

Life cycle of rice plant

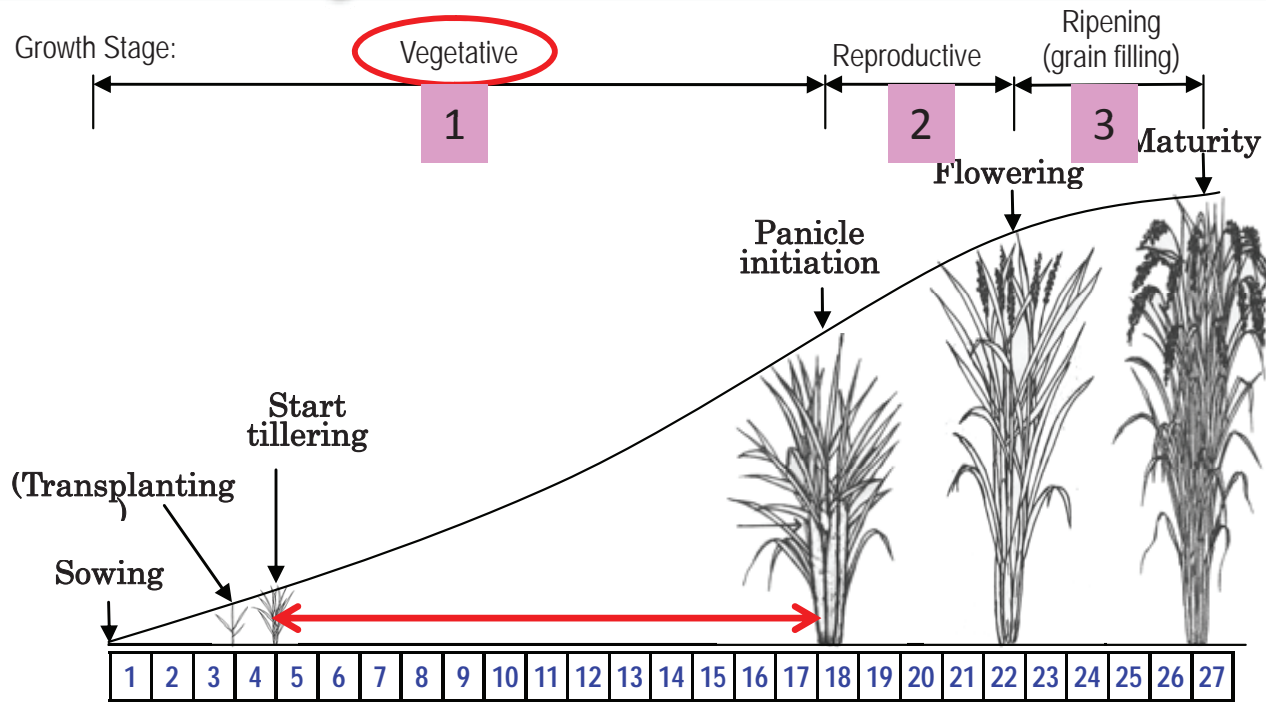
Let's study life cycle of rice plant with timeline

Important point:

- The growth duration depends on variety.
- Reproductive stage (panicle initiation to flowering) is constant at about 1 month
- Ripening stage (flowering to harvesting) is also constant at about 1 months.
- Only vegetative growth stage (sowing to panicle initiation) depends on variety.
- Tillering starts 2 - 3 weeks after sowing.



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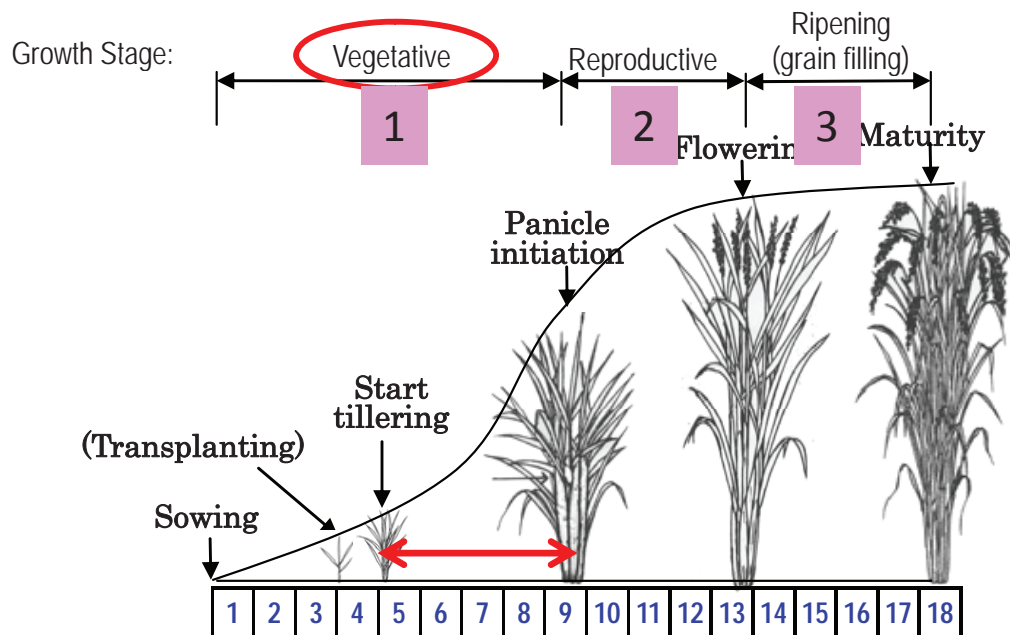


Three growth stages

1. Vegetative Growth

2. Reproductive

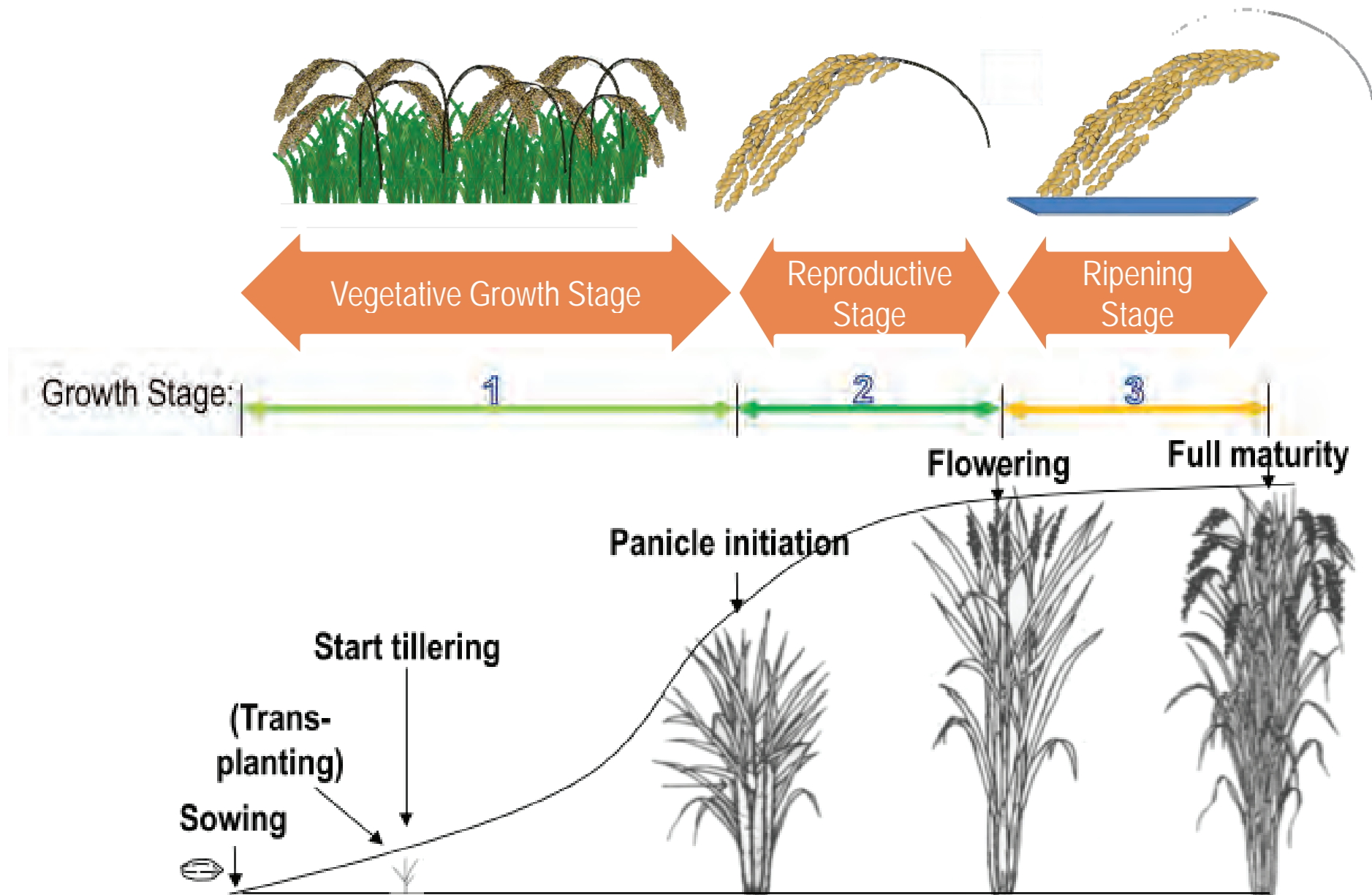
3. Ripening



Comparison of life cycle between long duration and medium duration varieties

What makes difference?

3 growth stages and yield components



Summary 1

- To obtain higher yield, rice in the field should have more panicles, more grains, and more filled grains.
- The entire life of rice plants is divided into three growth stages; namely vegetative growth stage, reproductive stage, and the ripening (grain filling) stage.
- Duration of both the reproductive stage and the ripening stage is almost same with about 30 days irrespective of the varieties.

Summary 2

- Difference between long duration and short duration varieties is its difference in the duration of vegetative growth stage.
- Each of three stages determines the number of panicles, the number of grains per panicle or size of panicle, and degree of grain filling, respectively.

Farming Plan and Cropping Calendar

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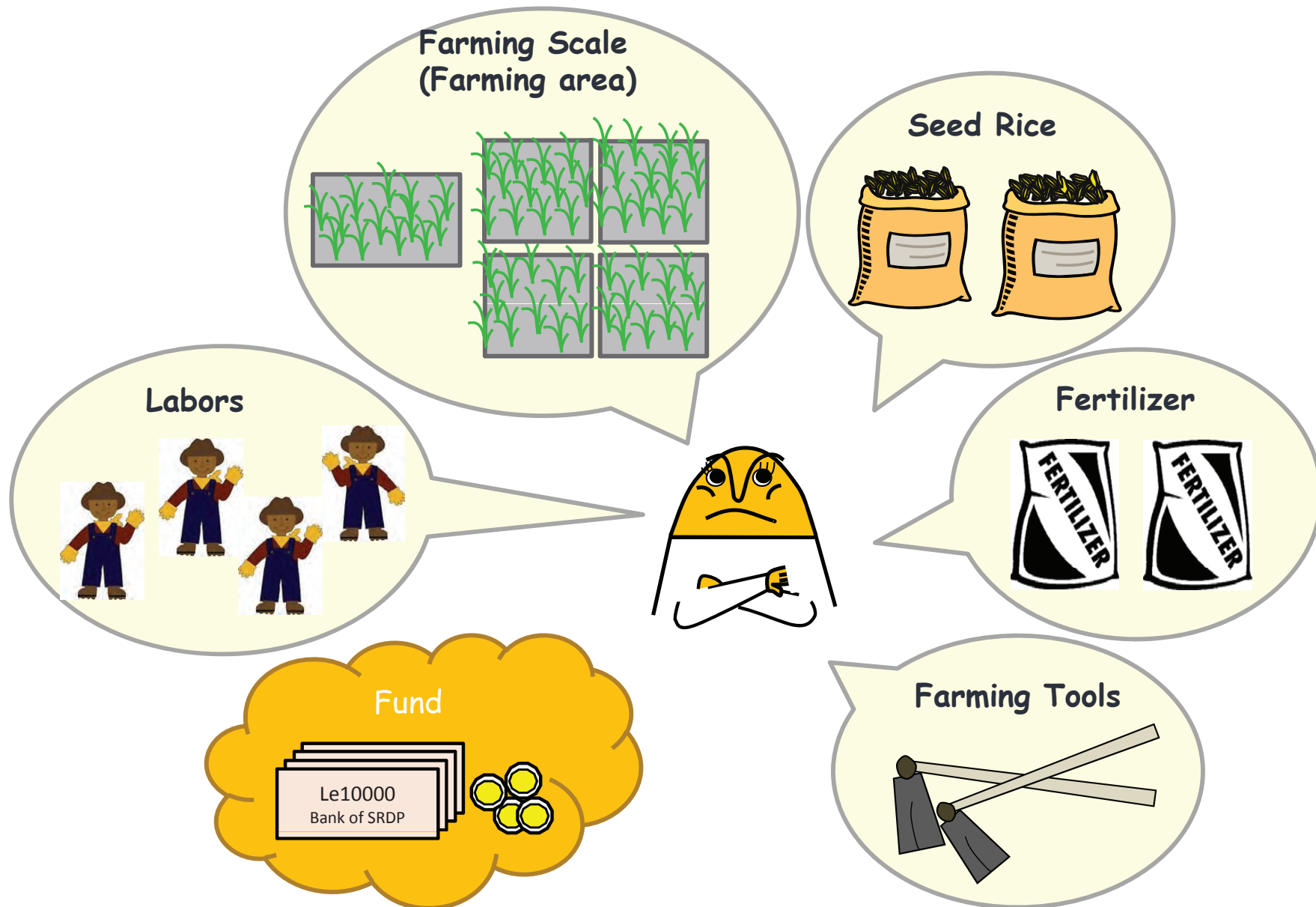
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Contents

- Formulation of a Farming Plan and Cropping Calendar
 - Procedure for formulating a farming plan
 - Prepare a cropping calendar
- Summary

What are necessary for farming?



Procedure for formulating a farming plan

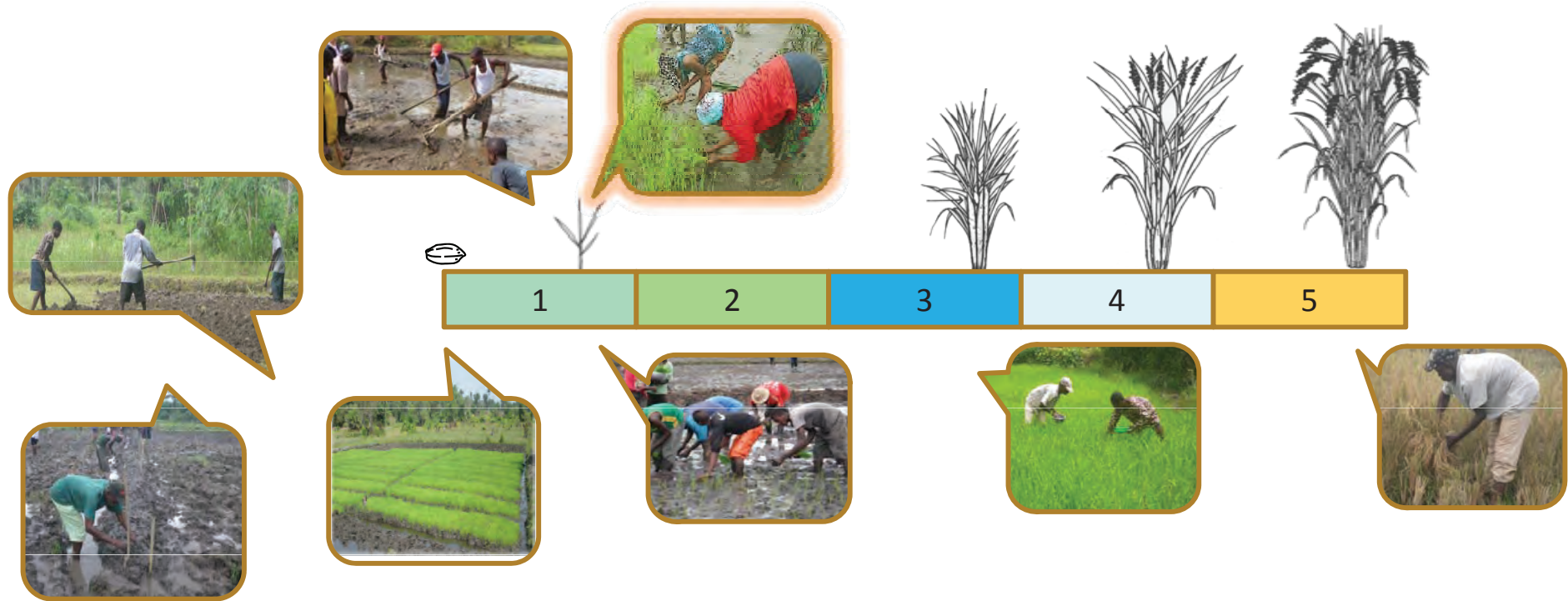
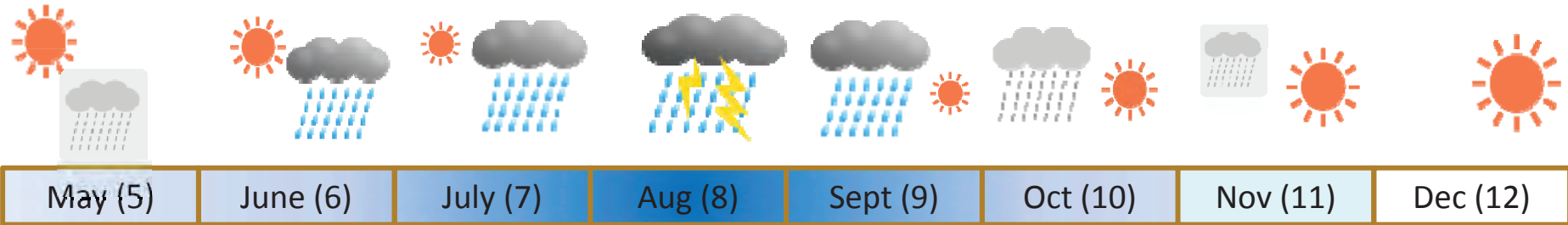
- Determine the location and area of the farm,
- Decide (a) rice variety(ies) to cultivate,
- Calculate required amount of input,
- Secure labor and funds,
- Make sure that necessary tools/materials are readily available,
- Ensure viable seed of the variety(ies),
- Procure fertilizer and other input, and
- Prepare a cropping calendar.

Preparation of a cropping calendar

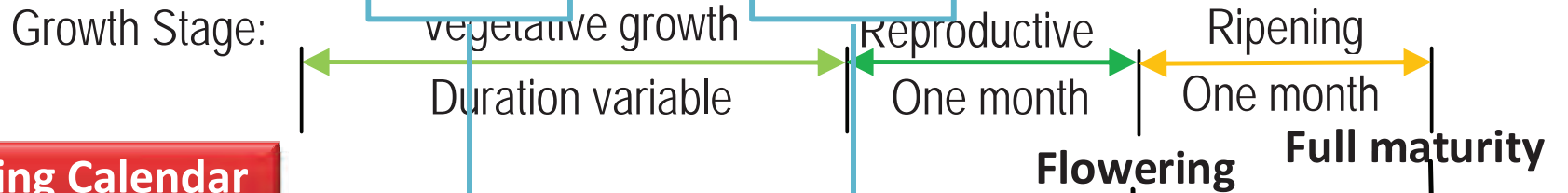
- Set the expected time of harvest so that the ripening period coincides with sunny days,
- Decide the sowing time taking account of the growth duration of the rice variety to be used,
- Set the starting time of brushing,
- Decide the first weeding time at 2 weeks after transplanting,
- Decide the time of top dressing at about 2 months before the harvest time, and
- Decide the starting time of bird scaring at about 1 month before the harvest time (= flowering)



Cropping Calendar

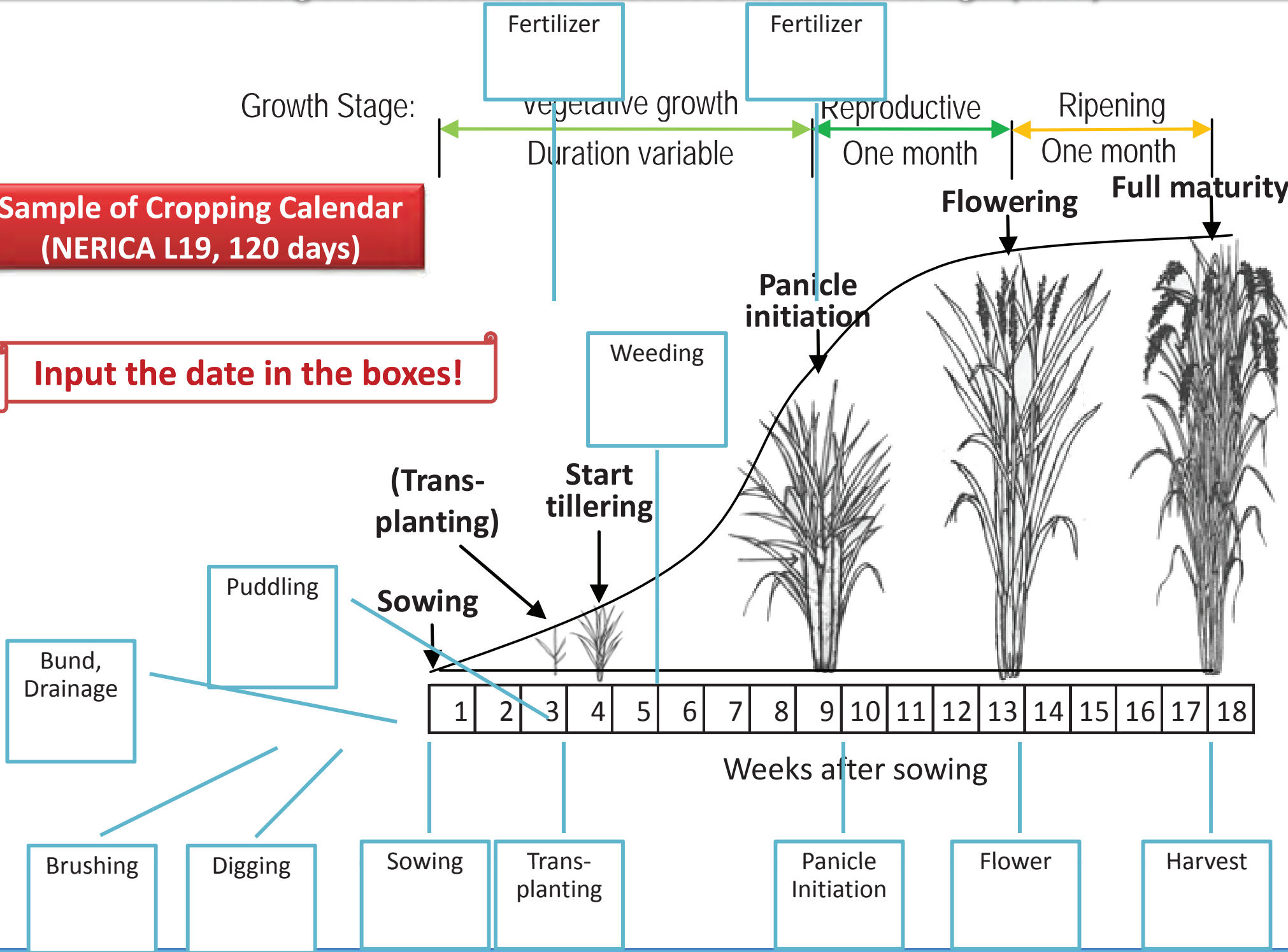


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Sample of Cropping Calendar (NERICA L19, 120 days)

Input the date in the boxes!



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
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Weeks after sowing

Brushing	Digging	Sowing	Trans-planting	Panicle Initiation	Flower	Harvest
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Summary

- Farmers should formulate a farming plan before starting a cropping season to let them prepare required resources for the farming.
- Required resources for the farming include labors, fund to purchase necessary inputs, land to cultivate, etc.
- Cropping calendar should be prepared based on a variety of rice to be planted, taking into consideration the timing of each farming practice and climate conditions then.

Nursery Preparation and Sowing

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Contents

- Selection of nursery site
- Area of nursery
- Preparation of nursery
- Amount of seeds
- Sowing
- Summary

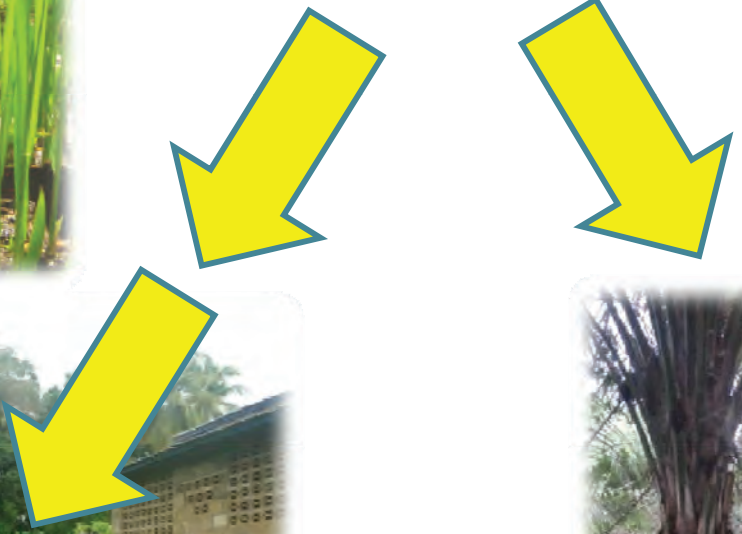
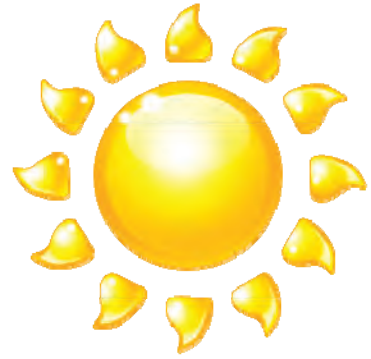
Dry Nursery
(For the rainy season cropping)



Wet Nursery
(For the dry season cropping)

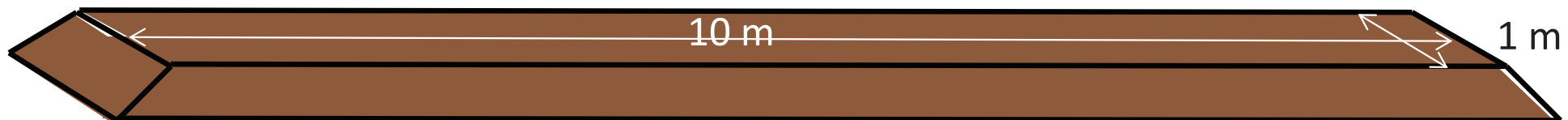
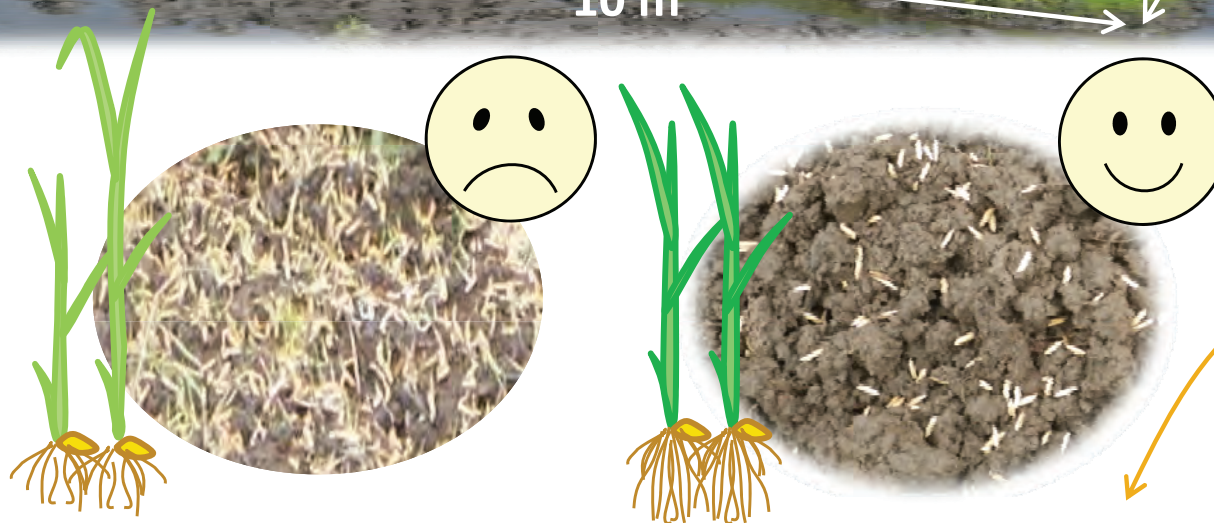
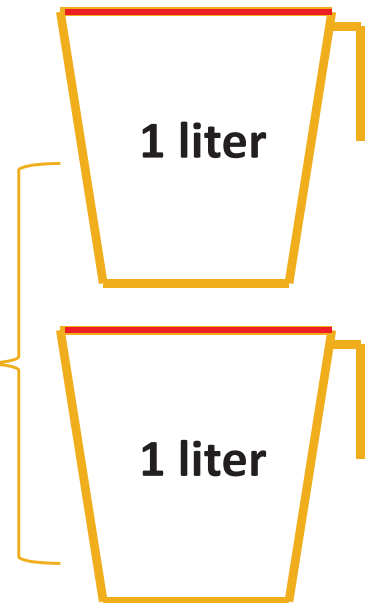


Nursery needs sunlight



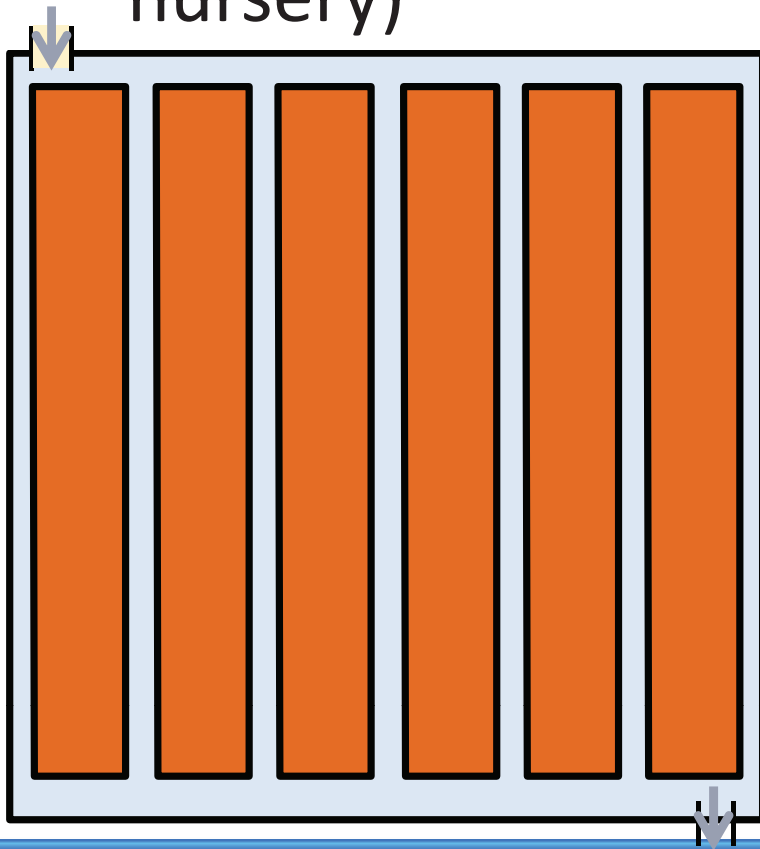


Seed Rice:
1 kg = 2 liter

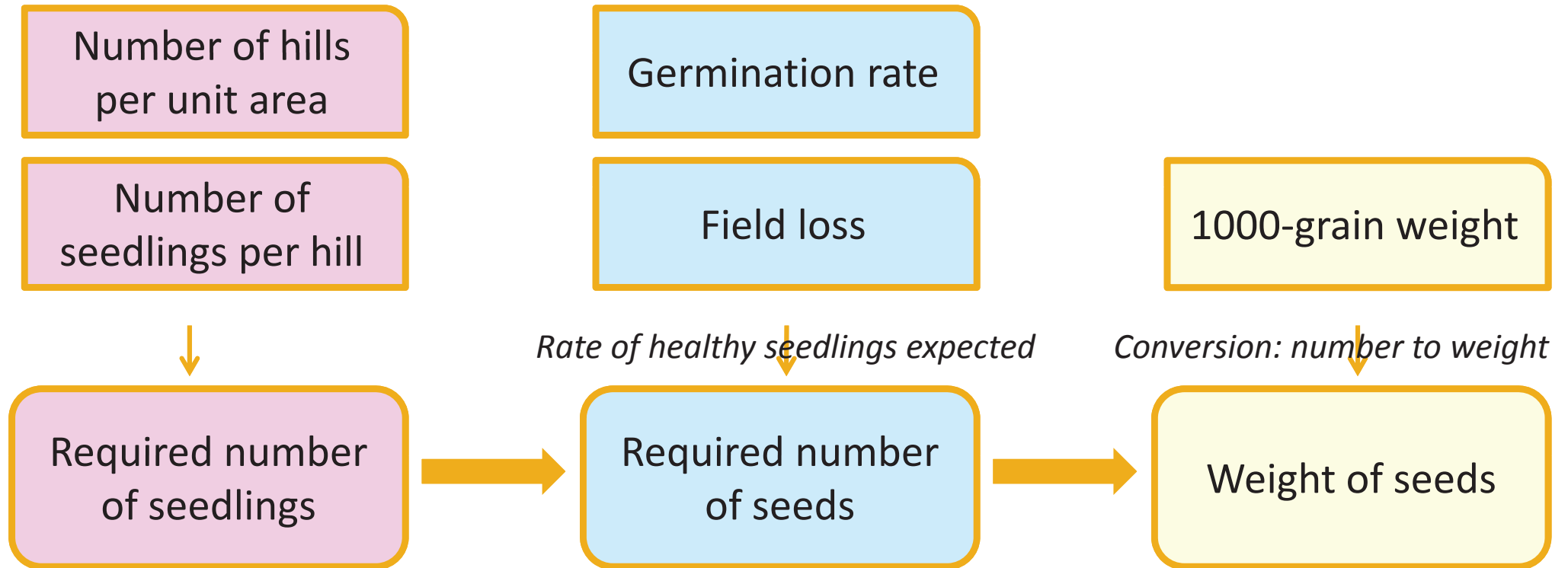


Nursery preparation

- Ensure uniform and healthy growth of seedlings
 - Water must be controlled
 - Make seedbeds with same area and level (wet nursery)



Calculation of required amount of seeds



Formula

$$\text{Seed rate} = \left(\text{Number of hills per unit area} \right) \times \left(\text{Number of seedlings per hill} \right) / \left(\text{Germination rate} \right) / \left(1 - \text{Field loss} \right) \times \left(\text{1000-grain weight} \right)$$

Amount of Seeds

- Assuming that:
 - Plant density: 20 hills/m²
 - Number of seedlings: 3 per hill
 - Germination rate: 80 %
 - Field loss: 25 %
 - 1,000-grain weight: 25 g
- Seed rate: 25 kg/ha (10 kg/acre, 0.4 bushel/acre)
 - Number of seedlings:
 $20 \text{ hills/m}^2 \times 3 \text{ seedlings/hill} \times 10,000 \text{ m}^2 = 600,000$
 - number of seeds: $600,000 / 0.8 / 0.75 = 1,000,000$
 - Weight of seeds: $1,000,000 \times 25 \text{ g} / 1000 = 25,000 \text{ g}$

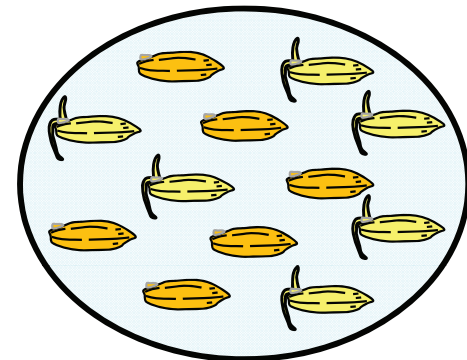
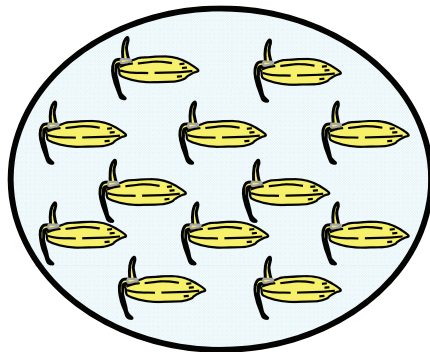
Exersize

Assumptions	Seed Rate
Plant density: 25 hills/m² Number of seedlings: 3 per hill Germination rate: 80% Field loss : 25% 1,000-grain weight: 25 g	
Plant density: 40 hills/m² Number of seedlings: 10 per hill Germination rate: 80% Field loss : 25% 1,000-grain weight: 25 g	

$$\text{Seed rate} = \text{Number of hills per unit area} \times \text{Number of seedlings per hill} / \text{Germination rate} / (1 - \text{Field loss}) \times 1000\text{-grain weight}$$

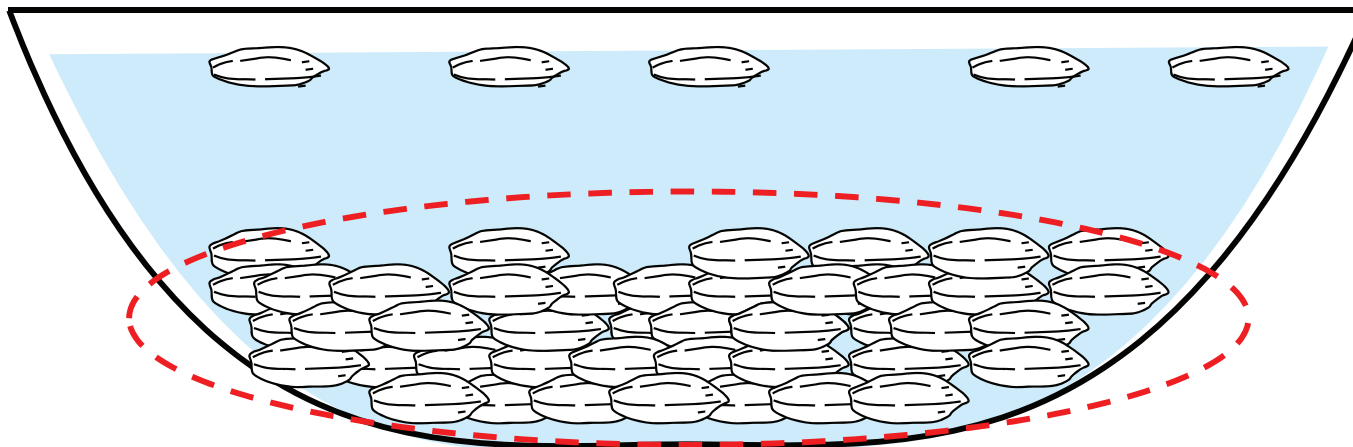
Grow healthy seedlings in the nursery

- Use quality seeds -



Selection with water

Floating paddy are discarded. Only sunken paddy are used as seeds.



Germination Rate



$$\text{Germination (\%)} = \frac{\text{Number seeds germinated}}{\text{Number seeds on tray}} \times 100$$

If 86 seeds germinated in a tray of 100 seeds:

$$\text{Germination (\%)} = \frac{86}{100} \times 100 = 86 \%$$

Good practice and bad practice of pre-germination treatment (recommended for wet nursery)



Good practice

Grains absorb water and buds are about to sprout (pre-germinated).



Bad practice

Roots and sprouts were grown (germinated).
Incubation period is too long!

Summary 1

- Nursery should be established at an open area exposed to sunlight. It is on either dry or wet land where water could be drained easily.
- Nursery soils should not be of heavy clay or contain too much gravel.
- Nursery bed is slightly raised and divided into small beds by footpath/water course for easy work and water control. Soils should be well cultivated before sowing.

Summary 2

- Nursery bed with about 1 m width is recommended.
- Sowing density is about 1 kg per 10 m².
- Seed rate for transplanting is about 25 - 30 kg/ha, depending on the quality of seeds.
- Selection of better seeds with water, and germination test is recommended.
- Pre-germination is recommended for wet nursery.

Transplanting

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Contents

- Nursery period
 - Appropriate time for transplanting
- Uprooting and handling of seedlings
- Transplanting
 - Number of seedlings per hill
 - Depth of transplanting
 - Distance between hills
- Transplanting and water management
- Summary