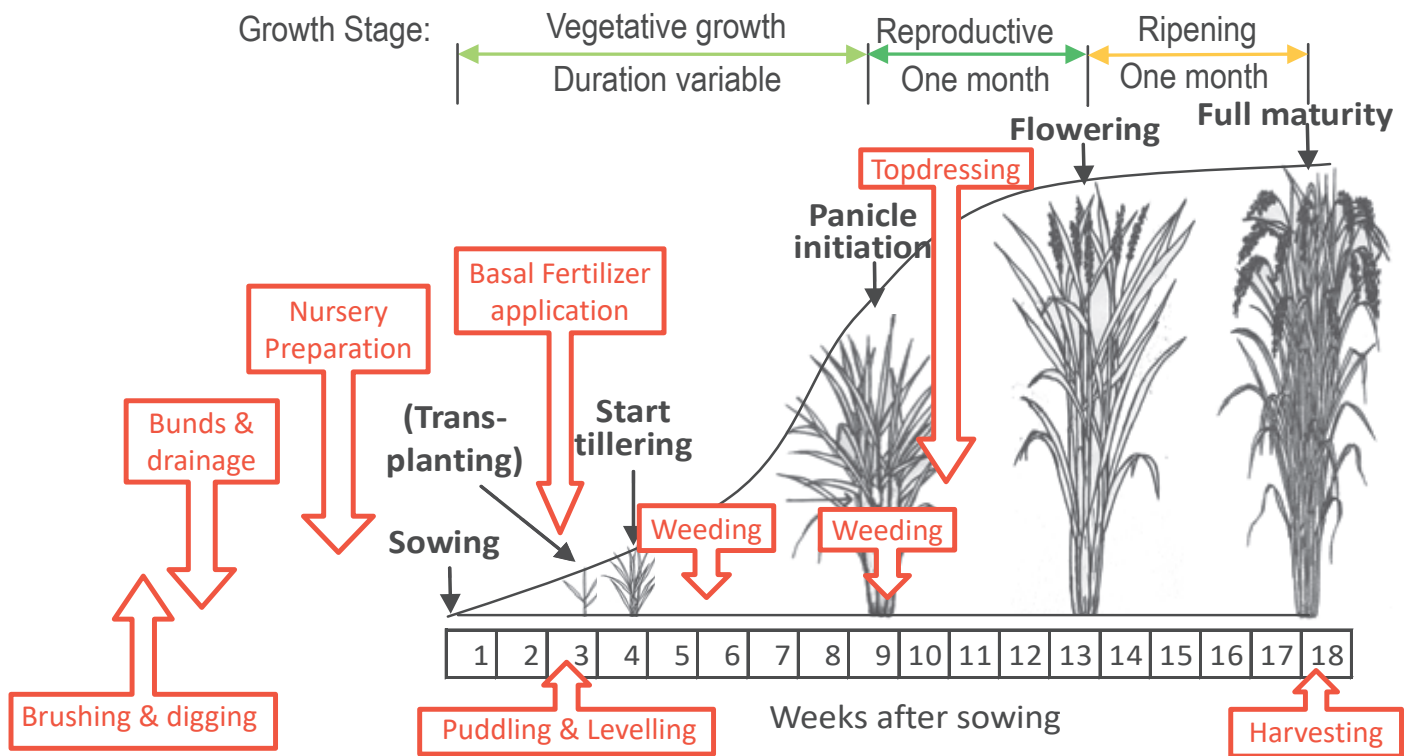
- 1) Farmers should prepare a cropping calendar that is appropriate for the rice variety to be cultivated. According to the plan, they should schedule the timing of land preparation, nursery preparation, sowing, transplanting, fertilizer application, weeding, and harvesting.

How to facilitate the session:

- 1) Introduction
 - Ask the farmers to describe their farming practices according to a variety to be used throughout the rice growth period in the order and write them on flipcharts (e.g., brushing, digging, bund making, drainage construction, nursery preparation, sowing, puddling, leveling, uprooting, transplanting, fertilizer application, weeding, water management, bird-scaring, harvesting, transporting, threshing, bagging, etc.)
- 2) Discussions
 - Ask the farmers to tell the appropriate timing of each activity in their normal undertakings. Emphasize the importance of making concrete plans with identification of specific time for each activity, as the timing of some activities causes positive or negative influence the growth of rice plant, thereby the yield. Farmers should know when to do what in order to grow their rice well and thus to obtain a good harvest at the end.

Tools and materials to be prepared: Markers and Flipcharts

CROPPING CALENDAR (Example of NERICA L19)



3-3

Session 3-3 Formulation of a Cropping Calendar - Exercise

Important messages:

- 1) Farmers should prepare a cropping calendar for the Group Farm, especially for the demonstration plots of this FFS.

How to facilitate the session:

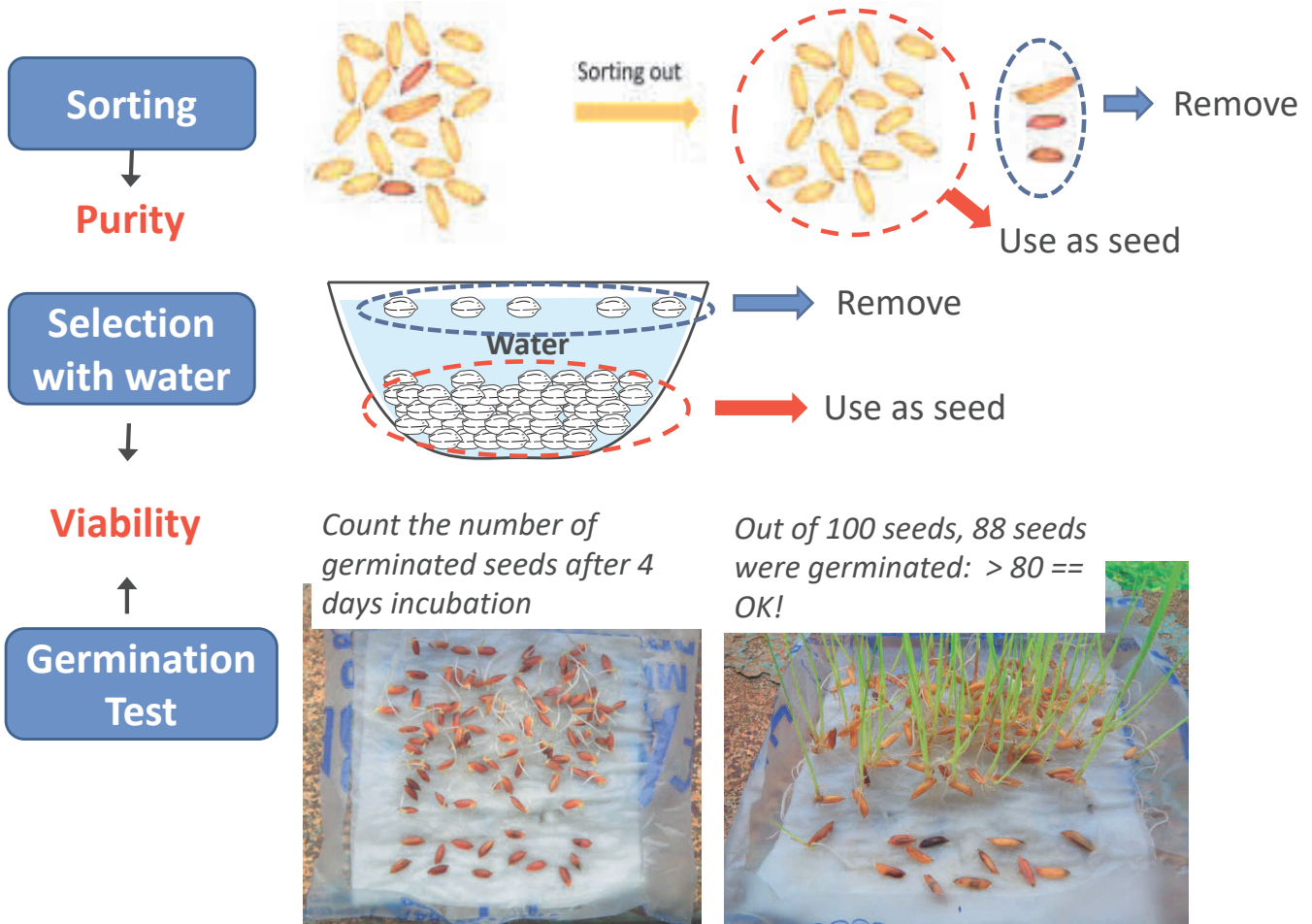
- Explain to the farmers how to prepare a cropping calendar using the timeline indicated.
- Together with the farmers, prepare the cropping calendar with the identification of a specific date for every activity.

- Steps to formulate the cropping calendar

- (1) Set the expected time of harvest so that the ripening stage coincides with a period of sunny days
- (2) Avoid transplanting and topdressing during the peak rainy season
- (3) Decide when to sow the seeds, taking into account the growth duration of the rice variety to be used
- (4) Decide when to start brushing so that the first digging can be finished before sowing
- (5) Transplanting should be scheduled about 3 weeks after sowing seeds
- (6) Set the time of first weeding at 2-3 weeks after transplanting
- (7) Set the time of topdressing at about 2 months before the harvest time

Tools and materials to be prepared: Markers and Flipcharts

Technical Package on Rice Production - SRPP



3-4

Session 3-4 Seed Selection

Important messages:

- 1) It is important to use pure (not mixed) and viable seeds to get a higher yield.
- 2) Cleaning of seeds should be done through sorting out.
- 3) The selection of healthy seeds is done by soaking in water.
- 4) A germination test should be conducted to confirm the viability of the seeds.

How to facilitate the session:

- 1) Sorting seeds
 - For seed purification, tell the farmers to find grains with different shapes and colors, weed seeds, and other foreign matter by carefully observing seeds and that those should be removed. It is important to remove the seeds of wild rice which may not easily be detected like weeds before heading, and by that time they will compete with rice plants for nutrition, sunlight, water, etc., thereby bringing negative effects on rice growth.
 - Explain to the farmers that if varieties with different growth periods are mixed, application of topdressing will not be effective due to the different timing of panicle initiation.
 - If time allows, let the farmers exercise sorting with a small amount of seed rice.
- 2) Selection of viable (high germination ability) seeds
 - Explain (and demonstrate) to the farmers the method of selecting healthy seeds by soaking them in water: To eliminate infertile and unfilled seeds, soak all seeds in water and remove those that float.
- 3) Germination test
 - Explain (and demonstrate) the method of germination test as follows:
 - Select 100 grains at random
 - Put them on absorbent material (e.g., paper, cloths, etc.) and keep them saturated for 4-5 days to 1 week at the maximum.
 - Count the number of germinated grains
 - If more than 80 grains out of 100 have germinated, the grains can be used for seed rice; If 70 to 80 have germinated, augment the amount of seeds by 10%, and If less than 70 have germinated, find another source of seed rice.

Tools and materials to be prepared:

Bucket, water, seed rice, newspaper (for soaking)

Plate, absorbent, water, seed rice (for germination test)

Prototype Flow of Activities in FFS Session 4

Tools & materials prepared (brought to the FBO or arranged to be available on site)

a) Extension Material on the TP-R 4-1, 4-2, and 4-3

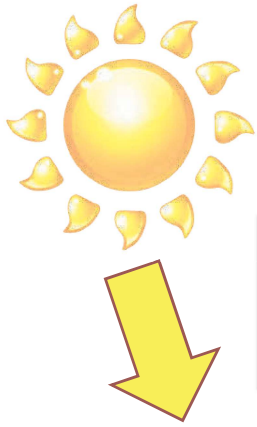
b) Farm tools to work in the plot

Time	Topic	Methodology	Contents	What to do and cautions to be made
0900 – 0930	Introduction to Session 4	Explanation in plenary meeting	- Recapitulation of the previous Session 3 - Introduction of the topics to be covered in the Session 4	
0930 – 1000	Nursery preparation: Site selection	Plenary discussion using Material 4-1	- Reason why a dry nursery is recommended for the rainy season - Desirable conditions of nursery sites	
1000 – 1030	Nursery preparation: Area and sowing	Plenary discussion using Material 4-2	- Nursery area - Seeding rate / sowing density	- Explanation of seeding rate should be as simple as possible. Foster the farmers' understanding on the recommended seed rate that is much less than the normal practices of the farmers.
1030 – 1130	Selection of nursery sites, preparation of nursery beds and actual sowing	Group work at nursery site	- Selection of the good site - Digging throughout the site - Measurement of area - Setting up of nursery beds - Preparation of seed - proper method of sowing	- Do not divide the farmers into groups to do different tasks at a time, so that everybody can experience all of the necessary processes - The nursery site should well be puddled and levelled before sowing.
1130 – 1200	Nursery management	Plenary discussion using Material 4-3	- Nursery management during the period from sowing to uprooting	- Emphasize the importance of frequent monitoring of the nursery until uprooting.
1230 – 1300	Wrap up & Way Forward	Plenary discussion	- Review of the important points of Session 4. - Confirmation of the schedule of next FFS session and work to be done by the FBO until next session.	- Ask if the farmers would try what they have learnt in their individual farms and record in the FFS report. - In case if the sowing should not be done on the day of this session, confirm the date of sowing and how to work on that day.

Cautions to be made in facilitating Session 4:

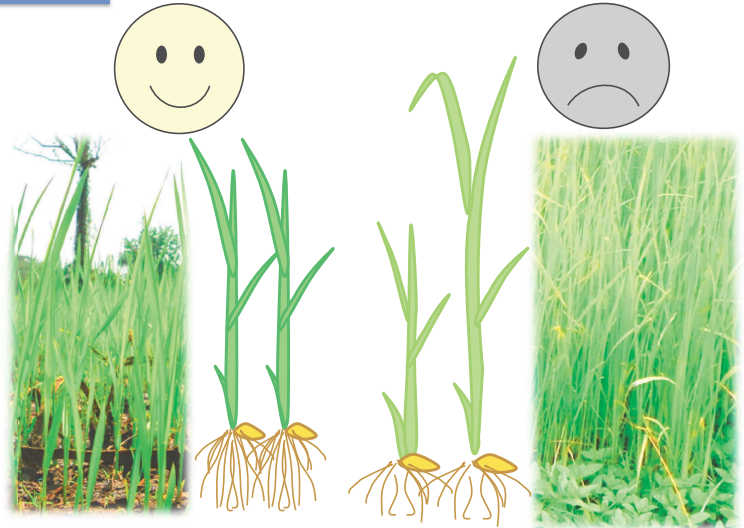
BEFORE the day of this session, the facilitators should:

- consult with the FBO leaders to **identify a candidate site for nursery and check the conditions**, rather than starting to search for the good site on the day of the session as time is limited.
- arrange with the FBO members **to meet at the nursery site, not at the FFS demo plot** on the day of the session.



Nursery preparation (Site selection)

Nursery needs sunlight,
fertile soil and sufficient
moisture



Session 4-1 Nursery Preparation (Site Selection)

Important messages:

- 1) A nursery site should be in an open area full of sunlight to grow healthy seedlings.
- 2) The land for a nursery should be dry in the rainy season free from flood and inundation while it should be wet in the dry season with sufficient water supply.
- 3) Soils of the nursery bed should be fertile enough for seedlings to grow healthily during nursery period.
- 4) Nursery soils should not be of heavy clay, nor full of gravel.

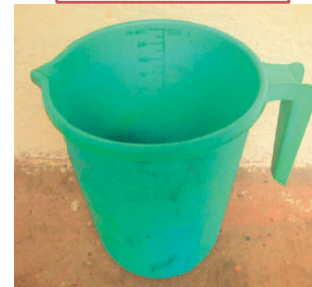
How to facilitate the session:

- 1) Introduction
 - Ask the farmers how they usually select a nursery site for the rainy season cropping; if they do double cropping, also ask them how they select a nursery site for the dry season cropping.
- 2) Selection of nursery site
 - Explain to the farmers that, in general, a dry nursery is recommended for the rainy season to avoid high humidity and inundation.
 - Tell the farmers the desirable nursery conditions as follows.
 - a) Where the sun shines:
 - Seedlings grown in open place become thick and strong with green color, while ones in shaded place are thin, tall and soft with yellowish color.
 - b) Soils of not heavy clay and without too much gravel:
 - Heavy clay is difficult to plow and inhibits the growth of the root. It also makes uprooting difficult. On the other hand, soil with too much gravel makes it difficult to keep the moisture in the soil.
 - c) Fertile soil (not sandy soil; preferably cultivated soils after vegetable production with fertilizer) to assure nutrient supply.
 - d) Accessible to water sources: To ease watering.
 - e) Free from inundation: To avoid risk of fungus diseases due to high humidity.
 - f) Free from flood: To avoid for seedlings being swept away.
 - g) Easily accessible: To ensure proper supervision and care of seedlings.
 - h) Not too far from the main field: To ease transporting seedlings when transplanting.
 - i) Not on a steep slope: To enhance the uniform growth of the root and avoid seedlings being swept away by run-off water.

Nursery preparation (Nursery bed and sowing)

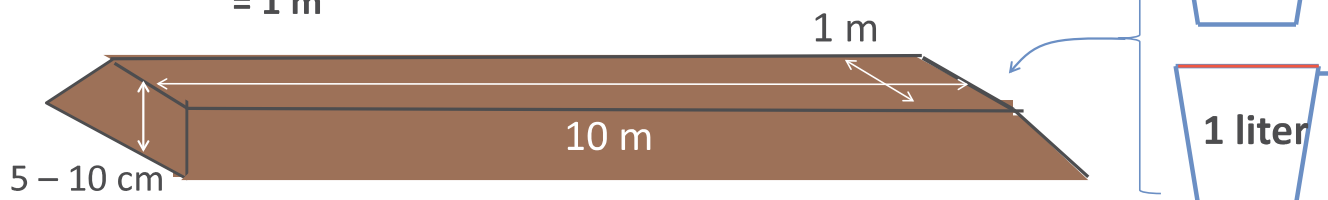
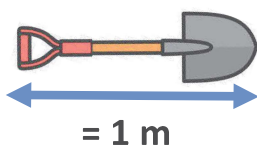


"Liter Cup"



Seed Rice:

**1 kg
= 2 liter**



4-2

Session 4-2 Nursery preparation (Amount of Seed and Nursery Bed)

Important messages:

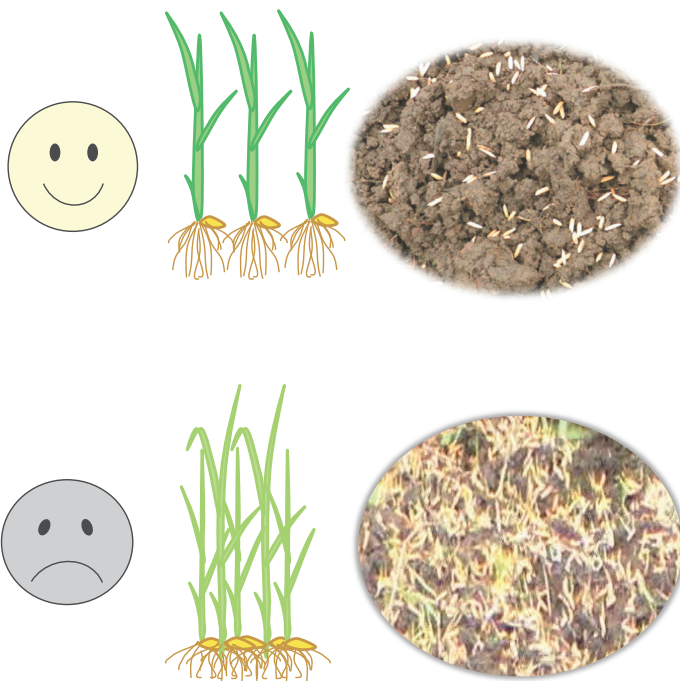
- 1) Nursery area is about 1/30 of main field area, and sowing density is about 1 kg per 10 m².
- 2) Nursery bed is slightly raised and divided into small beds by a footpath/water course to make the work easy and to control water. Soils should be well tilled before sowing, possibly with application of well matured compost, if available.
- 3) The amount of seed required in the main field is about 30 kg per ha which is much smaller compared to the conventional technique.

How to facilitate the session:

- 1) Amount of seed
 - The amount of required seed is much smaller with the improved techniques of the TP-R than in the conventional practices.
 - The standard seed rate for the main field is about 30 kg per ha (30 kg/10,000 m²) or 12 kg per acre (12 kg/4,000 m²) if the farmers follow the recommended transplanting and crop management.
 - This rate is much lower than the conventional rate, which is 1 local bushel (standard bushel is 25 kg) per acre (4,000 m²); they can drastically reduce the amount and cost of seed.
- 2) Nursery bed
 - Recommended nursery area is about 1/30 of the main field: if the area of the main field is 1 acre (4,000 m²), the area of the nursery is about 130 m².
 - For easy nursery management, a nursery bed size of 10 m by 1 m is recommended. To make the nursery of 130 m², 13 nursery beds of 10 m² are required. Tell the farmers that the standard length of shovel is about 1m.
 - The standard seedling rate is 1 kg of seeds per 10 m² nursery bed. As 1 liter-cup of seed is equivalent to about 0.5 kg, 2 liter-cups of seed are enough for sowing a 10 m² nursery bed.
 - The total amount of the seed required for the demo plot (1,000 m² in total) for this FFS is 3.0 kg. Three beds of 10 m by 1 m will be established and 1.0 kg of seeds are to be sown in each of the beds. Seedlings of one and half beds are to be transplanted in each of the two sub-plots.
 - High sowing density may weaken seedlings, and a large nursery is laborious.
 - Nursery bed is slightly raised at 5 to 10 cm from the ground level and divided by a footpath/water course to make the work easy and to control water. Soils should be well tilled before sowing. It is recommended that the well matured compost is applied, if available, to the soil at the time of tilling.

Tools and materials to be prepared: Hoe, measuring tape, sticks, strings or ropes

Sowing density



Seed cover



4-3

Session 4-3 Nursery Management

Important messages:

- 1) The seeds should be sown on nursery bed uniformly in each nursery bed
- 2) The seeds should be thinly covered with dry soil after sowing.
- 3) Nursery beds should be covered with palm leaves until germination so as to protect the sown seeds from being washed out by rain or attacked by birds.

How to facilitate the session:

- 1) Introduction:
 - Ask the farmers how they normally sow the seeds in the nursery beds. Discuss with farmers what are the cautions to be made in sowing the seeds and management after sowing until the transplanting.
- 2) Cautions to be made in sowing and nursery management:
 - Tell the farmers to equally divide the seeds corresponding to the number of the nursery beds before sowing.
 - Explain to the farmers that the seeds should be sown sparsely but uniformly in each nursery bed. If congested, the growth of seedlings will not be uniform.
 - After sowing, the seeds should sufficiently be covered with dry soil.
 - It is advisable that the nursery beds are covered with palm leaves until germination to protect the sown seeds from being washed away by heavy rain or attacked by birds.
 - It is also necessary to check the soil of the nursery beds to make sure that it contains enough moisture, depending on the weather condition. If the rain falls less, the nursery beds should be watered from time to time.

Prototype Flow of Activities in FFS Session 5

Tools & materials prepared (brought to the FBO or arranged to be available on site)

a) Extension Material on the TP-R 5-1, 5-2, 5-3, and 5-4

b) Farm tools to work in the plot

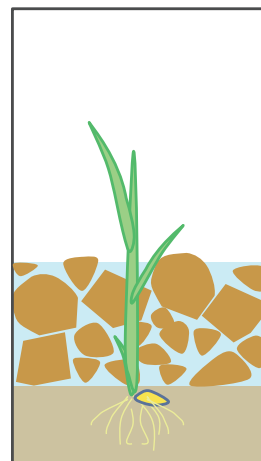
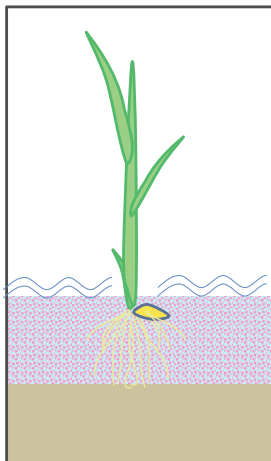
Time	Topic	Methodology	Contents	What to do and cautions to be made
0900 – 0920	Introduction to Session 5	Explanation in plenary meeting	- Recapitulation of the previous Session 4 - Introduction of the topics to be covered in the Session 5	
0920 – 0940	Importance of Puddling	On-site explanation using Material 5-1	- Importance of puddling	
0940 – 1000	Importance of Levelling	On-site explanation using Material 5-2	- Importance of levelling	
1000 – 1020	Terracing	On-site explanation using Material 5-3	- Terracing to ease the levelling - Cautions in terracing in the plots	- Emphasize the importance of NOT completely moving the topsoil from higher part to fill the low area.
1020 – 1040	Construction of Internal Drainage	On-site explanation using Material 5-4	- Characteristics of the IVS that needs internal drainage - How to construct the internal drainage	- If the IVS of the FBO does not need internal drainage, explain this topic just as a reference for individual members whose farm may be marshy.
1040 – 1230	Puddling and Levelling of the demo plots	Demonstration and group work for actual puddling and levelling of the demo plot	- How to do the puddling and levelling - Proper way of puddling - Proper way of levelling	- Demonstrate good ways of puddling and levelling and the bad ways to compare the conditions of soil. - Allow as many farmers as possible to practice using the levelling board.
1230 – 1300	Wrap up & Way Forward	Plenary discussion	- Review of the important points of the Session 5 - Confirmation of the schedule of next FFS session and work to be done by the FBO until next session.	- Ask if the farmers would try what they have learnt in their individual farms and record in the FFS report. - Arrange the day of FFS session 6 and ask the farmers to be prepared to spend longer time for group work so as to finish transplanting in the demo plot on that day.

Cautions to be made in facilitating Session 5:

Farmers always complain that levelling and puddling are laborious and time consuming. The facilitator should convince the farmers by:

- Emphasizing the benefit of leveling and how **it contributes to the better growth** of rice plants and hence to the high yield.
- Referring to the examples of other FBOs who used to raise same complains but **after seeing the bumper harvest, they are now eager to do the levelling** as an essential practice.

Puddling



5-1

Session 5-1 Importance of puddling

Important messages:

- 1) Puddling is conducted to mix soils well with water so that roots of the seedlings can freely grow and easily absorb water with nutrients right after transplanting.

How to facilitate the session

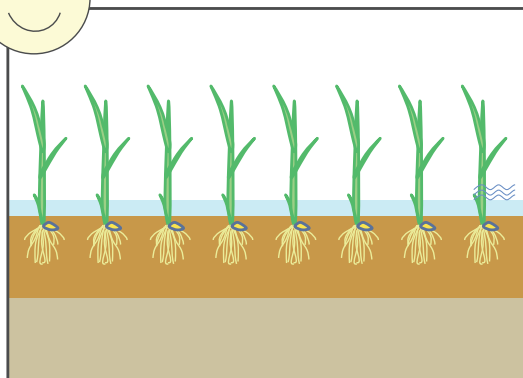
1) Introduction

- Ask the farmers about the way they usually puddle (when, how often, how deep, by what kind of tools or method, etc.).
- Tell the farmers that seedlings need soft soils to grow healthily.

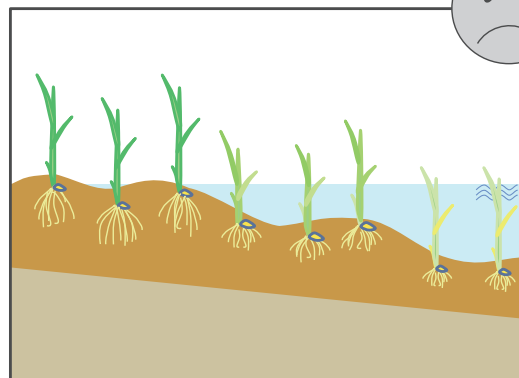
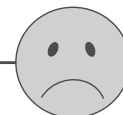
2) Puddling

- Describe puddling to the farmers as follows:
 - Puddling is the process of mixing water into the soil to make a muddy condition. Proper puddling is necessary for the uniform growth of seedlings, especially under shallow planting conditions.
 - The well- puddled field provides a favorable environment for root development. (Picture and photo on the left)
 - If puddling is not conducted, root development might become poor and the root cannot easily absorb water. (Picture and photo on the right)
- Describe the proper method of manual puddling to the farmers as follows (If possible, practice it on the field together with farmers):
 - After breaking the large clods into small ones by hoe, stamp on the clods to further break them down into the mud.
 - ◊ Give the farmers a hint: Puddling provides comfortable room for transplanted seedlings to grow. It is like a bed for a newly born baby to sleep in.

Tools and materials to be prepared: Hoes and shovels



Leveling



5-2

Session 5-2 Importance of leveling

Important message:

- 1) Leveling is conducted to provide rice plants with a uniform environment for growth in terms of water and nutrients.

How to facilitate the session:

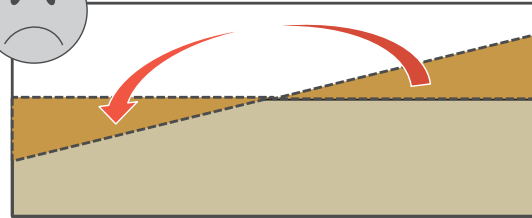
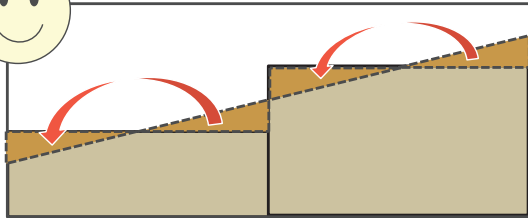
- 1) Importance of leveling
 - Tell the farmers the advantage of leveling as follows:
 - Leveled soil surface provides the uniform depth of water for rice plants in the plot, thus contributes to the uniform growth of the plants. (Picture and photo on the left)
 - In a field on the inclined or undulated ground, the water condition varies across the field and the growth of rice plants becomes uneven. (Picture and photo on the right)
- 2) How to conduct leveling
 - Describe the proper method of manual leveling to the farmers as follows (Practice it in the field with farmers after explanation):
 - Leveling should be done when the water in the plot is shallow and the ground level can easily be checked. Move some amount of soil from the higher corner to the lower corner of the plot by hoes, shovels, head pans, or other tools.
 - A simple tool (rake) is useful for micro land leveling. (Photo in the center)

Tools and materials to be prepared: Hoe, shovels, ground rakes

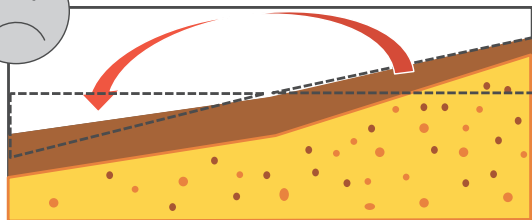
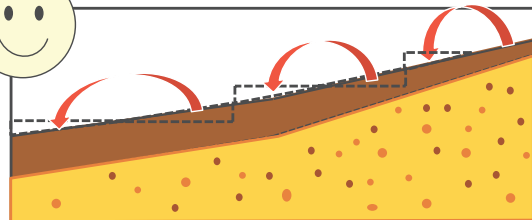
Terracing



Why should we level the sloping field by dividing it into small plots?



Answer 1: To save the laborious earth work



Answer 2: Not to disturb subsoil

5-3

Session 5-3 Terracing

Important message:

- 1) Terracing may ease the leveling of the plots in the inclined locations. Dividing one big plot into smaller sub-plots can save the required labour for leveling and prevent the subsoil from being disturbed.

How to facilitate the session:

1) Terracing

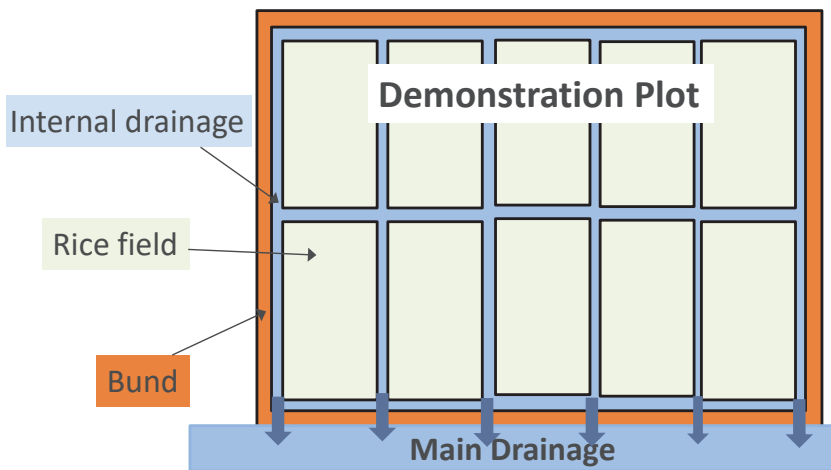
- Ask the farmers if they are familiar with the terraces in the rice fields.
 - The ground level can be different from plot to plot (higher in the edge of a swamp and lower in the center of a swamp), but the surface of the rice field should be as flat as possible.
 - If a plot is on a steep incline, it is desirable to divide the plot into smaller sub-plots as leveling is easier for small plots than a large and sloped plot.

2) The benefits of dividing the plot into smaller sub-plots

- Ask the farmers why the inclined plot should be divided into smaller plots:
 - Explain to the farmers that the amount of the soil to be moved would be less in the smaller plots than the bigger one by comparing the two upper pictures. Movement of the soils between the divided smaller plots would require less labour.
 - When moving the soil from the higher corner, it is important NOT to completely remove the surface soil from one part of the plot. By showing the lower two pictures, explain to the farmers that dividing the plot into smaller sub-plots can also assure that the subsoil should not be disturbed.

Tools and materials to be prepared: Hoe, shovels, ground rakes

Construction of Internal Drainage



5-4

Session 5-4 Construction of Internal Drainage

Important message:

- 1) Internal drainage ditches should be constructed to establish a drainage system in the demo plots where the area is marshy and where water seepage from underground is found.
- 2) Internal drainage ditches should connect each other to drain excess water out of the plots.

How to facilitate the session:

- 1) Necessity of drainage
 - Ask the farmers if the demonstration plots are marshy and if water seepage is found in the demo plots.
 - Explain to the farmers that rice growth will become poor if the water stagnates or if the water is excessive in the plots. In such a condition, water should be drained from the plot to lower the water level so that the rice growth would be improved.
- 2) How to establish a drainage system in the demo plots to effectively manage the water in the plot.
 - Explain to the farmers how to establish the drainage system:
 - Dig drainage ditches in the demo plot along the bunds as well as inside the plot as shown in the picture when puddling. Ditches should be at least 30 cm in both depth and width.
 - Soils dug from ditches should be put on the rice field to raise the height of the fields then leveled.
 - To control the water of the demo plot, bamboo pipes should be set at the outlets of the drainage ditch. The position of bamboo pipes should be lower than the soil surface of the demo plot.
 - Maintain the water in the ditch not to submerge the soil surface of the rice field by opening the bamboo pipes. Do not open the bamboo pipes when the water level in the main drainage is higher than that in the demo plots.

Prototype Flow of Activities in FFS Session 6

Tools & materials prepared (brought to the FBO or arranged to be available on site)

a) Extension Material on the TP-R 6-1, 6-2, 6-3, 6-4, 6-5, 6-6, 6-7, 6-8, and **9-1 (for discussion on caseworm)**

b) Fertilizer for basal application and head pans

c) Farm tools to work in the plot

Time	Topic	Methodology	Contents	What to do and cautions to be made
0800 – 0830	Introduction to Session 6	Explanation in plenary meeting	<ul style="list-style-type: none"> - Recapitulation of the previous Session 5 - Introduction of the topics to be covered in the Session 6 	
0830 – 0900	Nursery Period	Plenary discussion using Material 6-1 at nursery site		
0900 – 1000	Uprooting of Seedlings	On-site explanation using Material 6-2	<ul style="list-style-type: none"> - Proper ways of uprooting 	<ul style="list-style-type: none"> - In the demonstration, let some farmers to uproot seedlings first, and ask other farmers if the way they do is appropriate. - Demonstrate not only a good example but also a bad one, and then ask the farmers why the latter is bad.
		Demonstration and actual uprooting by farmers		
1000 – 1015	Fertilizer Application	On-site explanation using Material 6-3	<ul style="list-style-type: none"> - Timing of fertilizer application and how it works 	
1015 – 1100	How to Apply the Fertilizer	On-site explanation using Material 6-4 & 6-5	<ul style="list-style-type: none"> - Method of fertilizer application - Importance of evenly distribution 	<ul style="list-style-type: none"> - Explain the two methods and select either of method which farmers prefer.
1100 – 1115	Water Management and Fertilizer	On-site explanation using Material 6-6	<ul style="list-style-type: none"> - Importance of water control at fertilizer application to maximize its effects 	<ul style="list-style-type: none"> - In case water in the demo-plots is too deep, tell them to drain water until the water depth becomes shallow.
1115 – 1130	Transplanting	On-site explanation using Material 6-7	<ul style="list-style-type: none"> - No. of seedlings per hill - Proper depth of planting - Proper distance between hills 	<ul style="list-style-type: none"> - At the actual work in the demo plots, the fertilizer application is demonstrated with all members. - After fertilizer application, demonstrate the transplanting method with practice by farmers. Ask some farmer to transplant, and then let the other farmers to confirm if it is proper way. - After all demonstration, divide the members into two groups, i.e. one to go back to nursery to uproot and transport seedlings, and another group to transplant in the demo plots.
1130 – 1300		Actual fertilizer application and transplanting by farmers		
1300 – 1330	Water Management	Plenary discussion using Material 6-8 and 9-1	<ul style="list-style-type: none"> - Importance of water control (depth of water) at different rice growth stages - Cautions to be made to prevent iron toxicity and caseworm 	<ul style="list-style-type: none"> - Emphasize critical timing to control water depth with approximate dates in accordance with the growth duration of the variety. - Emphasize that the water control is also important to mitigate the problem of iron toxicity and to prevent caseworm damage.
1330 – 1400	Wrap up & Way Forward	Plenary discussion on site	<ul style="list-style-type: none"> - Review of the important points of the session 6 - Confirmation on the schedule of next FFS session and work to be done by the FBO until next session 	<ul style="list-style-type: none"> - Ask if the farmers would try the method of uprooting and transplanting learnt in their individual farms and record in the FFS report. - In case if the transplanting in the demo plot could not be finished, make sure that the farmers will continue to finish on the same day after the session or within the following day.

Cautions to be made in facilitating Session 6:

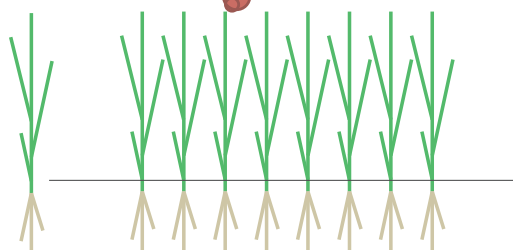
Since there are a lot of techniques to explain as well as field work to be done in this Session;

- At the end of the previous Session 5, the facilitator should discuss with farmers and agree to **start the session at earlier time**. Also inform them and get consensus on that the Session 6 may take longer time to work in the field.
- Make sure that farmers get together **at the nursery site, not at the demo plot**.
- If the nursery and the FFS demo plot are far away from each other, **uprooting should be completed before moving to the demo plot** so that people do not need to go back and forth. (But in such a case, make extra caution to ensure that **the roots of the seedlings are kept wet** until transplanted.)
- If the transplanting in the demo plot should not be finished on the day of the session, discuss with farmers, and ensure that it should be **completed on the next day**, regardless of whether it is the group's working day or not.
- Do not forget to discuss about prevention of caseworm when explaining water management after transplanting **by using EXTENSION MATERIAL 9-1**.

Nursery Period
Use young seedlings

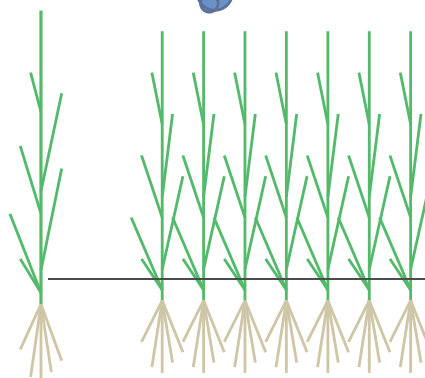


Healthy,
Vital
4 leaves

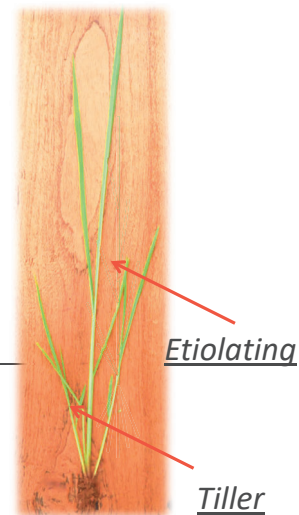


3 weeks

Too long,
Deterioration,
5 - 6 leaves,
Tillering started



more than 1 month



6-1

Session 6-1 Nursery Period

Important messages:

- 1) The seedlings in the nursery should be uprooted for transplanting when they develop the fourth leaf 2-3 weeks after sowing.

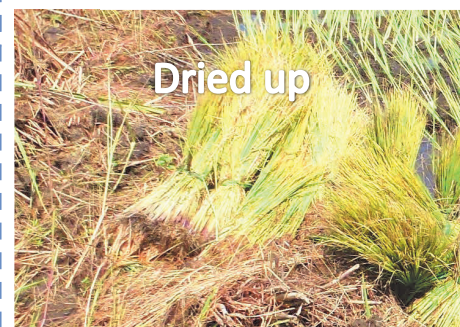
How to facilitate the session:

- 1) Introduction
 - Ask the farmers how long the nursery period is in their conventional rice farming in IVS.
 - Ask the farmers how a healthy seedling should look like. Tall or short, green or yellowish, thin or thick, and with or without tillers.

- 2) The appropriate time for uprooting seedlings
 - Tell the farmers that the appropriate seedling age for transplanting is about 2-3 weeks depending on temperature.
 - Seedlings start developing tillers at about the fourth leaf stage. It is the right time for transplanting, as the seedlings need more space to grow larger with tillers and absorb more nutrients.
 - As a new leaf develops every 4 days under the normal temperature, a seedling reaches the four leaves stage about 2-3 weeks after sowing. This is when seedlings should be transplanted.
 - If uprooting and transplanting are delayed: (1) seedlings become unhealthy with etiolation and chlorosis as a result of competition between seedlings for sunlight and nutrition, which should be avoided; (2) it takes longer time for seedlings to recover from planting shock; and (3) duration of tiller development becomes shorter after transplanting, which results in the smaller number of tillers.



Uprooting of seedlings



Dried up



Died before planting

- ✓ Uproot seedlings carefully.
- ✓ Keep root wet.
- ✓ Transplant soon after uprooting.

6-2

Session 6-2 Uprooting of Seedlings

Important messages:

- 1) The seedlings should be uprooted little by little. The soil attached to the roots should be gently removed to minimize damage to them.
- 2) The roots of the uprooted seedlings should be kept wet until the seedlings are transplanted in the main field.

How to facilitate the session:

- 1) Introduction
 - Ask the farmers how they usually uproot and handle seedlings.
 - Tell them that seedlings should be carefully uprooted and transplanted. They need tender care just like babies who need their mothers' love and care.
- 2) Handling of seedlings
 - Tell the farmers the following key points of uprooting and storage before transplanting.
 - Uproot young seedlings carefully to minimize damage to their roots and leaves. Do not pull too many seedlings out at once.
 - Gently remove soil attached to the roots of seedlings. Do not strike seedlings against other seedlings or the ground or kick them.
 - Uprooted seedlings should be transported to the main field as soon as possible.
 - Store uprooted seedlings properly. The root of the seedlings should always be wet. (Left picture)
 - Do not leave their roots without water under the sun. Seedlings become weak under dry conditions and eventually die before planting. (Right picture)

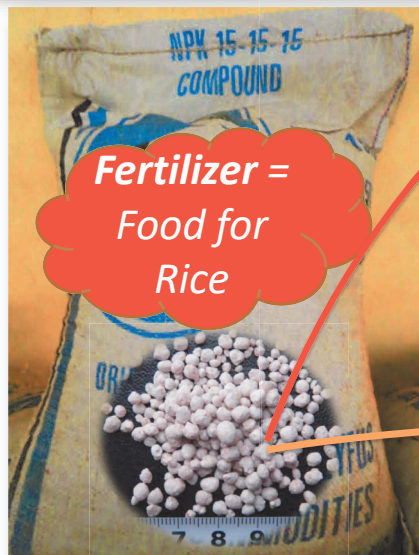
Tools and materials to be prepared: Bowl, water, palm leaves, etc.

Fertilizer Application

[1st] Basal Fertilizer Transplanting Stage



Promotion of Tillering

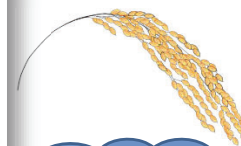
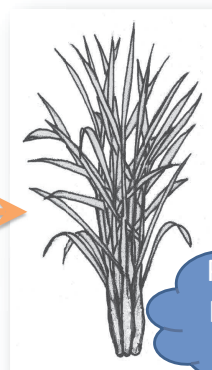


Fertilizer = Food for Rice

Fertilizer application



[2nd] Topdressing Panicle Initiation Stage



Promotion of Formation of Spikelets

Session 6-3 Fertilizer Application

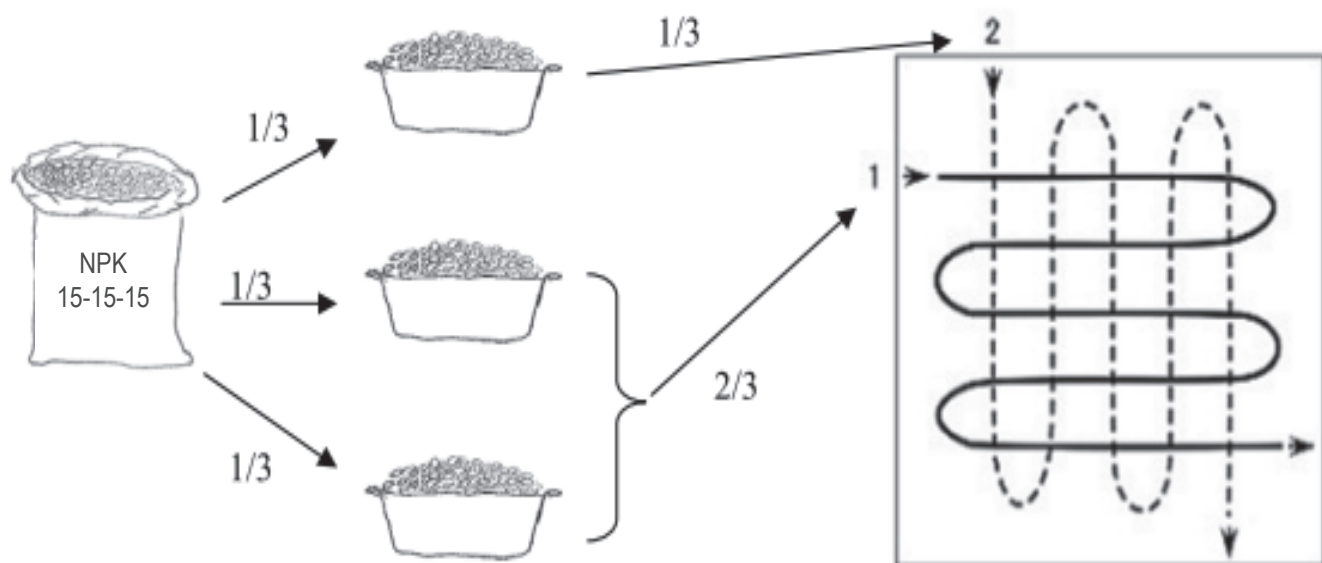
Important messages:

- 1) Chemical fertilizer is supplemental nutrition contributing to the better growth of plants. It is dissolved into water and absorbed by plants. Nitrogen, Phosphorous, and Potassium are the major elements of fertilizer.
- 2) Fertilizer should timely be applied when rice plants require more nutrients. Fertilizer is basically applied two times: (i) when tillers are produced (at the time of transplanting) and (ii) when panicles are formed (about two months before harvesting).
- 3) For lowland rice in IVS, the recommended fertilizer dose is 270 kg of compound fertilizer NPK 15-15-15 per 1 ha.

How to facilitate the session:

- 1) Characteristics of fertilizer
 - Ask the farmers what fertilizer is. Give them general information about fertilizer.
 - Fertilizer is like supplements to crops. Humans take various nutrients from foodstuff such as rice, cassava, fish, meat, eggs, vegetables, oil, etc., to grow or maintain their bodies. Crops also need minerals including nitrogen (N), phosphorus (P), and potassium (K) for their growth, and minerals are contained in soils and absorbed by crops through roots. Since the amount of minerals in the soil is normally insufficient for healthy crop growth, fertilizer is used to supplement the minerals.
 - Compound fertilizer of NPK 15-15-15 contains the three main essential elements with a balanced proportion of 15% each.
- 2) Time for fertilizer application
 - Tell the farmers that fertilizer should be applied at two separate times when rice plants require more nutrients as follows;
 - a) The first time (Basal application) at transplanting (2-3 weeks after sowing)
 - It is when a seedling develops its fourth leaf or starts to develop tillers. Basal application is effective in increasing the number of tillers as well as in growing rice plants larger.
 - b) The second time (topdressing) at about 60 days before full maturity
 - This timing corresponds to the panicle initiation stage. Topdressing contributes to an increase in the number of grains per panicle and grain-filling.
- 3) Fertilizer application rate
 - The recommended fertilizer dose for different size of the land is as follows
 - 1 acre (4,000 m²): NPK 110 kg (2.2 bags of fertilizer) in total, for basal application, 75 kg (1.5 bags)
 - 1,000 m²: NPK 27 kg (24 liter-cups of fertilizer) in total, for basal application, 18 kg (16 liter-cups)
 - 500 m²: NPK 13 kg (12 liter-cups of fertilizer) in total, for basal application, 9 kg (8 liter-cups)

Proper way of fertilizer application for even distribution 1



6-4

Session 6-4 How to Apply Fertilizer 1

Important messages:

- 1) Fertilizer should equally be spread across the plot.

How to facilitate the session:

1) Timing of fertilizer application

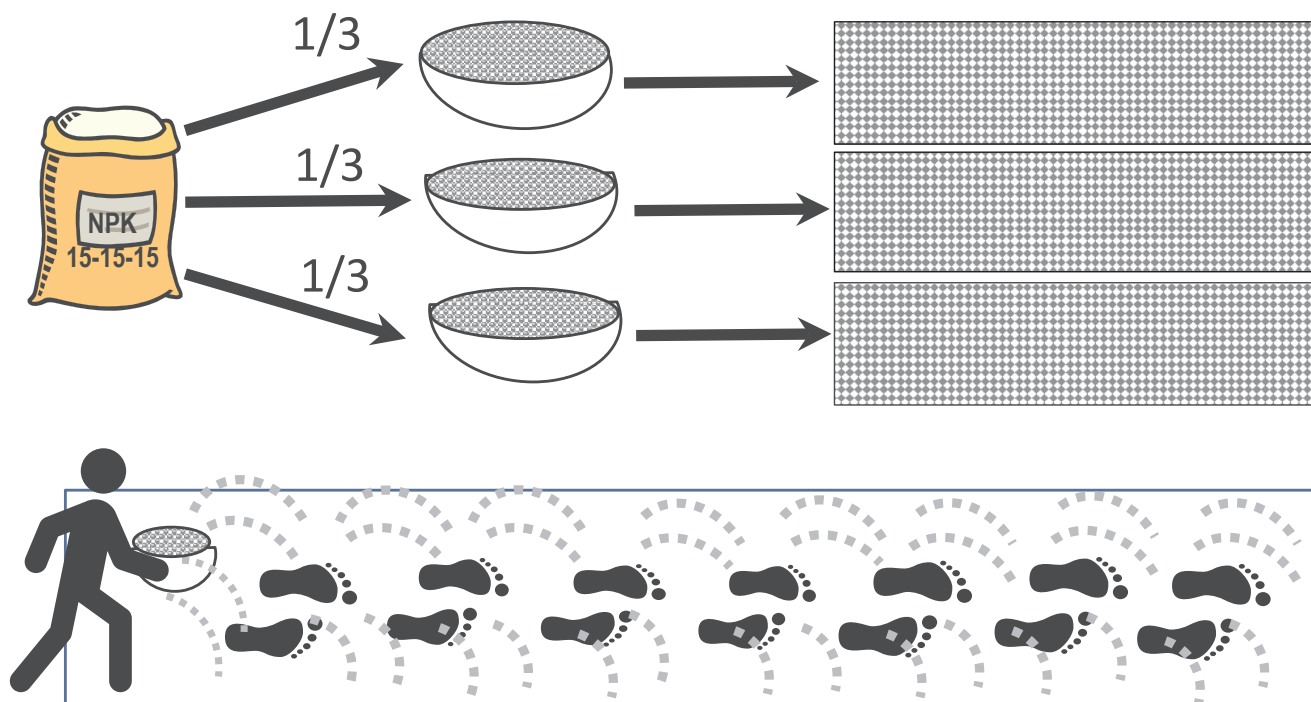
- Tell the farmers how to apply basal fertilizer at transplanting.
 - Fertilizer applied to the soil surface just before transplanting will be mixed into the soil as the farmers walk through the plot to plant seedlings. The effects of fertilizer last longer if its nutrition elements are held by soil particles.

2) Method of fertilizer application

- Fertilizers should be applied equally across a field to promote the uniform growth of rice plants. Explain to the farmers how to apply fertilizer evenly in a plot as follows: (Picture on the left)
 - Divide the fertilizer into three portions and broadcast them separately at an orthogonal angle as shown in the figure.

Tools and materials to be prepared: Fertilizer, bucket, bowls

Proper way of fertilizer application for even distribution 2



6-5

Session 6-5 How to Apply Fertilizer 2

Important messages:

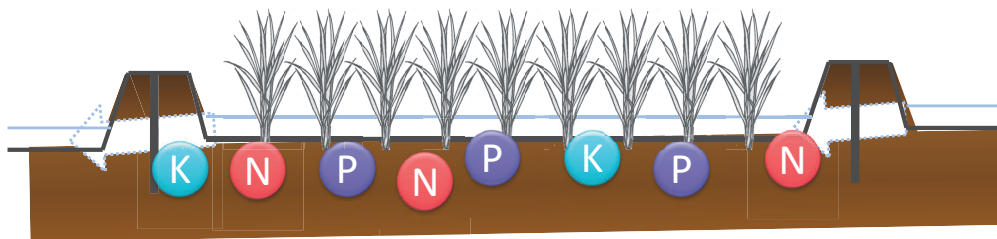
- 1) There is another method to ensure the uniform application of fertilizer across the plot.

How to facilitate the session:

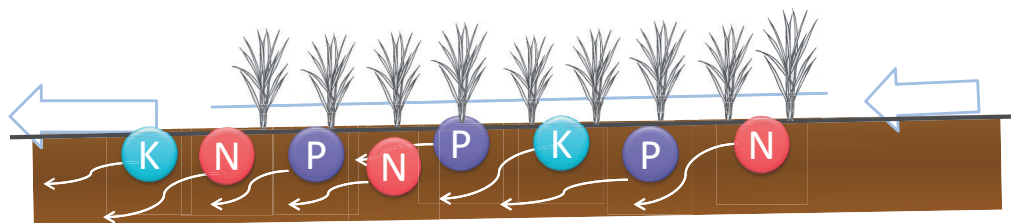
- Explain to the farmers that there is another method of fertilizer application as follows;
 - Divide the fertilizer into three (3) portions.
 - Divide the plot into three (3) areas in line.
 - Apply one-third of fertilizer to the first line area by casting the fertilizer to the left and right while walking straight. Make sure that all of the fertilizer was evenly broadcasted by the time to reach the end of the line area. If some fertilizer is left at the end, go back to the same line area to add the remaining fertilizer to the places where the farmer has cast less amount.
 - Repeat the same procedure in the other two areas in line.

Tools and materials to be prepared: Fertilizer, bucket, bowls

Water control can enhance fertilizer use efficiency.



With bunds, nutrients contained in fertilizer will stay in the field and absorbed by rice plants



Nutrients contained in fertilizer will be washed away with running water unless water control measures are properly taken.

6-6

Session 6-6 Water Management and Fertilizer

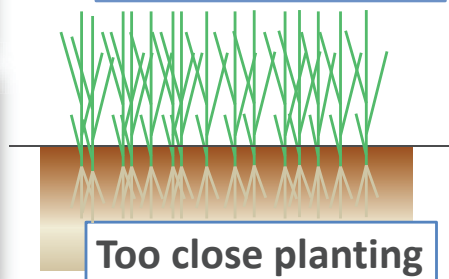
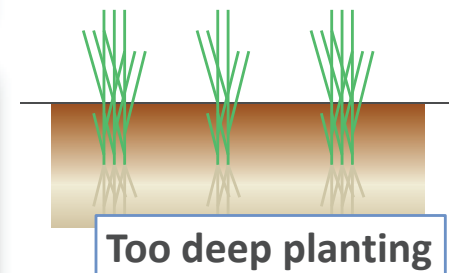
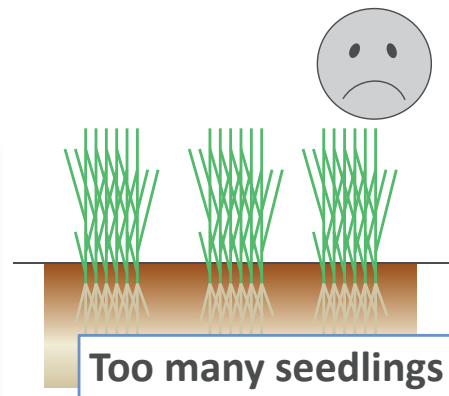
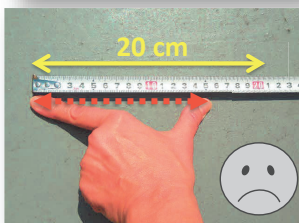
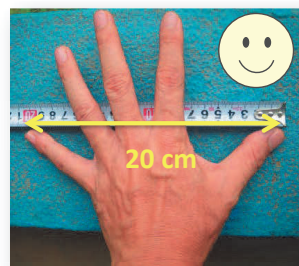
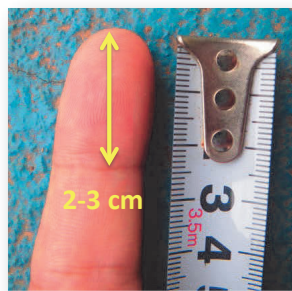
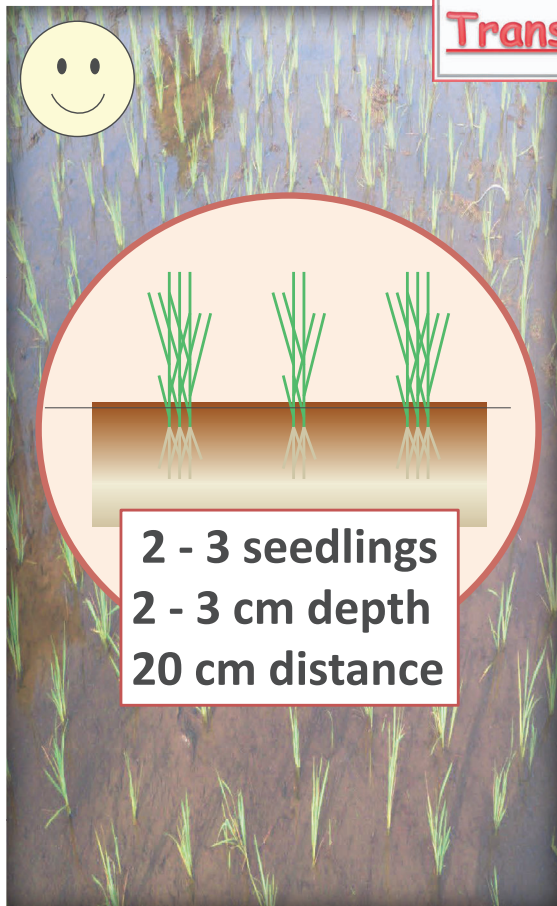
Important message:

- 1) Chemical fertilizer is supplemental nutrition contributing to the better growth of the plant. It is dissolved into water and absorbed by the plant. Nitrogen, Phosphorous, and Potassium are major elements of fertilizer.
- 2) Fertilizer is only effective under water-controlled conditions. If drainage and bund are not constructed or not functioned, nutrients added by fertilizer may easily be washed away from the plot.
- 3) Stable and lower (as low as possible) water level in a plot is a preferable condition for fertilizer application.

How to facilitate the session:

- 1) The necessity of water management
 - Remind farmers that bunds are important in settling water and nutrients in the field because without them water does not stay in the field flowing away with nutrients.
 - 2) Method of water management
 - Tell the farmers the general principles of water management in a rice field.
 - The water level in the field surrounded by bunds can be controlled by opening and closing the inlet and outlet installed on the bunds in the higher and lower part of the field, respectively.
 - Tell the farmers that water should be settled in the field at the time of fertilizer application and that low water levels are preferable for efficient uptake of nutrients by plants, and explain as follows:
 - Running water may wash nutrients supplied by fertilizer away from a plot. Thus, water should be kept in the plot by bunds until nutrients are taken up by rice plants.
 - For a given amount of fertilizer, the concentration of its nutrients is higher in a lower volume of water than in a higher volume of water. Thus, the water level in a plot should be low for rice plants to take up nutrients more efficiently.
- ☆ Give the farmers a hint: One teaspoonful of sugar dissolved in a large water basin is not sweet and hard to drink all. The same amount of sugar dissolved in a small glass of water is sweet and easy to drink all.

Transplanting Method



6-7

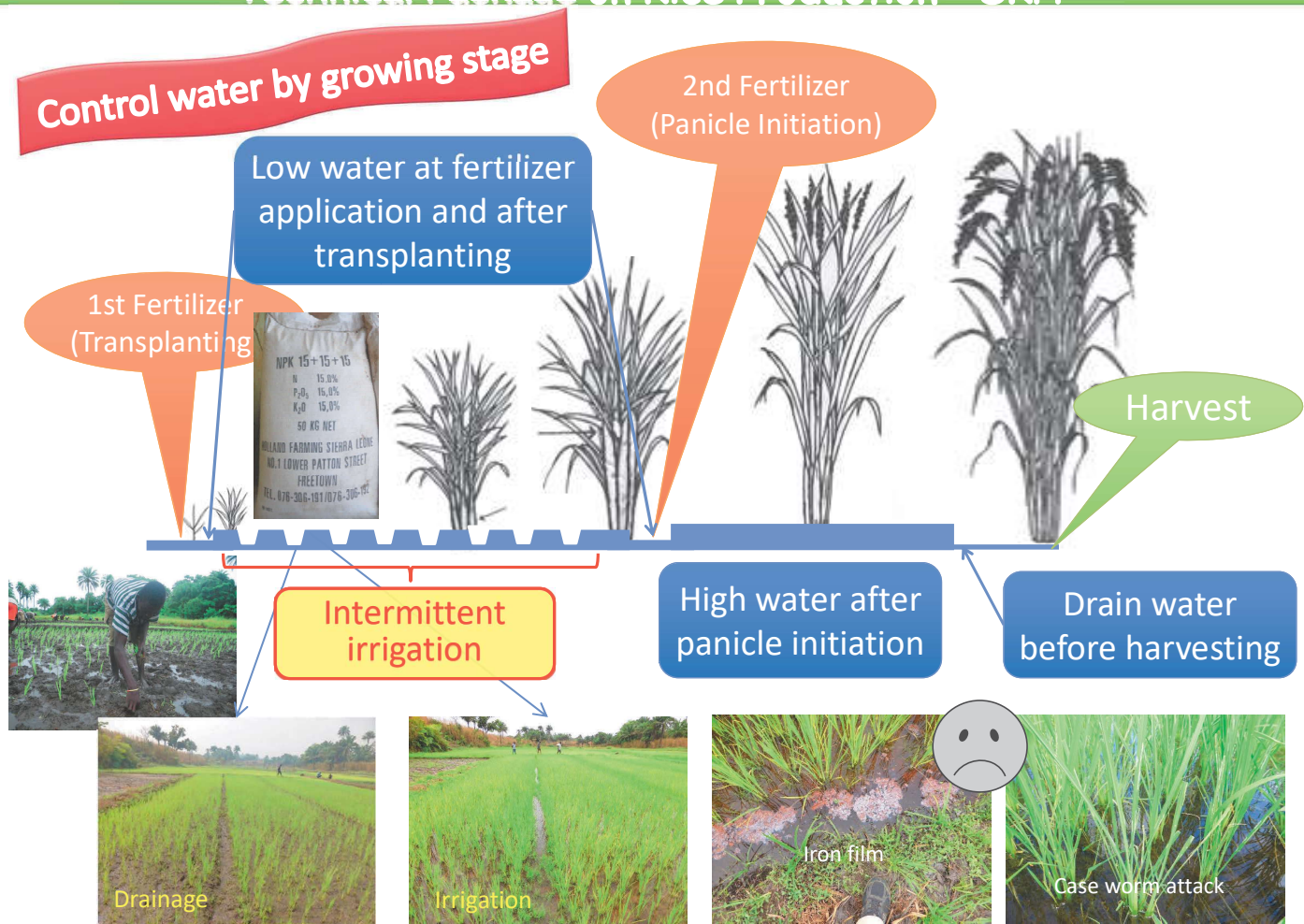
Session 6-7 Transplanting Method

Important messages:

- 1) Transplanting should be done with 2 to 3 seedlings per hill at 20 cm apart between hills.
- 2) The depth of the planting should be 2 to 3 cm.

How to facilitate the session:

- 1) Number of seedlings per hill
 - Tell the farmers that the recommended number of seedlings per hill is only two to three (2-3) because of the following reasons:
 - A single rice plant has the potential to develop many tillers. A few seedlings could develop enough tillers to attain a higher yield.
 - Using fewer seedlings per hill can save seed rice.
 - When too many seedlings are planted on a hill, they do not grow healthily due to competition with other seedlings.
- 2) Density of transplanting
 - Tell the farmers that the appropriate distance between hills is about 20 cm because of the following reason.
 - Closer planting or higher hill density inhibits active tillering and weakens rice plants.
 - Tell the farmers that 20 cm can be measured by the distance between a thumb and little finger when the palm is widely open.
- 3) Planting depth
 - Tell the farmers that the suitable transplanting depth is only 2-3 cm from the soil surface because of the following reasons:
 - A sufficient number of tillers can be secured by shallow planting.
 - Deep planting (e.g., 10 cm or more) leads to delays in the start of tillering. The vegetative growth period is limited especially for short-duration varieties. Thus, deep planting significantly reduces the number of tillers and panicles per hill, resulting in a yield decrease.
 - Tell the farmers that 2-3 cm can be measured by the distance between the tip of the forefinger and its first joint.



Session 6-8 Water Management at Transplanting and after

Important messages:

- 1) At transplanting, the soil of the main field should be saturated with water, well puddled, and leveled.
- 2) After transplanting, the water level should be kept low for several days to promote the seedlings' root development.
- 3) During the vegetative growth stage, intermittent irrigation should be practiced with about one-week intervals to mitigate iron toxicity and avoid case worm damage.

How to facilitate the session:

- 1) Transplanting and water management
 - Tell the farmers the following points to be kept in mind regarding the water management at transplanting
 - The soil of the main field should be saturated with water, well puddled, and leveled.
 - Floodwater may wash out young rice plants that have just been planted in the field. Farmers should note that the seedlings should be transplanted in a static water condition, like in a plot surrounded by bunds, to protect them from the risk of being washed out by floodwater.
 - The water level in the main field should be kept low for several days after transplanting to promote the seedlings' root development, to prevent shallow-planted seedlings from floating away, and to keep the nutrients of the fertilizer in the soil.
- 2) Water management after transplanting during the vegetative growth stage
 - Tell the farmers the following points to be kept in mind regarding the water management after transplanting
 - During the vegetative growth stage, intermittent irrigation should be practiced. It is a water management technique: draining out water from the field and drawing water into the field alternately at about one-week intervals.
 - This technique will allow the soil to dry periodically and exchange gas produced in the soil under the water with the air during the drainage period, which activates the roots of rice plant.
 - Through the adoption of the intermittent irrigation, it is expected that iron toxicity problem will be mitigated, and damage of case worm will be prevented.

Prototype Flow of Activities in FFS Session 7

Tools & materials prepared (brought to the FBO or arranged to be available on site)

a) Extension Material on the TP-R 7-1, 7-2, and 7-3

b) Farm tools to work in the plot

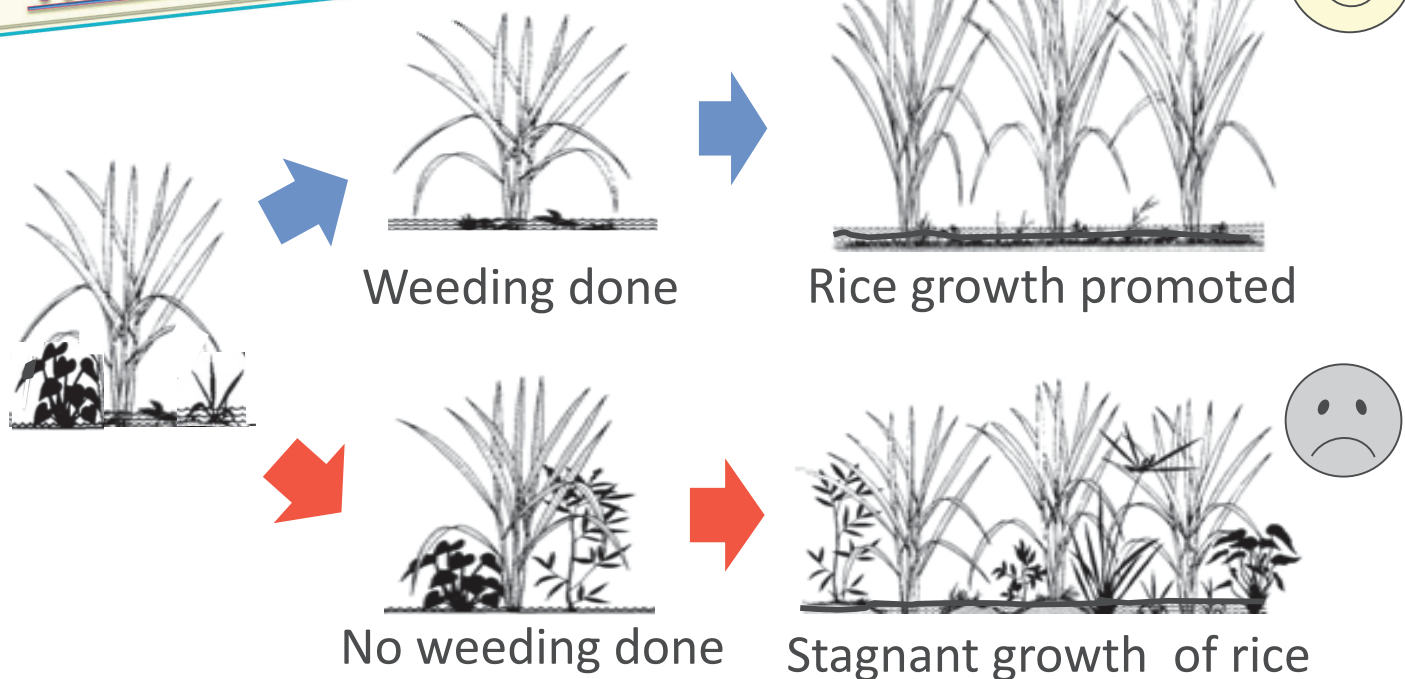
Time	Topic	Methodology	Contents	What to do and cautions to be made
0900 – 0930	Introduction to Session 7	Explanation in plenary meeting	- Recapitulation of the previous session 6 - Introduction of the topics to be covered in the Session 7	- Reinforce the important points in previous session 6. Ask the farmers whether they have controlled the water after transplanting.
0930 – 1000	Weed management	Plenary discussion using Material 7-1	- Importance of weeding	- Emphasize the negative effects of weeds on the growth of rice
1000 – 1030	Timing of weeding	On-site explanation using Material 7-2 & 7-3	- Optimal timing of weeding - Method of weeding	- Move to the demo plot and observe the weed conditions with farmers
1030 – 1200	Actual weeding in the demo plot	Group work in the demo plot	- Identification of even very small weeds - Removal of roots of the weeds - Hand tilling at weeding	- At the demonstration, pick up weeds of different size and reinforce the importance of removing them when they are still small. - Let some farmers to try to pick up some weeds and confirm that the roots are also removed.
1200 – 1230	Wrap up & Way Forward	Plenary discussion	- Review of the important points of the session 7 - Confirmation on the schedule of next FFS session and work to be done by the FBO.	- Ask if the farmers would try what they have learnt in their individual farms and record in the FFS report.

Cautions to be made in facilitating Session 7:

If the farmers insist that there is no weed in the demo plot, the facilitators should convince the farmers by:

- conducting field monitoring after the previous session at around 2 weeks after transplanting to observe the conditions by yourselves.
- Also, **emphasize the importance of early weeding** and explain the consequence of allowing the weeds to grow.

Weed control



Source: modified based on "A Farmer's Primer on Growing Rice"; IRRI; 1992

7-1

Session 7-1 Weed Management

Important messages:

- 1) Weeds should be removed from rice fields because they compete with rice plants for nutrition, water, sunlight, space, etc.

How to facilitate the session

- 1) Introduction
 - Ask the farmers if they usually weed their fields (upland and lowland).
 - Ask the farmers why weeding is important.

- 2) Necessity of weeding
 - Give the farmers a general idea on weeding as follows:
 - Both lowland rice and upland rice need weeding.
 - Weeds compete with rice plants for nutrition, sunlight, water, etc., thereby hindering rice growth and leading to less grain yield.
 - A rice field should be kept clean by weeding especially when applying fertilizer as the weed can further elongate due to nutrients.



7-2

Session 7-2 Timing and Method of Weeding

Important message:

- 1) Weeding should be conducted at the timing of 2-3 weeks after transplanting when weeds are still small, for rice plants to grow faster without competitors.

How to facilitate the session:

- 1) Timing of weeding
 - Tell the farmers that by timely and thorough weeding, rice plants grow faster by getting more nutrition, sunlight, water, etc.
 - The first weeding should be conducted at about 2-3 weeks after transplanting when rice plants develop the root system and weeds appear in the field. The timing of weeding can be adjusted depending on the field condition. Weeding in an early growth stage is important in lessening the competition for rice plants to grow and in reducing workload.
 - The second weeding should also be done before applying topdressing to ensure the effects of fertilizer.
 - Frequent removal of weeds is recommended to allow the rice plants to fully utilize the nutrients in the soil.
- 2) Method of weeding
 - Ask the farmers how to remove and reduce weeds; give them some advice including the following:
 - In Sierra Leone, hand weeding is common, which is laborious. To lessen the work, weeding should be done at earlier stage, when weeds are still small (about 2-3 weeks after transplanting for the first weeding).
 - Before weeding, the rice field should be irrigated until the water depth is up to about 5 cm. Under the submerged condition, scratching the soil will be effective and efficient weeding method to uproot the weeds from the soil. Uprooted weeds will be floated on the water, which should be collected and taken out from the field.
 - Before top dressing, sizeable weeds should be removed to avoid further competition with rice.

Right time for weeding



Too late



Prototype Flow of Activities in FFS Session 8

Tools & materials prepared (brought to the FBO or arranged to be available on site)

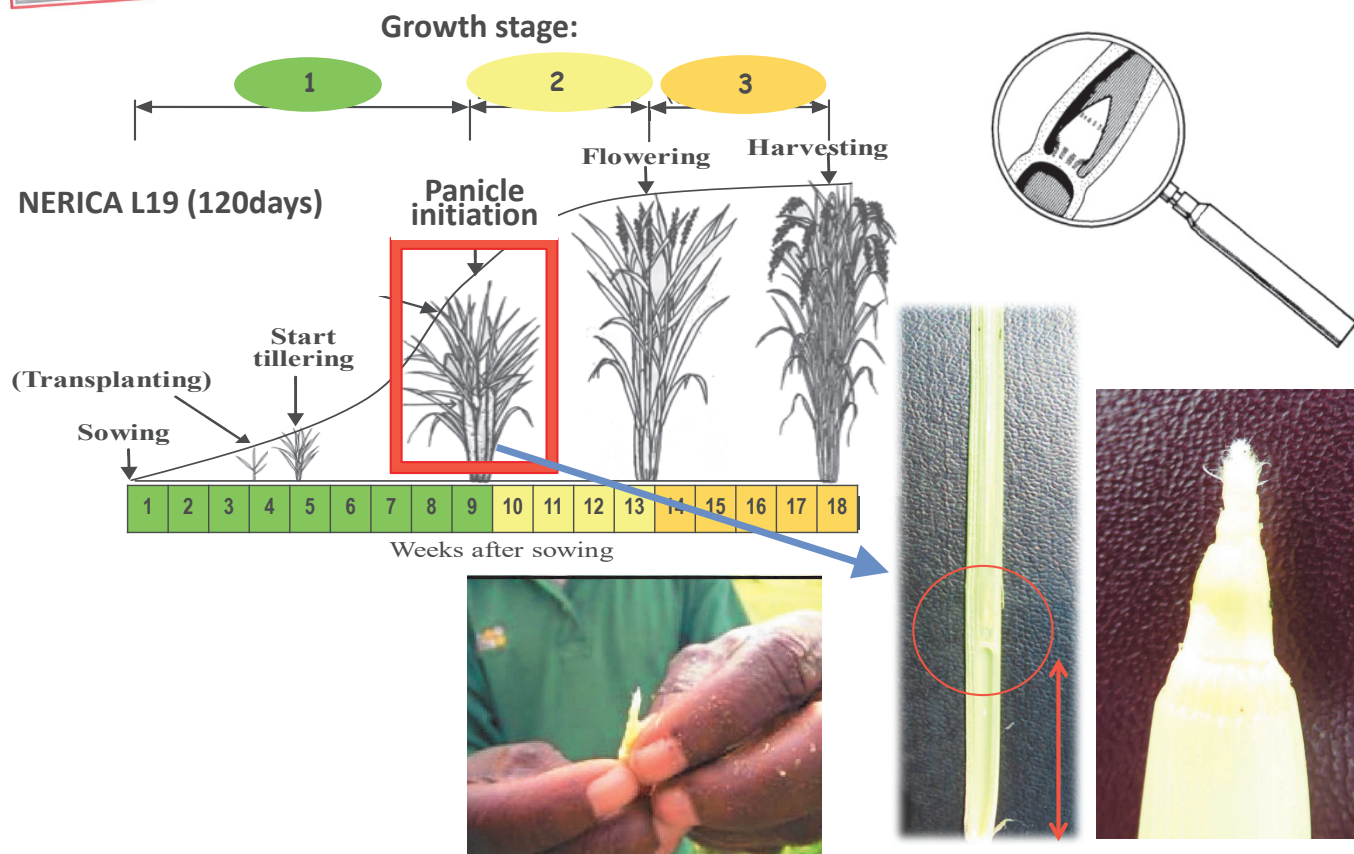
- a) Extension Material on the TP-R 8-1, 8-2, and 8-3
- b) Small knife or scissors to cut the stem of rice plant
- c) Fertilizer for topdressing and head pans

Time	Topic	Methodology	Contents	What to do and cautions to be made
0900 – 0930	Introduction to Session 8	Explanation in plenary meeting	<ul style="list-style-type: none"> - Recapitulation of the previous session 7 - Introduction of the topics to be covered in the Session 8 	<ul style="list-style-type: none"> - Confirm that the farmers remember the important points in previous session 7. - Ask the farmers whether they did weeding in the demo plot as well as in their individual farms.
0930 – 1000	Identification of panicle initiation	On-site explanation using Material 8-1	<ul style="list-style-type: none"> - Panicle initiation as critical stage to increase the number of grains in panicles 	<ul style="list-style-type: none"> - Discuss with farmers how they identify panicle initiation (by observation of colour, opening of stems, etc.) and confirm those symptoms in the demo plot.
1000 – 1030	Topdressing	On-site explanation using Material 8-2	<ul style="list-style-type: none"> - Importance of topdressing at panicle initiation stage - Method of fertilizer application 	
1030 – 1130	Demonstration and actual application in the demo plot	Group work in the demo plot	<ul style="list-style-type: none"> - Demonstrate the fertilizer application first, then ask the farmers to apply the fertilizer in the entire demo plot. 	
1130 – 1200	Water Management and Fertilizer	Plenary discussion using Material 8-3	<ul style="list-style-type: none"> - Importance of water management to maximize the effects of fertilizer 	<ul style="list-style-type: none"> - Remind the farmers about the importance of water management (which was once taught at basal application)
1200 – 1230	Wrap up & Way Forward	Plenary discussion	<ul style="list-style-type: none"> - Review of the important points of the session 8 - Confirmation on the schedule of next session and work to be done by FBO until next session. 	<ul style="list-style-type: none"> - Ask if the farmers would try what they have learnt in their individual farms and record in the FFS report.

Cautions to be made in facilitating Session 8:

The facilitators should explain to the farmers that the rice has come to the reproductive stage and remind them of the yield component that is to be determined at this stage.

Panicle initiation



8-1

Session 8-1 Identification of Panicle Initiation

Important message:

- 1) During the panicle initiation stage, the rice plant turns pale, grows taller, and becomes stiff at the stem base.

How to facilitate the session:

1) Identification of the panicle initiation stage

- Tell the farmers how to identify the panicle initiation stage when topdressing should be applied.
 - Panicles start to form about 2 months before the full maturity, irrespective of the variety. For example, NERICA L19, a 4-month variety, reaches the panicle initiation stage about 2 months after sowing; while the one for Pa Kiamp, a 4.5-months variety, is about 2.5 months after sowing.
- Ask the farmers to describe the changes they notice in the appearance of rice plants before heading. Then, describe to them several ways to identify the panicle initiation stage, including the following:
 - Panicle initiation is not directly observable. A small panicle is formed inside the stem base where it starts to grow. About one week after panicle initiation, the panicle can be observed inside the stem base by stripping off the outer leaf sheaths with fingers or by splitting the bottom of the stem vertically in half with a sharp blade. When a small panicle is observed in several plants in the field, it is time to apply topdressing.
 - There are also several changes in the appearance of rice plants during the panicle initiation stage. The color of the entire rice plant turns yellowish. The plants grow taller by elongating internodes, and their stem base becomes stiff. When these changes are observed, topdressing should be applied.

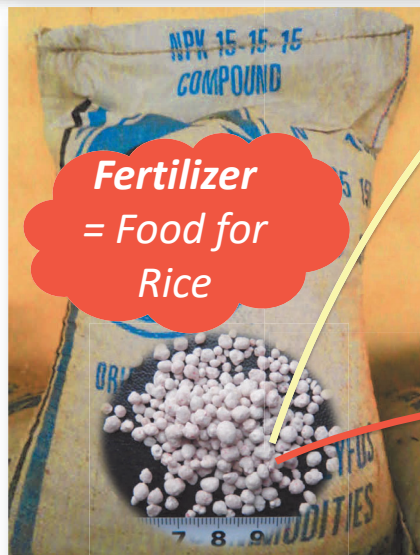
Fertilizer Application



[1st] Basal Fertilizer Transplanting Stage



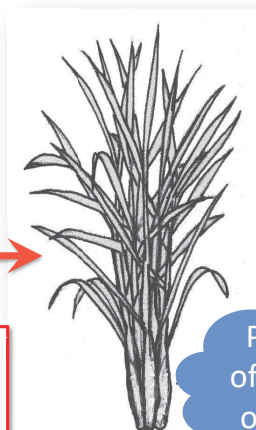
Promotion of Tillering



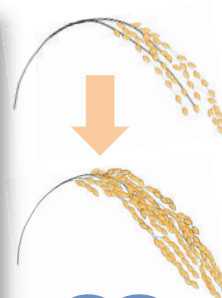
Fertilizer = Food for Rice



[2nd] Topdressing Panicle Initiation Stage



Promotion of Formation of Spikelets



8-2

Session 8-2 Topdressing

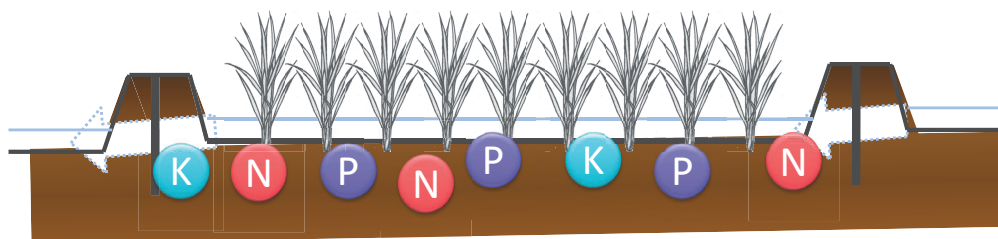
Important messages:

- 1) The purpose of topdressing is to increase the number of filled grains.
- 2) Topdressing should be applied at the panicle initiation stage when the rice plant starts forming panicles with spikelets; one-third of the total amount of fertilizer should be used for topdressing.

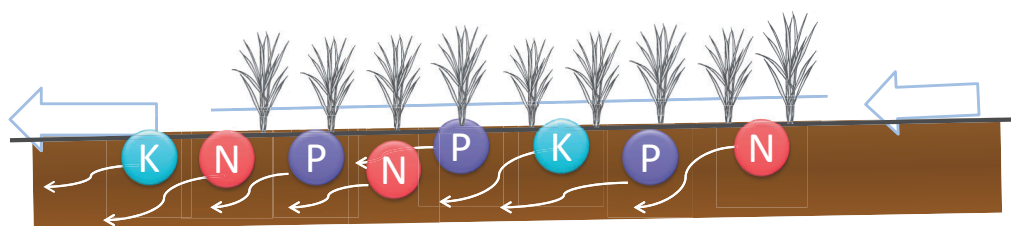
How to facilitate the session

- 1) Introduction
 - Ask the farmers why topdressing should be applied.
 - Ask them how to determine the appropriate time of topdressing.
- 2) Necessity and method of topdressing
 - Explain to the farmers why topdressing is necessary:
 - At a certain point in its life cycle, the rice plant forms panicles where grains are produced. This is called the panicle initiation stage. In this stage, the plant needs more nutrients and energy to produce grains while maintaining its life. Topdressing helps the plants to produce more grains, which leads to a higher yield.
 - Explain to the farmers how to apply topdressing:
 - Topdressing should be applied at a rate of NPK=13-13-13 kg/ha, which is half of the basal application (one-third of the total).
 - Confirm that the second weeding has already been done before application of topdressing (second fertilizer application). If sizeable weeds are still observed in the plots, they should be removed before topdressing.

Water control can enhance fertilizer use efficiency.



With bunds, nutrients contained in fertilizer will stay in the field and absorbed by rice plants



Nutrients contained in fertilizer will be washed away with running water unless water control measures are properly taken.

8-3

Session 8-3 Water Management and Fertilizer (Review of Session 6-6)

Important message:

- 1) Chemical fertilizer is supplemental nutrition contributing to the better growth of plants. It is dissolved into water and absorbed by plants. Nitrogen, Phosphorous, and Potassium are major elements of fertilizer.
- 2) Fertilizer is only effective under water-controlled conditions. If drainage and bund are not constructed or not functioned, nutrients added by fertilizer may easily be washed away from the plot.
- 3) Stable and lower (as low as possible) water level in a plot is a preferable condition for fertilizer application.

How to facilitate the session:

- 1) The necessity of water management
 - Remind farmers that bunds are important in keeping water and nutrients in the field because without them water leaks out of the field taking nutrients away with it.
 - 2) Method of water management
 - Tell the farmers the general principles of water management in a rice field.
 - The water level in the field surrounded by bunds can be controlled by opening and closing the inlet and outlet installed on the bunds in the higher and lower part of the field, respectively.
 - Tell the farmers that water should be settled in the field at the time of fertilizer application and that low water levels are preferable for efficient uptake of nutrients by plants, and explain as follows:
 - Running water may wash nutrients supplied by fertilizer away from a plot. Thus, water should be kept in the plot by bunds until nutrients are taken up by rice plants.
 - For a given amount of fertilizer, the concentration of its nutrients is higher in a lower volume of water than in a higher volume of water. Thus, the water level in a plot should be low for rice plants to take up nutrients more efficiently.
- ☆ Give the farmers a hint: One teaspoonful of sugar dissolved in a large water basin is not sweet and hard to drink all. The same amount of sugar dissolved in a small glass of water is sweet and easy to drink all.

Prototype Flow of Activities in FFS Session 9

Tools & materials prepared (brought to the FBO or arranged to be available on site)

a) Extension Material on the TP-R 9-1, 9-2, and 9-3

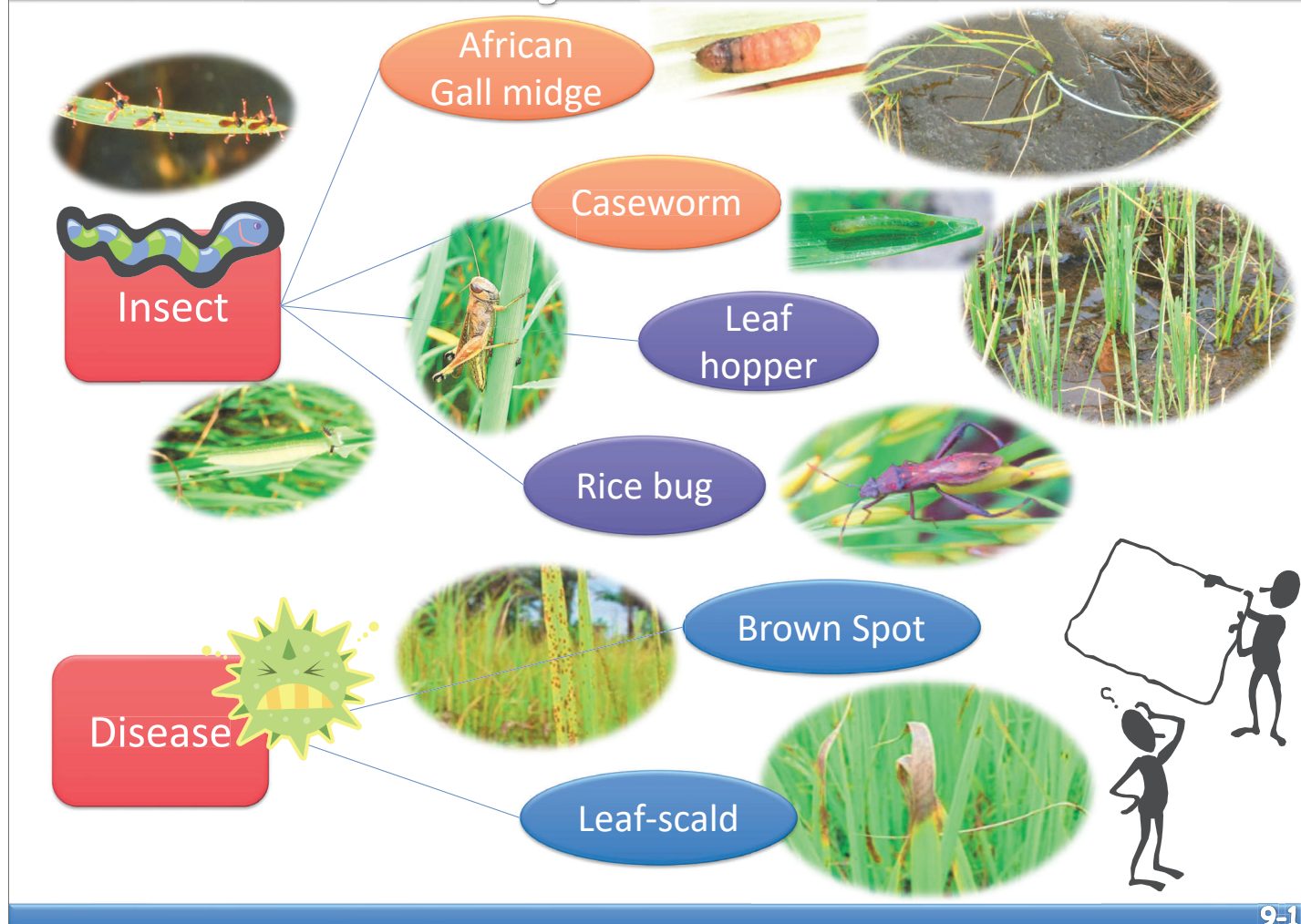
b) Sample of damaged rice plants, if any available

Time	Topic	Methodology	Contents	What to do and cautions to be made
0900 – 0930	Introduction to Session 9	Explanation in plenary meeting	- Recapitulation of the previous session 8 - Introduction of the topics to be covered in the Session 9	
0930 – 1000	Control of Pests and diseases	Plenary discussion using Material 9-1	- Importance of early detection and proper management - Checking in the demo plot together with farmers	- Emphasize that the farmers should regularly monitor the plot and inform the extension staff immediately in case of any symptom observed.
1000 – 1030	Prevention of damages by Rodents	On-site explanation using Material 9-2	- Damages by rodents - Methods of keeping rodents away	
1030 – 1100	Prevention of damages by birds	On-site explanation using Material 9-3	- Damage by birds - Methods of keeping birds away	- Emphasize the importance of bird scaring especially in the IVS where not many farmers are growing rice in the dry season. - Tell the farmers to start vigilance at the milking stage when the birds may start attacking the grains.
1100 – 1130	Wrap up & Way Forward	Plenary discussion	- Review the important points of the session 9 - Confirmation on the schedule of next session.	- Ask if the farmers would try any of the methods that they have learnt in their individual farms and record in the FFS report.

Cautions to be made in facilitating Session 9:

The facilitators should

- emphasize the important precaution against the birds' attack by explaining that the bird attack will start at the time of flowering.
- discuss with the farmers to make **internal arrangement for them to take turn to do bird scaring** on a regular basis.



Session 9-1 Control of Insect Pests and Diseases

Important messages:

- 1) The early detection of insect pests and diseases is important in implementing effective countermeasures; therefore, frequent field inspection is necessary.
- 2) Farmers should consult the extension workers about the control measures against pests and diseases as soon as they observe such damage.

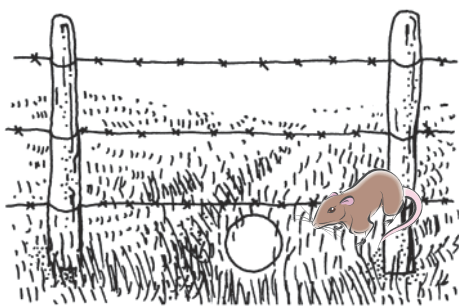
How to facilitate the session

- 1) Introduction
 - Ask the farmers what kind of insect pests and diseases they find in their rice fields.
- 2) Presentation on insect pests of rice and control measures
 - Present the following to the farmers:
 - Two common insect pests are African gall midge and caseworm, which are observed up to the active tillering stage of the rice plant. Other insect pests of rice include leafhopper and rice bug. Stem borer and stalked-eye fly may also be found but they are not quite common as the other insect pests.
 - To mitigate the damage by caseworm, draining of the field is effective since the insect cannot respire in the air.
 - To prevent damage by Africa rice gall midge (ARGM), host plants like wild rice found surroundings of rice fields should be removed and burned in the off-season to disturb the life cycle of ARGM and decrease the population.
- 3) Presentation on rice diseases
 - Present the following to the farmers:
 - Brown spot and related fungal diseases are common and found across the rice-growing agroecology. Brown spot is a physiological disease, caused by the nutrient imbalance in the rice plant. It is rare to be found in rice plants grown in fertile soil.
 - Leaf-scald is a disease that could be caused by both fungal and physiological factors.
- 4) Observation of insect pests and disease if any in the demonstration plot
 - Visit the FFS demonstration plot with the farmers and have them carefully observe insect pests and diseases if any.
 - Ask the farmers to write down the results of their observation on a flipchart; discuss control measures against the pests and diseases with them.

Rodents



Rats



2

9-2

Session 9-2 Prevention of Damage from Rodents

Important message:

- 1) Rodents (cutting grasses and rats) should be kept away from the field by fencing, traps, cleaning bunds, and slashing the surrounding bushes.

How to facilitate the session:

- 1) Introduction
 - Ask the farmers what kind of animals cause damage to rice plants in their field during the grain-filling stage and how serious the damage was in the previous season.
- 2) Prevention of damage from rodents
 - Explain to the farmers how rodents (cutting grasses and other rats) damage the rice and tell them about measures to prevent possible damage.
 - Cutting grasses move in groups, trample over rice plants, chop them, and chew them into pieces from the booting through harvesting stages. Preventive measures include clearing weeds and bushes in and around the field, fencing with snares, hunting, and pitfalls. These measures should be taken as soon as a sign of damage is found in the field to minimize damage.
 - Rats eat grains in the field as well as in the storage. Measures against rats include setting the metal snap traps, clearing weeds and bushes in and around the field, and keeping water in the field until the time of harvest.

Birds



Damaged by weaverbirds



9-3

Session 9-3 Prevention of Damage from Birds

Important message:

- 1) Birds (mainly weaverbirds) should be kept away from the field by scaring them immediately after flowering.
- 2) Bird scaring is essential to protect the rice at the final stage, without which all the efforts made and resources spent so far will be wasted.

How to facilitate the session

- 1) Introduction
 - Ask the farmers what kind of birds cause damage to rice plants in their field during the grain-filling stage and how serious the damage was in the previous season.
 - Ask the farmers how they usually scare birds. Discuss with them the effectiveness of different scaring methods.
- 2) Scaring of birds
 - Explain to the farmers about the damages by birds and tell them about the recommended method as follows:
 - Birds (mainly weaverbirds) damage rice grains at the milky stage by chewing.
 - To reduce bird damage, take measures such as putting up scarecrows, hanging tin cans, beating cans or drums, shouting, throwing stones, searching and destroying bird nests, and removing roosting sites.
 - Working in groups in adjacent fields at the same time is also effective in keeping birds away.
 - Tell the farmers not to rely on small children to do the bird-scaring as they do not understand the importance of the work.
 - Emphasize that the bird-scaring is important to secure the harvest and that if the bird-scaring is not properly done, all the efforts made and resources spent so far will be wasted.
 - Discuss with the farmers the effective ways to conduct regular bird-scaring for the FFS plots, such as setting an internal rule to organize small groups among members and assign the groups to take turns.

Prototype Flow of Activities in FFS Session 10

Tools & materials prepared (brought to the FBO or arranged to be available on site)

a) Extension Material on the TP-R 10-1, 10-2, and 10-3

b) Farm tools for harvesting, tarpaulin sheets, rice sacks weighing scale, moisture meter, pallets/timber sticks

Time	Topic	Methodology	Contents	What to do and cautions to be made
0830 – 0900	Introduction to Session 10	Explanation in plenary meeting	<ul style="list-style-type: none"> - Recapitulation of the previous session 9 - Introduction of the topics to be covered in the Session 10 	<ul style="list-style-type: none"> - Confirm that the farmers remember the important points discussed in previous session 9. - Ask the farmers whether they had any problems of pests and diseases and what countermeasures were taken in the demo plot as well as in their individual farms.
0900 – 0920	Timing of harvest	On-site explanation using Material 10-1 and observation of the demo and conventional plots	<ul style="list-style-type: none"> - Identification of appropriate timing of harvest - Comparison among the demo plots and the conventional plot 	<ul style="list-style-type: none"> - Discuss with the farmers the negative effects of improper harvest timing on production. - Ask the farmers to observe how different the rice in demo plots and conventional plots are and discuss about the possible factors that made differences
0930 – 0940	Post-harvest handling 1	On-site explanation using Material 10-2	<ul style="list-style-type: none"> - Proper way of drying and cautions 	<ul style="list-style-type: none"> - Ask the ordinary way of harvesting and threshing by the farmers and discuss about the possible negative effects of improper methods.
0940 – 1000	Post-harvest handling 2	On-site explanation using Material 10-3	<ul style="list-style-type: none"> - Proper way of storing 	<ul style="list-style-type: none"> - Ask the ordinary way of drying and storing by the farmers and discuss about the possible negative effects of improper methods.
1000 – 1330	Actual harvesting, threshing, drying, and yield measurement	Group work in the demo plots	<ul style="list-style-type: none"> - Harvesting in the demo plots - Threshing and drying of the harvested rice - Yield measurement and recording 	<ul style="list-style-type: none"> - Divide the members into 3 groups, i.e. one to cut in the demo plots, another to transport the rice to threshing ground, and the 3rd to thresh, winnow, dry and bag the grains. - If both plots are to be harvested on the same day, harvesting, threshing, and drying should separately be done for demo plot WITH fertilizer first, and then for the demo plot WITHOUT fertilizer, so as not to mix them up for accurate measurement of yield for comparison.
1330 – 1400	Wrap up & Way Forward	Plenary discussion	<ul style="list-style-type: none"> - Review of the important points of the session 10 - Confirmation on the schedule of harvesting in the conventional plot and the work to be done by FBO by that time. 	<ul style="list-style-type: none"> - Ask if the farmers would try what they have learnt in their individual farms and record in the FFS report. - Discuss and agree with farmers on the date to harvest the conventional plot as well as the date to hold FFS session 11.

Cautions to be made in facilitating Session 10:

For yield survey, harvesting, threshing, and winnowing are to be done in one day, which some farmers misunderstand as a part of the TP-R. The facilitators should explain that this is **not a technical recommendation**, but for the accurate measurement of the yield performance.



10-1

Session 10-1 Timing of Harvest

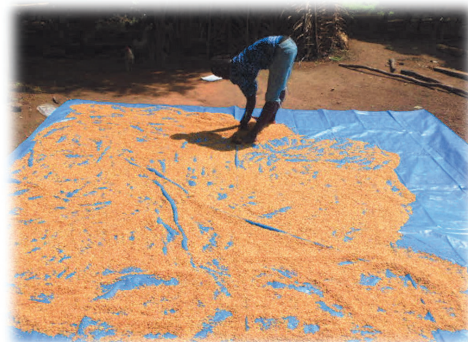
Important messages:

- 1) Harvesting at the right time is necessary to minimize the losses of the grains.
- 2) At the ripening period, careful observation of the field should be made to judge the timing of harvest.
- 3) Over-ripening of the grains increases losses by shattering.
- 4) Early harvest causes a low rate of filled grains.
- 5) The right harvest timing is when 80 - 85 % of the grains on the panicles are colored in yellow.

How to facilitate the session:

- 1) Introduction
 - Ask the farmers how they determine the time to harvest rice.
 - Ask the farmers what happens if they harvest rice plants too early or too late.
- 2) Determination of the timing of harvest
 - Tell the farmers the importance of timely harvest
 - Early harvest leads to a greater number of immature grains and delayed harvest to more shattering and a greater chance of rodent attack; both result in yield decrease.
 - In general, the appropriate timing of harvest is 4-5 weeks after flowering, but to determine the exact timing for harvest, it is necessary to visit the field frequently.
 - The followings are the indicators of the right harvest timing.
 - a) The majority (about 80-85%) of the grains on the panicles have turned yellow or gold in color.
 - b) The majority of grains are well dried, judged by biting.
 - c) Most (80%) of the rachis-branches of panicles have become dry.
- 3) Comparison of rice production among FFS demo plots (TP-R with fertilizer, TP-R without fertilizer) and the conventional plots
 - Tell the farmers that the difference of rice plants in two FFS demo plots shows the effect of fertilizer and that the difference of those between in FFS demo plot without fertilizer and the conventional plot shows the effect of crop management including water control.
 - Ask the farmers to harvest the rice in the FFS demo plots and in the conventional plot separately and compare the amount of production among the three plots.

Threshing, winnowing, and drying



10-2

Session 10-2 Post-harvest Handling 1

Important message:

- 1) Harvested rice grains should be transported carefully to minimize loss.
- 2) Thresh rice grains in a clean condition to minimize contamination with foreign materials such as small stones.
- 3) Threshed rice grains should be dried well and uniformly under the sun before putting them in sacks.
- 4) Spreading on the earth is not recommended.

How to facilitate the session:

- 1) Introduction
 - Ask the farmers about their methods of post-harvest handling including binding, transporting, field drying, threshing, cleaning, drying, and storage.
- 2) Post-harvest handling
 - Tell the farmers the recommended methods of post-harvest handling as follows:
 - Binding and transporting
 - a) Use binding materials such as vine tree barks and woven grasses or palm leaves
 - b) Use a large pan, basket, cloth, or tarpaulin to carry rice to reduce handling loss
 - Threshing
 - a) Thresh the rice plants by trampling, beating against a hard object, or beating with sticks
 - b) Spread a tarpaulin sheet on the threshing ground; otherwise, thresh on cleaned flat ground
 - Cleaning
 - a) Clean threshed rough rice because it contains various foreign matters such as bits of straw, empty grains, and gravel
 - b) Remove light foreign matters such as empty grains, chaff, weed seeds, and bits of straw by winnowing
 - c) Remove stones and other hard and heavy foreign matters by hand and winnower
 - d) Use a tarpaulin sheet in cleaning to avoid further contamination by foreign matters



**Store well-dried and winnowed grains
in proper ways**



10-3

Session 10-3 Post-harvest Handling 2

Important message:

- 1) Rice should be well dried before putting them in sacks.
- 2) Rice bags should be kept in the proper place to avoid damages from rats, pests, and fungus.
- 3) Rice bags should not be piled too densely to secure ventilation.
- 4) It is recommended to put the bags on the pallet of woods, instead of putting them directly on the floor, to avoid unfavorable moisture absorption from the floor.

How to facilitate the session

1) Post-harvest handling

- Tell the farmers the recommended methods of post-harvest handling as follows:

- Drying

- a) After cleaning, dry the rice grains further under the sun on clean ground, tarpaulin, or drying floor near storage
- b) While drying, watch the grains carefully to avoid contamination by soil and gravel

- Storing

- a) Put the dried rough rice into sacks (normally 50kg) and store them in a storage room or house
- b) Place the sacks on a wooden pallet or timbers laid side by side as a mat to keep them away from moisture seeping through the floor
- c) Do not pile the sacks too densely; space them out for ventilation
- d) Keep the storage room or house always clean so as not to attract rats and other pests

How to Conduct Yield Survey

(All Cutting Method)

Procedures of Yield survey

- Prepare the threshing ground nearby the field (select flat area, clean the soil surface, and spread a tarpaulin sheet)
- Cut the rice plants of one treatment plot (start with fertilizer applied plot)
- Transport harvested plants by head pan or bowls to the threshing ground
- Thresh the plants by their conventional way
- Winnow the threshed grains
- Dry the winnowed grains
- Put dried grains in rice bags
- Weigh the grains (X kg) ^{*Note}
- Measure the moisture contents of the grains (M %; average of six measurements)
- Yield is calculated according to the following formula:

$$\text{Yield (kg/m}^2 \text{ at 14\% moisture content)} = \frac{\text{X (kg)}}{\text{Area of the harvested field (m}^2\text{)}} \times \frac{100 - \text{M}}{100 - 14}$$

Tools and equipment required for yield survey by all cutting method:

- sickles and/or knives (for cutting rice);
- bowls and head pans (for transport);
- tarpaulin sheet for threshing and drying paddy after winnowing;
- bamboo pole (balancing body in case of stamping);
- wooden sticks (in case of hitting);
- mortars and/or drums (in case of beating),
- winnowers;
- rice bags (to put winnowed rice in);
- weighing scale (up to 100 kg); and,
- moisture meter (to measure the moisture of rice).

Note: please find proper place to weigh the paddy (where there is strong beam or timber to which weighing scale can be hung. They should not sag under the weight of paddy.)

*Note:

Precisely speaking, the weight of the bag should be deducted from this weight, but since it is negligible, it is not taken into account in the yield survey during this FFS.



How to use the Moisture Meter



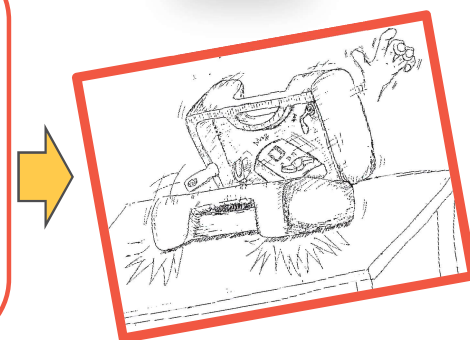
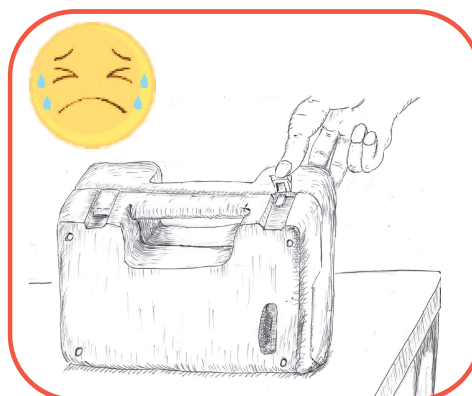
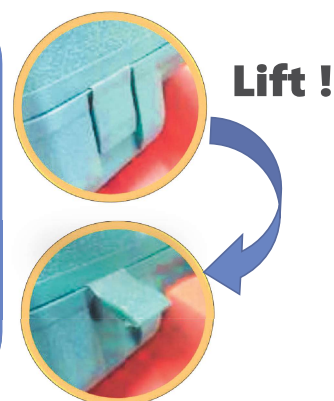
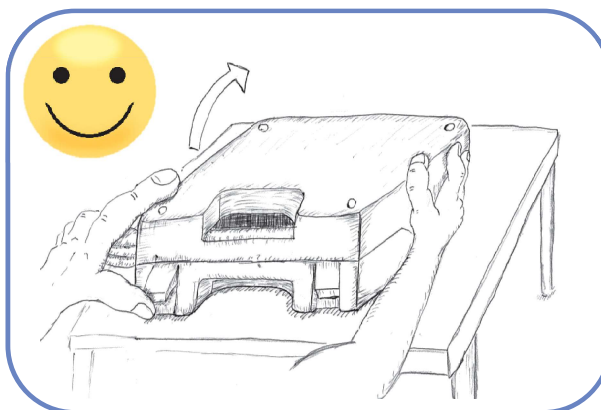
November 2020

① Open the box



Check Point !

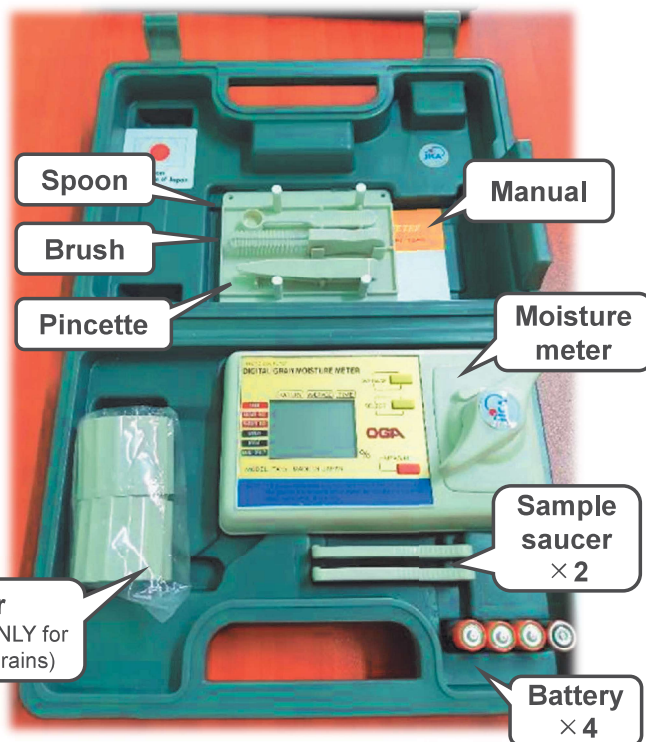
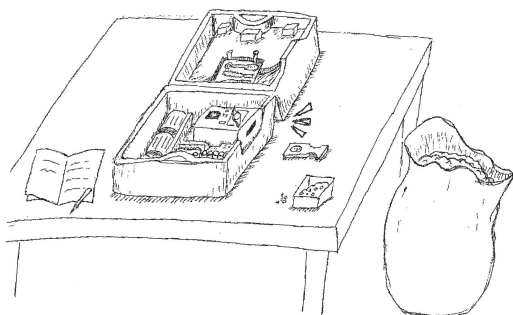
- Put the box on a **flat place** before opening it.
- When you open the box, **please lay it down**.
- Lift the lock near the handle and **slowly open** the box.



② Confirm the contents

Check Point

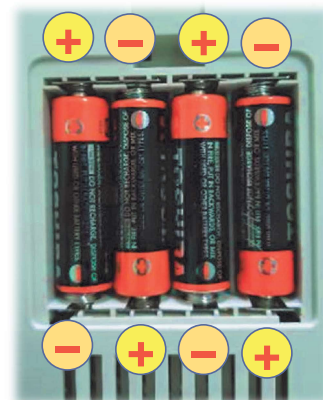
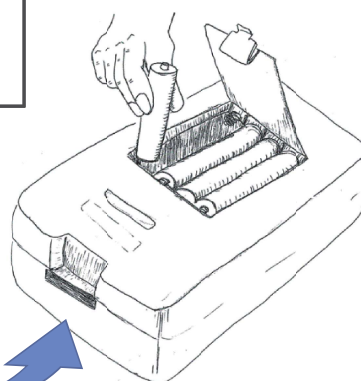
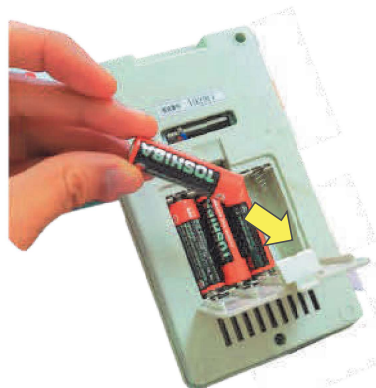
- Read the manual carefully before start using the gadget.
- Make sure that you have **all tools** and instruments in the box.
- Confirm that all tools and instruments are properly kept **without any damage**.



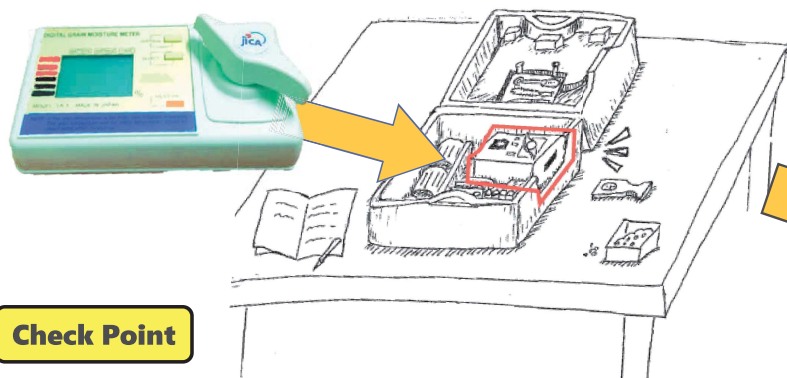
③ Set the batteries

Check Point

- Open the lid at the back side of the moisture meter.
- Set the **batteries** correctly.
- Close the lid properly.



④ Put the moisture meter back in the box and switch it on.



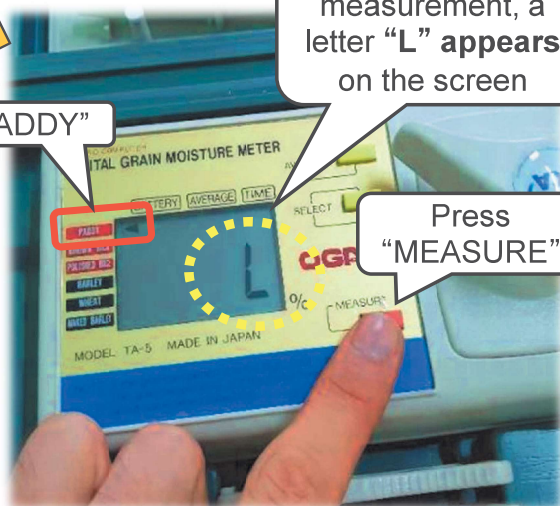
Check Point

- Put the moisture meter back in the box.
- Press **"MEASURE"** to switch on.
- Make sure the **"MODE"** is set on **"PADDY"**.
- ※ If not, press **"SELECT"** button for several times until the arrow on the screen points at **PADDY**.

"PADDY"

When it is ready for measurement, a letter **"L"** appears on the screen

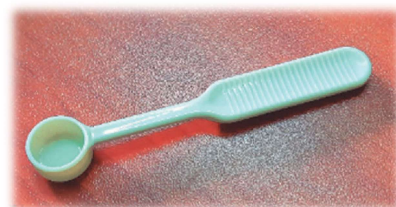
Press **"MEASURE"**



⑤ Put the sample on the saucer

Check Point

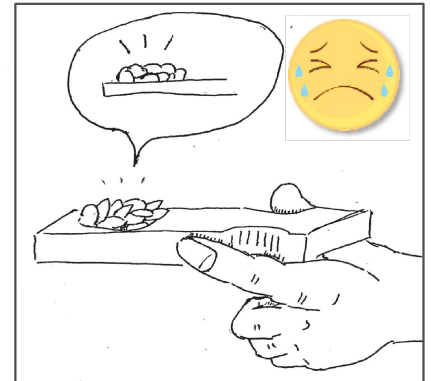
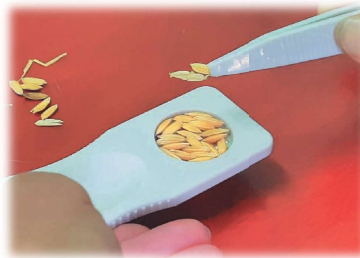
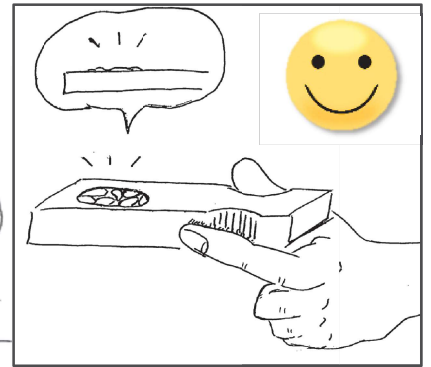
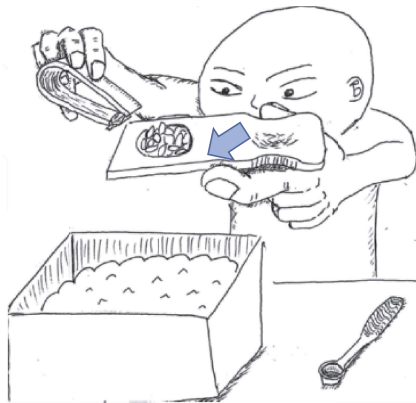
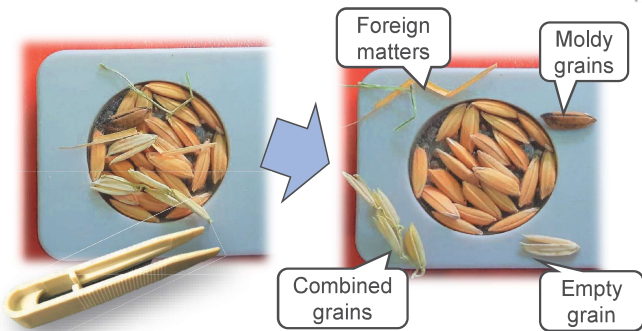
- Use a **spoon** to put the sample on the saucer.
- Don't use your fingers** to grab the paddy.
- ※ To prevent the sample from being affected by the moisture of your fingers.



6 Adjust the samples

Check Point

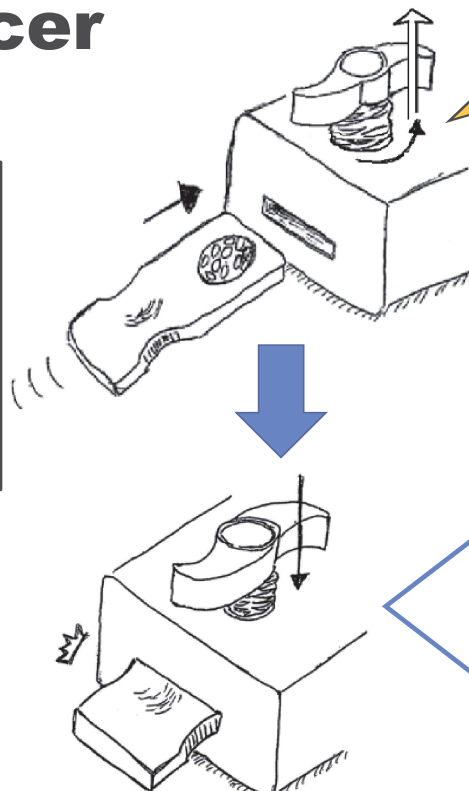
- Check the saucer **horizontally** at your eye level to ensure that you don't put too many grains.
- Remove foreign matters and excess or unsuitable grains by using a **pincette** !



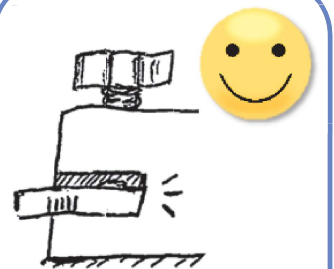
7 Insert the saucer

Check Point

- Loosen the press screw by **turning it counterclockwise**.
- Slowly **insert the saucer** into the moisture meter.
- Make sure the saucer is **inserted to the end of the slot**.



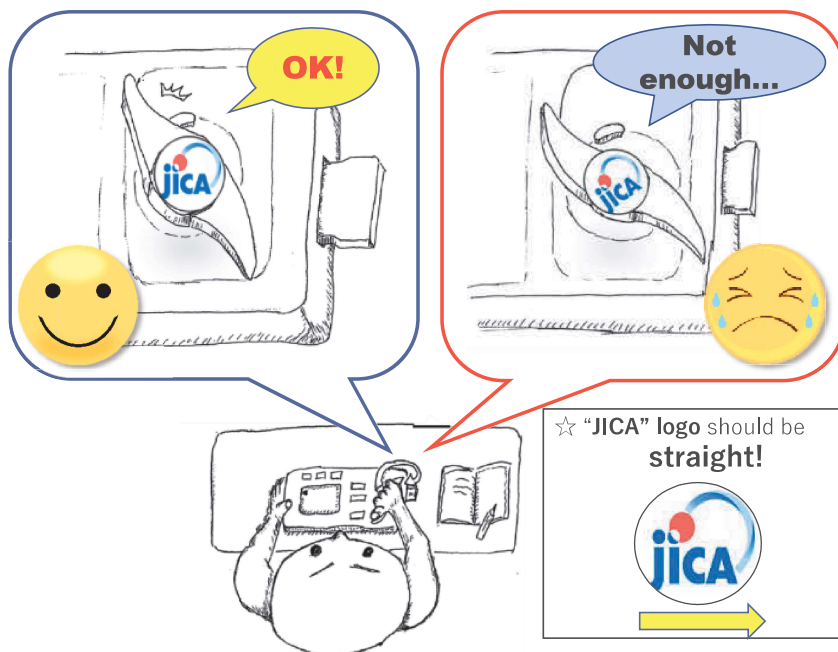
Turn the screw **counterclockwise** to insert the saucer



⑧ Crush the sample by turning the press screw

Check Point

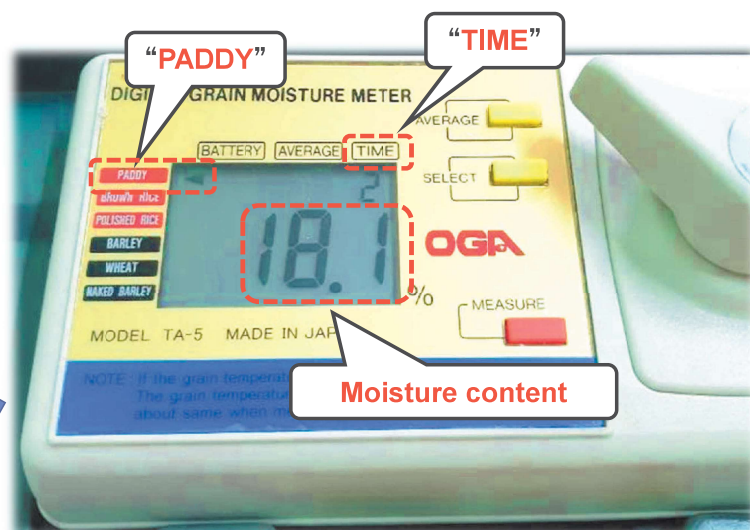
- Turn the press screw **clockwise** until it reaches the stopper.
- “**JICA**” on the screw should be read **horizontally straight**.



⑨ Measurement of the Moisture contents

Check Point

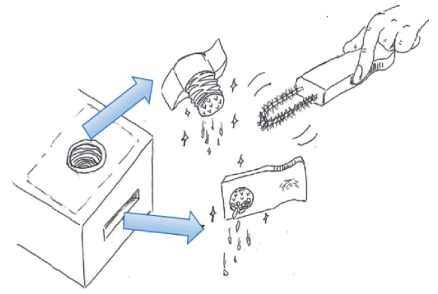
- Re-assure that the mode is set as “**PADDY**” before measurement.
- Press “**MEASURE**” (the red button).
- Confirm the number measurement shown as “**TIME**” is correct.



10 Clean the parts before next measurement (1)

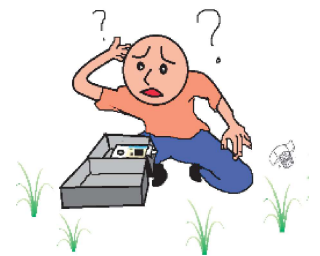
Check Point !

- Remove the screw and brush off the crashed paddy from it.
- After cleaning, put it back in the screw hole of the moisture meter. Do not put it outside the box.



After brushing the screw, don't place it out of the box !

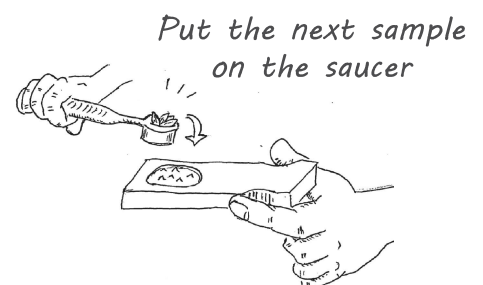
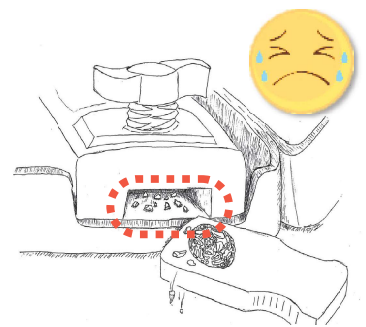
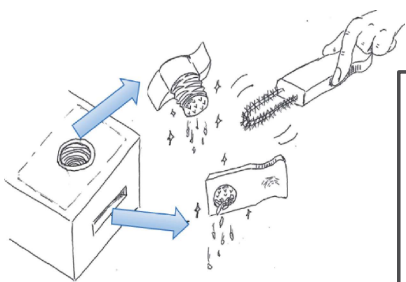
You may lose it...



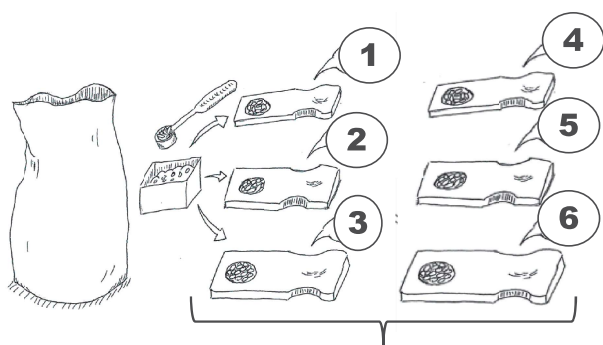
11 Clean the parts before next measurement (2)

Check Point !

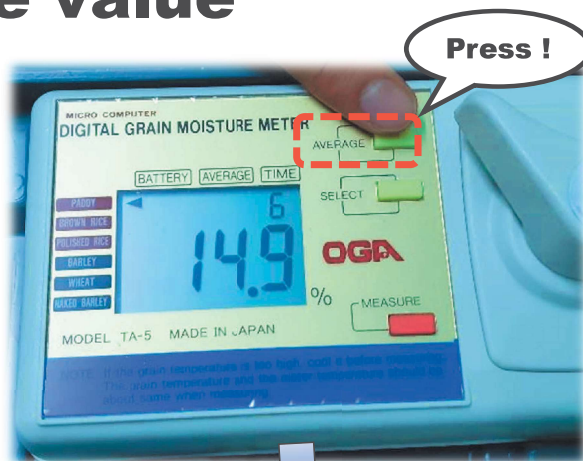
- Carefully pull out the saucer so that the crashed paddy will not fall off inside.
- Brush the screw and the saucer to remove the crashed paddy from them.



12 Calculate the average value

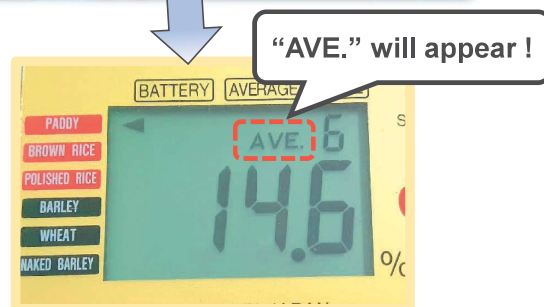


After measuring the required number of times,,,

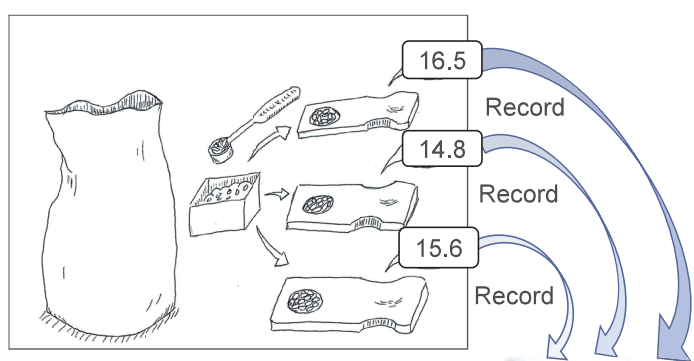


Check Point

- After measuring the required number of times, **press "AVERAGE"**, the yellow button.
- The average value can be calculated after at **least two** measurements.



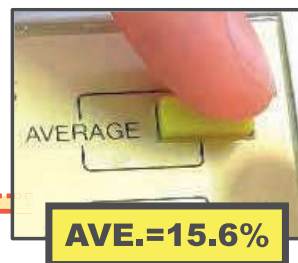
※ When you press "Average"...



Recorded figures

1st : 16.5%
2nd : 14.8%
3rd : 15.6%

press "Average"

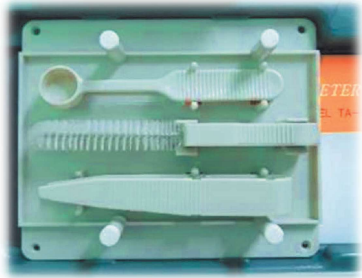


After getting average, all figures recorded previously will be deleted !

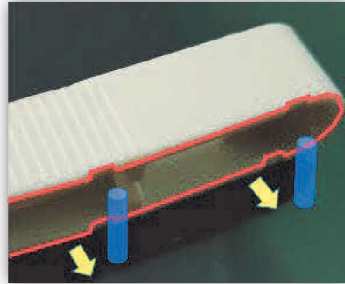


※ Press "Average" even if you manually calculate the average in order to start measuring next sample.

13 After use, put the tools back into the box

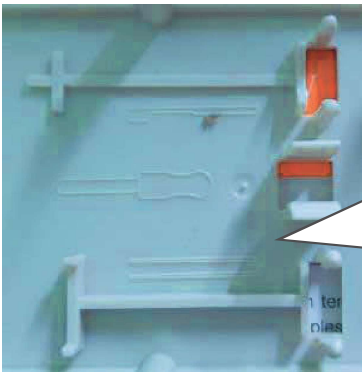


Look at the two side dents of the pincette!

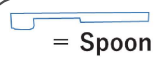




Check Point

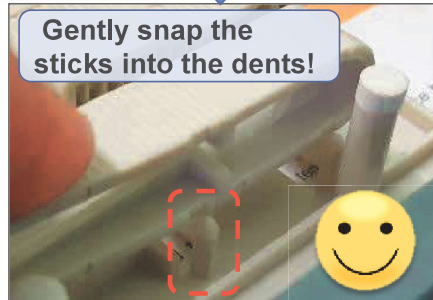
- Put the tools back into the box according to the tool marks shown on the bottom of the lid.
- Side dents of the pincette should be snapped into the small sticks.



Check the marks on the bottom.

-  = Spoon
-  = Brush
-  = Pincette

Gently snap the sticks into the dents!



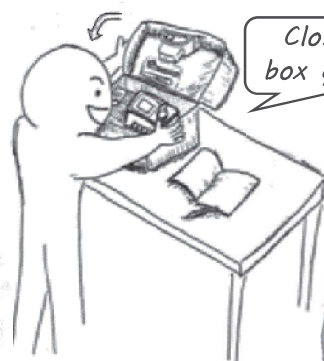
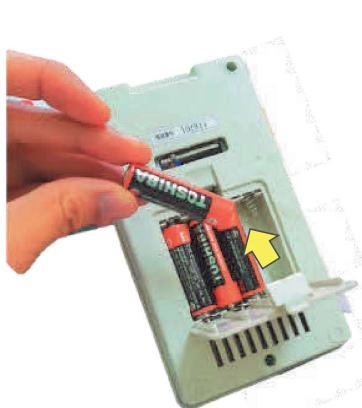
Don't force it!!



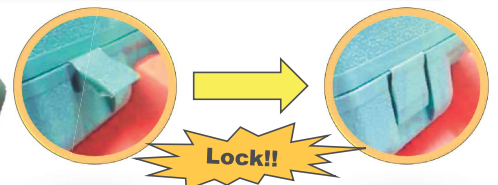
14 Remove the battery and close the box

Check Point

- Remove the battery from the moisture meter if you do not use it for more than one (1) week.
- Put the moisture meter back in the box.
- Close and lock the lid.



Close the box gently!



RECORDING FORMAT

Name of the FBO

Name of the Village

District

1. Demo plot with fertilizer Area = (A_f) : _____ m² Harvested date: _____

Data for Rice bag No.1

Weight = X_1 (kg)				
Moisture content measurement (%)	1 st		4 th	
	2 nd		5 th	
	3 rd		6 th	
Average moisture content = M_1 (%)				
Adjusted weight at 14% moisture content = Y_1 (kg)				

$$Y_1 = X_1 \times \frac{100 - M_1}{100 - 14}$$

Data for Rice bag No. 2

Weight = X_2 (kg)				
Moisture content measurement (%)	1 st		4 th	
	2 nd		5 th	
	3 rd		6 th	
Average moisture content = M_2 (%)				
Adjusted weight at 14% moisture content = Y_2 (kg)				

$$Y_2 = X_2 \times \frac{100 - M_2}{100 - 14}$$

Data for Rice bag No. 3

Weight = X_3 (kg)				
Moisture content measurement (%)	1 st		4 th	
	2 nd		5 th	
	3 rd		6 th	
Average moisture content = M_3 (%)				
Adjusted weight at 14% moisture content = Y_3 (kg)				

$$Y_3 = X_3 \times \frac{100 - M_3}{100 - 14}$$

Data for Rice bag No. 4

Weight = X_4 (kg)				
Moisture content measurement (%)	1 st		4 th	
	2 nd		5 th	
	3 rd		6 th	
Average moisture content = M_4 (%)				
Adjusted weight at 14% moisture content = Y_4 (kg)				

$$Y_4 = X_4 \times \frac{100 - M_4}{100 - 14}$$

Yield (ton/ha) = ($Y_1 + Y_2 + Y_3 + Y_4$) / $A_f \times 10,000/1,000$: _____ ton/ha

RECORDING FORMAT

Name of the FBO

Name of the Village

District

2. Demo plot without fertilizer

Area = (A_{nf}) : _____ m² Harvested date: _____

Data for Rice bag No.1

Weight = X_1 (kg)		
Moisture content measurement (%)	1 st	
	2 nd	
	3 rd	
	4 th	
	5 th	
	6 th	
Average moisture content = M_1 (%)		
Adjusted weight at 14% moisture content = Y_1 (kg)		

$$Y_1 = X_1 \times \frac{100 - M_1}{100 - 14}$$

Data for Rice bag No. 2

Weight = X_2 (kg)		
Moisture content measurement (%)	1 st	
	2 nd	
	3 rd	
	4 th	
	5 th	
	6 th	
Average moisture content = M_2 (%)		
Adjusted weight at 14% moisture content = Y_2 (kg)		

$$Y_2 = X_2 \times \frac{100 - M_2}{100 - 14}$$

Data for Rice bag No. 3

Weight = X_3 (kg)		
Moisture content measurement (%)	1 st	
	2 nd	
	3 rd	
	4 th	
	5 th	
	6 th	
Average moisture content = M_3 (%)		
Adjusted weight at 14% moisture content = Y_3 (kg)		

$$Y_3 = X_3 \times \frac{100 - M_3}{100 - 14}$$

Yield (ton/ha) = $(Y_1 + Y_2 + Y_3) / A_{nf} \times 10,000/1,000$: _____ ton/ha

RECORDING FORMAT

Name of the FBO

Name of the Village

District

3. Conventional Plot

Area = (A_c): _____ m²

Harvested date: _____

Data for Rice bag No.1

Weight = X ₁ (kg)		
Moisture content measurement (%)	1 st	
	2 nd	
	3 rd	
	4 th	
	5 th	
	6 th	
Average moisture content = M ₁ (%)		
Adjusted weight at 14% moisture content = Y ₁ (kg)		

$$Y_1 = X_1 \times \frac{100 - M_1}{100 - 14}$$

Data for Rice bag No. 2

Weight = X ₂ (kg)		
Moisture content measurement (%)	1 st	
	2 nd	
	3 rd	
	4 th	
	5 th	
	6 th	
Average moisture content = M ₂ (%)		
Adjusted weight at 14% moisture content = Y ₂ (kg)		

$$Y_2 = X_2 \times \frac{100 - M_2}{100 - 14}$$

Data for Rice bag No. 3

Weight = X ₃ (kg)		
Moisture content measurement (%)	1 st	
	2 nd	
	3 rd	
	4 th	
	5 th	
	6 th	
Average moisture content = M ₃ (%)		
Adjusted weight at 14% moisture content = Y ₃ (kg)		

$$Y_3 = X_3 \times \frac{100 - M_3}{100 - 14}$$

Yield (ton/ha) = (Y₁ + Y₂ + Y₃) / A_c x 10,000/1,000 : _____ ton/ha

Prototype Flow of Activities in FFS Session 11

Tools & materials prepared (brought to the FBO or arranged to be available on site)

- a) The comparative tables on the flipchart with figures (enlarged copy of the Extension Material on the TP-R 11-1)
- b) All information about farming activities to be compared (date of activity, amount of seed and/or fertilizer used, yield, etc.)
- c) The evaluation form on the flipchart (enlarged copy of the Extension Material on the TP-R 11-2)

Time	Topic	Methodology	Contents	What to do and cautions to be made
0900 – 0930	Introduction to Session 11	Explanation in plenary meeting	<ul style="list-style-type: none"> - Recapitulation of the previous session 10 - Introduction of the topics to be covered in the Session 11 	<ul style="list-style-type: none"> - Confirm that the farmers remember the important points in previous session 10. - Ask the farmers whether they decided the timing of harvest and treat the harvested rice in accordance with what was taught in their individual farms.
0930 – 1030	Comparison of Rice Production among sub-plots of the TP-R Demo plot and conventional plot	Explanation using Flipchart (enlarged copy of Material 11-1) and discussion	<ul style="list-style-type: none"> - Review of the amount of inputs with farmers - Review of the amount of production in different plots - Discussion on the farmers' opinion on possible reasons for the differences 	<ul style="list-style-type: none"> - Try to let the farmers to point out some of the TP-R components related to any inputs when refer to some specific input. - Emphasize that the TP-R, even without fertilizer, makes difference from the conventional practices
1030 – 1130	Evaluation of the TP-R	Explanation using Flipchart (enlarged copy of Material 11-2) and discussion	<ul style="list-style-type: none"> - Review of the entire process of rice production with the TP-R. - Pros and cons on the TP-R in farmers' opinion 	<ul style="list-style-type: none"> - Facilitate the discussion to identify the felt benefit among the farmers as well as the possible obstacles for the application of the TP-R by the farmers (especially in their individual plots).
1130 – 1200	Wrap up & Way Forward	Plenary discussion	<ul style="list-style-type: none"> - Discussion on the plan for next cropping in the group farm and individual farms 	<ul style="list-style-type: none"> - Congratulate the group for successfully completed the FFS. - Convince the FBO to continue applying the TP-R in the group farm. - Encourage the farmers to try to adopt the TP-R in their individual farms.

Cautions to be made in facilitating Session 11:

To foster the better understanding among the farmers, the yield should be converted from ton/ha to bushel/acre for the discussion in this session. As this session is the last chance for the facilitator to remind and reinforce the correct understanding on the TP-R, thus:

- When discussing the “difference between the TP-R and the conventional practices”, ensure that farmers do not think the fertilizer application is the main point. Discourage the idea of making too much importance on the fertilizer application, as the **improved cultural management is more important** than the fertilizer application.
- When discussing “the benefits of the TP-R”, guide the farmers to discuss **the benefits of the improved techniques**, not the material provisions for FFS such as seed, fertilizer or farm tools.
- When farmers raise some TP-R techniques as the “unfavorable aspect of the TP-R”, remind the farmers **the reason why these techniques are recommended** despite the challenges the farmers may face.
- When asking if the FBO members are willing to apply the TP-R in their individual farms in the coming season, please re-confirm the extent of their interest or willingness, especially in case where the **yield performance of FFS demo plot without fertilizer was not very good**.

Technical Package on Rice Production - SRPP

Conventional Techniques	TP-R without Fertilizer	TP-R with Fertilizer
Variety: (_____)	Variety: (_____)	Variety: (_____)
Area: (_____ m ²)	Area: (_____ m ²)	Area: (_____ m ²)
Date of Sowing: (_____)	Date of Sowing: (_____)	Date of Sowing: (_____)
Date of Transplanting: (_____)	Date of Transplanting: (_____)	Date of Transplanting: (_____)
Date of Harvesting: (_____)	Date of Harvesting: (_____)	Date of Harvesting: (_____)
Amount of Seed: (_____ kg)=(_____ TP)	Amount of Seed: (_____ kg)=(_____ TP)	Amount of Seed: (_____ kg)=(_____ TP)
Amount of Fertilizer: (_____ kg)	Amount of Fertilizer: (<u>0</u> kg)	Amount of Fertilizer: (_____ kg)
Amount of Production: (_____ kg)=(_____ bushel)	Amount of Production: (_____ kg)=(_____ bushel)	Amount of Production: (_____ kg)=(_____ bushel)
Yield: (_____ ton/ha) = (_____ bushel/acre)	Yield: (_____ ton/ha) = (_____ bushel/acre)	Yield: (_____ ton/ha) = (_____ bushel/acre)

11-1

Session 11-1 Comparison of the Yield Performances

Important messages:

- 1) The yield performances of the conventional plot, the TP-R without fertilizer plot, and the TP-R with fertilizer plot are to be compared.

How to facilitate the session

- 1) Introduction
 - Ask the farmers if they are satisfied with their rice production in this season. Ask their general impression on the TP-R that was tried out in the demo plots.
 - Review with the farmers the issues and experiences during the cropping season.

- 2) Evaluation of rice yield with improved cultivation techniques
 - Using the table, compare the yield between the demonstration plots with the improved cultivation techniques and the conventional plot with the farmers' normal practices. Highlight the different timing of farming activities.
 - Tell the farmers that the difference in rice performance between the FFS demo plot without fertilizer and the conventional plot shows the true effect of TP-R.
 - Discuss with the farmers the results and possible reasons for the difference in yield.

What were the big differences between the TP-R and conventional practices?

-
-
-

What do you think were the good/beneficial aspects in the TP-R?

-
-
-

What do you think were the unfavorable aspects in the TP-R?

-
-
-

Do you want to apply the TP-R in your individual plot in the next season? If not, why?

-
-
-

Session 11-2 Evaluation of the TP-R

Important message:

- 1) Clarify the difference in the farming techniques between the TP-R and the conventional practices.

How to facilitate the session:

- 1) Review of the improved rice production techniques
 - Review all components of the TP-R by showing all the materials used so far.
 - Discuss with the farmers which techniques have successfully been implemented in this season and which ones have not, and the reasons why they were or were not implemented successfully.
 - Discuss with the farmers what are the positive and negative points of the TP-R compared with their conventional farming practices.
- 2) Discussion on the way forward
 - Ask the farmers if they would like to apply the improved techniques learned; ask them which techniques they will apply in the next season. Also, ask the reasons why some of them will not apply any techniques.
 - Discuss with the farmers what is to be done in the coming cropping season in the group farm (as well as in their individual farms).

2-3. Reporting on FFS sessions and field monitoring

After each session, the facilitators should submit the report of the FFS sessions. The monitoring report in between the FFS sessions may also be required to follow up on the progress of activities in FFS demo plot as well as in the conventional plot.

The followings are the common aspects to be covered in the session reports, while the tangible outputs of the activities during the session should also be submitted, such as the formulated cropping calendar, results of the yield survey and so forth.

- date when the session was held,
- the number of participating farmers (gender disaggregated),
- major questions and comments from the farmers on the TP-R recommendation discussed in the session,
- aspects that were difficult for the facilitators to explain to the farmers, if any,
- whether the activities in the demo plot have been completed on the day of the session or not,
- the number of participants who are willing to apply what they have learnt in the session to the individual farms,
- the reason for non-willingness to apply what they have learnt if any participant is not willing, and,
- evaluation of the usefulness of the extension materials with identification of problems, if any

The field monitoring in between the sessions is to check the growth of rice plants in the FFS demo plot, confirm that the recommended techniques of the TP-R are properly applied, and collect the information regarding the conventional practices, including the dates of activities conducted, and inputs or techniques used for the activity. Aside from the periodic submission of the field monitoring reports, the FFS facilitators should immediately report to their supervisors whenever any problem is observed or reported in the FFS demonstration plot so that necessary countermeasures can be taken in time.

The information to be obtained through the field monitoring is as follows:

- Dates of plot establishment,
- Size of the plots (TP-R demo plot with fertilizer, TP-R demo plot without fertilizer, conventional plot),
- Dates and method of cultivation activities (brushing, clearing, digging, nursery establishment, sowing, puddling and levelling, transplanting, basal fertilizer application, weeding, topdressing, harvesting, threshing, winnowing, storing, etc.),
- Volume of input used for the plots (seed, fertilizer, chemicals if used),
- Record of the rice growth (dates of commencement of tillering, panicle initiation, heading, commencement and 50% of flowering, etc.), and,
- Problem encountered during the growth period.

2-4. Resource requirement for the FFS on the TP-R

For the effective implementation the FFS on the TP-R, it is essential to secure the required resources for and provide them at the right timing to the FBO farmers as well as to the FFS facilitators. As explained in 1-3 above, the FBOs will be provided with some farm tools and gadgets as well as the inputs for FFS demo plot. The FFS facilitators will be provided with the resources for field activities, starting from mobility for field visits, stationaries and the equipment to conduct the FFS sessions.

The following items will be provided to the FBO farmers:

- A set of farm tools such as digging hoe, cutlasses, shovels, head pans, etc.
- Seed and fertilizer for the FFS demo plot
- Leveling boards
- Tarpaulin sheets
- Rice bags

The following items will be made available for the FFS facilitators:

- Motorbike and fuel for field visits
- Rain gears
- Stationary for teaching in the sessions, such as flipcharts, markers, etc.
- Measuring tape for plot and nursery measurement
- Weighing scale and moisture meter for yield survey

It is very important to ensure that the required items should be procured well in advance and provided at the optimal timing to the FBO farmers and FFS facilitators. Any delay in the provision will hamper the timely implementation of the FFS sessions, resulting in a deviation from the cropping calendar, which will negatively affect the yield performance, and the FFS itself will be a failure.