

# Transplanting and establishing experimental plots

This module discusses transplanting with special reference to age of seedlings at the time of transplanting, the advantages of transplanting over direct-seeding and the appropriate practices for transplanting (Reference 16). It also addresses the subject of farmers' experimentation and the choice of experimental treatments for the experiments that some volunteer farmers would like to establish in their own fields. It is possible that this module will not be finished in a single session, in which case, the part treating the establishment of experiments can be deferred to an 'extraordinary' session in which only farmers who volunteered to carry out experiments would be involved.

- ❶ Discuss farmers' transplanting practices and experiences.
- ❷ Introduce the practices recommended and their advantages.
- ❸ Conduct a practical transplanting demonstration.
- ❹ Review the agreed experimental treatments.
- ❺ Conduct a demonstration of how to install a farmer's experiment.



## Learning objectives

At the end of this module farmers will:

- Have shared knowledge on transplanting practices.
- Have a good knowledge of appropriate transplanting techniques and their advantages.
- Be able to execute optimum transplanting.
- Be able (especially the volunteer farmers conducting experiments) to install variety experiments or fertilization experiments.



## Procedure

1. Farmers and the PLAR-IRM team meet at the PLAR-IRM Center. The facilitator briefly reviews the previous module and invites farmers' feedback. The facilitator asks if the farmers have put in place any new practice on their IRM fields.
2. One of the PLAR-IRM team members explains the learning objectives and procedures for the current module.
3. Discussion of farmers' transplanting practices and experiences. The facilitator encourages the debate by highlighting the following topics and paying special attention to differences between farmers' practices.
  - What is transplanting?
  - Why is transplanting necessary?
  - What are the advantages of transplanting compared to direct sowing?

## Module 12

### Transplanting and establishing experimental plots

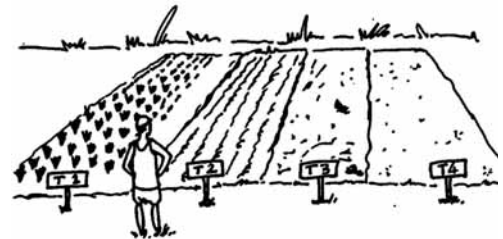
- How is transplanting carried out?
  - Watering the nursery;
  - Uprooting of seedlings, preparing the field: field condition and water management (Module 4);
  - Transplanting: depth, spatial arrangement, density.
- 4. Discussion on recommended practices and their advantages.
  - Advantages of transplanting compared to direct-seeding:
    - Controlling plant density;
    - Stimulating tillering;
    - Improved weed control.
  - Requirements for water management and condition of the field, especially the soil.
  - The ideal plant age at transplanting (15 to 21 days) enables early and fast growth initiation as well as adequate tillering (refer to Module 8).
  - Watering the nursery and uprooting the seedlings: minimize plant and root damage to ensure a quick re-start of growth.
  - Draining and leveling the field to ensure adequate puddling and avoid submerging young plants.
  - The ideal depth of transplanted plants (2 to 3 cm):
    - When transplanting is too deep, the start of growth is slow and there is a risk of diseases and seedling decay;
    - When transplanting is shallow, and plots are irrigated, there is a risk of plants being washed away.
  - Spatial arrangement and planting density: in rows, with plants spaced 20 cm apart in the row:
    - Using pegs and a long rope to guide the transplanters makes density management easier;
    - If plant stand is too close, tillering is not adequate and rice can be scrawny;
    - If plants are too far apart, vegetative cover (i.e. plant canopy closure) will not be optimal and solar radiation will hit the soil or water surface instead of the rice leaves, leading to reduced photosynthesis and reduced growth. It will also encourage weed infestation;
    - A reference line can facilitate transplanting in rows.
  - Time interval between seedling uprooting and transplanting should preferably be less than 2 days to avoid the death of roots.
  - Replacement of missing hills shortly after transplanting ensures an optimal plant population in the field.
- 5. The facilitator and farmers proceed to a farmer's field in the valley that is ready to be transplanted.



6. Observation of nurseries and transplanted fields, and transplanting demonstration.
  - Observation of a seedling nursery:
    - Age of seedlings, density, development and health.
  - Observation and possible rehabilitation of the field where seedlings will be transplanted:
    - Cleaning: removal of weeds;
    - Puddling and drainage;
    - Optimal leveling.
  - Uprooting of seedlings:
    - Watering of nursery;
    - Uprooting of seedling with a shovel, a hand-trowel or a hoe;
    - Cleaning the roots of excess soil.
  - Transplanting:
    - Demarcation of the reference line;
    - Transplanting parallel to the reference line while maintaining the optimum planting depth, spacing and number of seedlings per hill (ideally two to three).

#### *Farmers' experimentation*

7. Demonstrate the establishment of experiments. The example of variety and fertilization experiments is used here (refer to Reference 17). Please note that this section involves only farmers conducting experiments.
  - The facilitator invites farmers to briefly summarize the objectives of the experiment (Module 5, item 8 and Module 10, item 8).
  - Farmers explain the treatments:
    - Varieties involved in the test, including the local variety;
    - Fertilization options including farmer's practice.
  - The facilitator introduces the notions of:
    - Representativeness of the field;
    - Dimensions of sub-plots;
    - Calculation of fertilizer quantities for each sub-plot (fertilization test only).
  - The facilitator introduces the notions of:
    - Plot size—sub-plots should preferably be laid adjacent to one another with a small space between sub-plots;
    - Fix a tag that labels the treatment at the corner of each sub-plot. The sub-plot with the local variety or farmer's practice can be larger than the other sub-plots (of course, the rest of the field represents farmer's practice).



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- The facilitator presents the small sachets of fertilizer that are to be applied as basal fertilizers (often a compound NPK or phosphorous fertilizer) for fertilization test. Then, farmers apply these fertilizers in the sub-plots as indicated on the labels. The fertilizer is incorporated into the soil.
  - Farmers transplant rice plants into the various sub-plots. Special attention is taken to ensure that experimental treatments are not mixed up.
8. Back at the PLAR-ICM Center, the facilitator and farmers conducting experiments set dates to conduct the tests.
    - For each type of experiment, there is a list of farmers conducting experiments and the corresponding dates for field preparation, sowing the nursery, transplanting, and all major crop management practices. Normally, farmers are able to establish the experiment on their own, but they can request the facilitator's support if they wish.
    - The facilitator explains the importance of the observations to be made on the test plots. Test plots should not be confused with IRM plots, the observations will therefore not be the same either. Module 14 will deal with the observations and records to be made on experimental plots.
  9. Evaluation: the facilitator asks what the farmers appreciated (or did not appreciate), what they learnt, and what they intend to do with their newly obtained knowledge. The facilitator specifically asks which new ideas this module has generated and how farmers intend to put these into practise on their IRM fields.
  10. The facilitator asks volunteer farmers to conclude the session, and then invites farmers to the next session.



#### Time required

- Three hours



#### Materials required

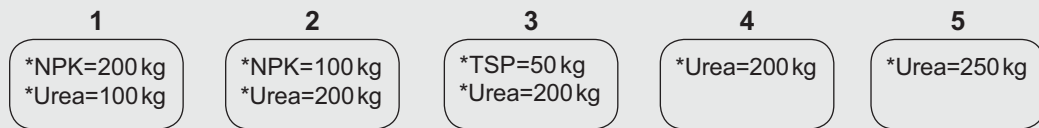
- Sachets of fertilizer corresponding to the calculated rates for the experimental treatment and plot size.
- Well-labeled tags.
- Shovel or hoe to pull out seedlings.
- Already prepared rope to guide plant spacing.

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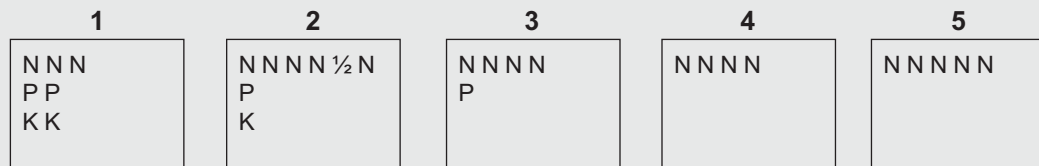
#### Box 12

Farmers of Lokakpli had decided to experiment with the application of five levels of fertilizers:



Urea contains 46% nitrogen (N); NPK contains 10% nitrogen (N), 20% phosphorus ( $P_2O_5$ ) and 20% potassium ( $K_2O$ ); TSP contains 45% phosphorus ( $P_2O_5$ ).

Treatments were pictured as follows to indicate differences in contents of N, P and K. To adequately distinguish the quantities of the 3 nutrients, we represented N, P and K with small pieces of paper of different colors:



In the field, the practical aspects focused on a number of rules that need to be followed, i.e.:

- Identify the number of the sub-plots.
- Know the type of fertilizer treatment for each sub-plot.
- Take a tour of the plot so as to have an overview of the area to be treated.
- Apply small quantities of fertilizer at the time for better coverage of the whole area.
- Identify the right period to apply the fertilizer.

Thus, (basal) fertilizer was applied in the first three plots. It is advisable to apply the fertilizer on the day of transplanting. A transplanting demonstration was also conducted—there were two different opinions regarding the way of uprooting seedlings:

- One farmer said that it is better to dig up seedlings without damaging much of the roots.
- Another farmer said that you can actually cut off the roots, it does not have any effect on crop establishment.

Farmers decided to conduct a small experiment to compare these two types of seedling handling besides the original trial. We then conducted a demonstration of transplanting in lines with and without a rope. Farmers were impressed by the results when a rope was used.

