



LOWLAND RICE CULTIVATION GUIDE



Lowland rice varieties

Supa: Late maturity (140 days -), good eating quality with Aroma

K-85: High yield, 130 days

WITA-9: Rice Yellow Mottle Virus (RYMV) resistant.

Input:

- Seed: 15 kg / acre (Conduct germination test)
- Fertilizer: DAP (18-46-0) 25 kg / acre
Urea (46:0:0) 50 kg / acre

Advantage of transplanting method:

- Reduce weed problems: Planted seedlings are about 3 weeks old by the time weed seeds germinate.
- Rotary weeder can be used if transplanted in straight rows.
- Reduce lodging problem.

Disadvantage of transplanting method:

- Seedbed preparation and transplanting cost/labour are needed.

Seed preparation

① Floating empty grains

It is difficult to determine seed viability with the naked eye. It is advisable to carry out seed selection using the floatation method.

Separate sunken seeds (filled grain) with high potential to germinate from those that float (empty grain) that are unable to germinate.

② Soak seeds for 24 hours in clean water.

③ Incubate the seeds for 30-36 hours by placing in a sack filled to half its capacity. Warm temperature is needed to increase the activities inside the seed. Incubation keeps the seeds warm, increases growth of the embryo, and results in uniform germination.

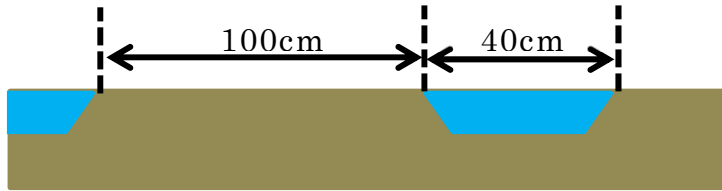
But where temperature is too high, germination rate decreases and may be killed.



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Seedbed preparation & management (Wet Seedbed)

1. Prepare seedbed plots of 1 m wide and any convenient length 1/2 - 1 day before sowing. Need a plot area of about 150 m² to sow 15 kg of seeds for one acre.
2. Collect mud around the seedbed area and raise it to about 5 cm above original field level. Provide a 40 ~ 50 cm space between beds.



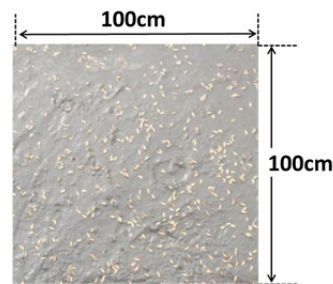
3. Level and smooth the seedbed surface.



4. Sow evenly about 100 g of seeds / m² on the seedbed.



100 g seeds



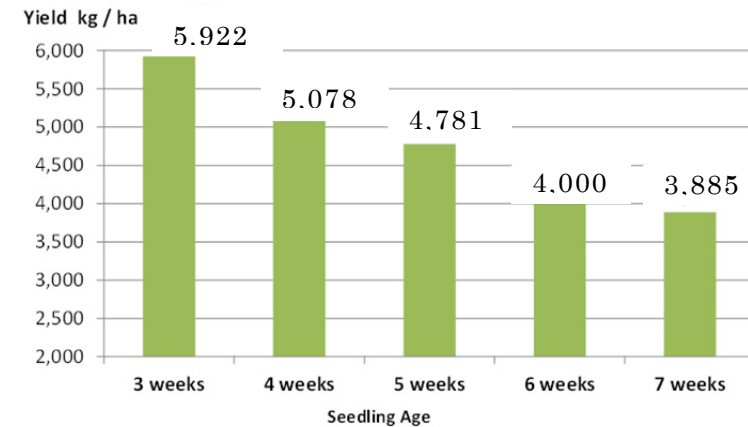
100g/m²

5. Once seeds have sprouted 3-4 cm high, irrigate and keep shallow water level. (Do not dry the seedbed surface)



6. 16 days after sowing, seedlings are ready to transplant.
 - Seedlings should be transplanted before 25 days after sowing.

Seedling Age: Seedlings should be transplanted before 25 days after sowing.



Dapog seeding

- This is a type of nursery practiced by farmers in Asia.
- Pre-germinated seeds are spread at the sowing rate of 2 kg / m² on a concrete floor or a tarpaulin. The required area of nursery is only 12 m² for an acre.
- After sowing, seeds should be kept wet throughout by watering.
- The surface of nursery should be pressed by palms for 2-3 days to prevent seedling to be lifted up by their root development.
- Watering is needed 3 - 4 times a day.



4 days

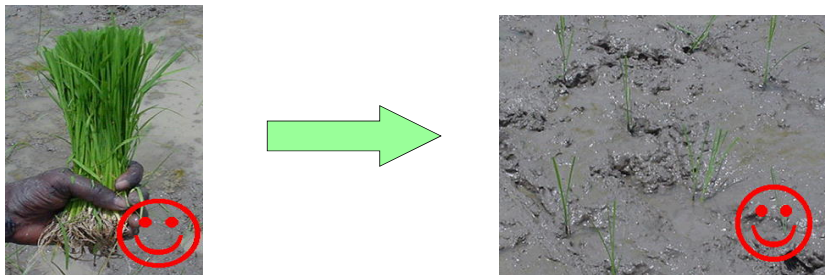
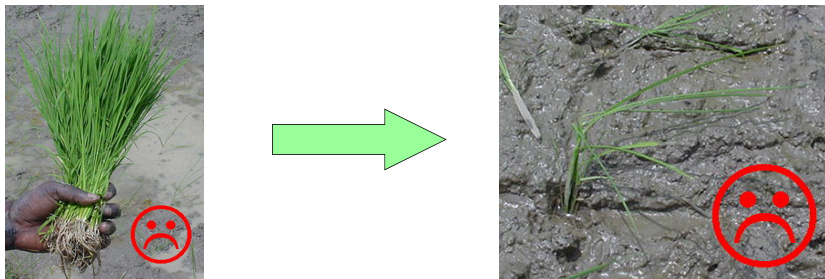
7 days

12 days

- Seedling should be transplanted 12-16 Day After Sowing (DAS).
- Seedling does not require nutrients from other sources for 15 days because the nutrients are supplied by their embryo.
- Since seedlings are smaller when it is transplanted, a good field preparation and leveling are needed.
- About 25 kg seeds are required for one acre.

How to transplant

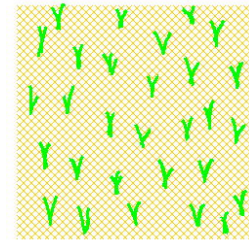
- If seedlings are tall, one may cut tip of the seedlings so that one can handle and transplant easier.



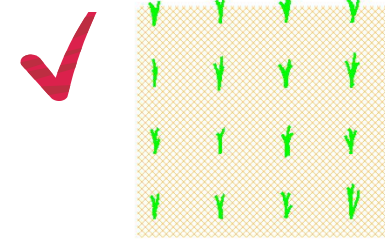
- Planting short seedlings can avoid deep transplanting

Planting method

Random planting



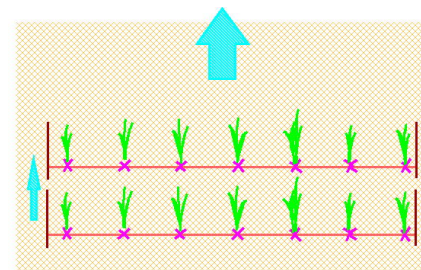
Straight row planting



- Straight row planting has an optimum plant population and facilitates the application of fertilizer, agricultural chemicals, and rotary weeder can be utilized for weeding.

Straight row planting

Using guide rope.



Transplanting can be done with standing water in the field. However the excess water should be drained before transplanting.

Plant spacing

- 25 cm x 25 cm (16 hills / m²), 25 cm x 20 cm (20 hills / m²) and 30 cm x 15 cm (22.2 hills / m²) are recommended.

Number of seedling / hill

- Plant 3 - 4 seedling / hill

Planting depth

Planting depth: 3 - 4 cm



Farmers field



Effect of planting depth

- Deep transplanting causes retard rooting and poor tillering.

Replant missing hills 10 days after transplanting.

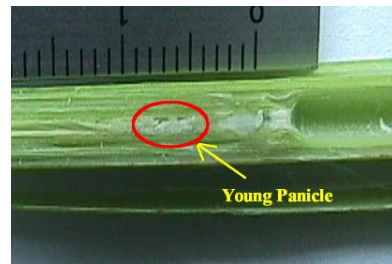
- After transplanting, place excess seedling at the corner of field to refilling the missing hills.

Amount and time of fertilizer application

Basal: Apply 25 kg of DAP (18-46-0) and 25 kg of Urea before final harrowing.

Top dressing: Apply 25 kg of urea at panicle initiation stage (65 - 70 days after sowing).

- When you apply top dressing, irrigate the field and keep 2 - 3 cm standing water.
- If there is no water in the field, fertilizer application become useless.



Panicle initiation stage

- After fertilizer application, keep water in the field for one week to avoid fertilizer runoff.

Weed management

Weed control measure that one can use are the preventive, mechanical, cultural and chemical method.



1. The preventive method includes the use of good seeds (no weed seeds contaminated), control of weeds before flowering and keep bund and canals free of weeds.

2. The mechanical method involves hand weeding and use of rotary weeder.

3. The cultural method involves good land preparation, closer crop spacing, flooding. Most weed seeds or rhizome cannot germinate or grow without air under the surface of puddled soil.

4. Chemical control involves the use of appropriate herbicides. An herbicide is a chemical used to kill or prevent the growth of weeds.

Types of herbicide

- Contact herbicides:** kill only the parts that are sprayed. Normally applied to leaves and stems. Propanil (selective), Paraquat (non selective)
- Systemic herbicides:** herbicide move within the plant to kill portions that were not sprayed. Applied to leaves and stems or to the soil. Butachlor and 2,4-D (selective), Glyphosate (non selective)

Herbicide injury (Phytotoxicity)

Improper herbicide use;

- Applying too much herbicide or high rate.
- Applying herbicide at the wrong time.
- Herbicide label information should be followed at all time to prevent damage to the rice.

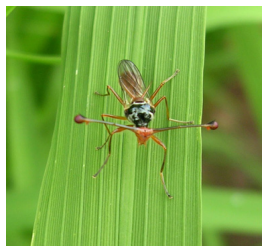


Herbicide injury

Insect Pests of lowland rice

Stalked-eyed flies (*Diopsis thoracica*)

The larvae bore and feed on plant tissue inside the rice stem causing dead heart.



African Rice Gall Midge (*Oreolia oryzivora*)

The larvae attacks the growing point of the apical bud at a node and cause the leaf sheath tissues to form a tube-like structure called a 'silver shoot gall' or 'onion shoot'.

Rice fields planted early are less damaged than those planted late.



Stem borers (*Pyralidae*)

The larvae bore through the stem and eat up the plant tissue resulting in a condition called dead heart and / or white head.



Stink bug and Rice bug

The bugs stay on the panicle and suck the milky juice in young panicles causing staining of the grains hence lowering grain quality.



Stink bug



Rice bug



Damage

Diseases of lowland rice

Rice Yellow Mottle Virus (RYMV)

RYMV is known only in Africa and one of the most severe diseases of rice in Africa.

Symptoms:

- Stunting of rice plants if infected at early stage.
- Reduce tiller number.
- Yellowing and mottling of leaves.
- Infected plants are easily attacked by other diseases (such as brown spot).



Control of RYMV

- There is no practical ways (no chemicals) of curing a plant after it becomes infected.
- Planting resistant varieties is the cheapest and most effective way of controlling RYMV.
- Resistant varieties: NERICAs.

Rice Blast (*Magnaporthe grisea*)(*Pyricularia oryzae*)

- The fungus produces spots or lesions on leaves, nodes, panicles and grains. The spots are usually elongated and pointed at each end. Damage is often characterized by 50% reduction of yield.
- Control is by planting resistant varieties and avoiding excessive nitrogen application.



Leaf blast



Neck blast

Harvesting

- Drain the field 10 days before harvest



- Harvesting should be done when 80-85% of the grains are straw coloured and the grains in the lower part of the panicle are in the hard dough stage.

Best time for harvesting

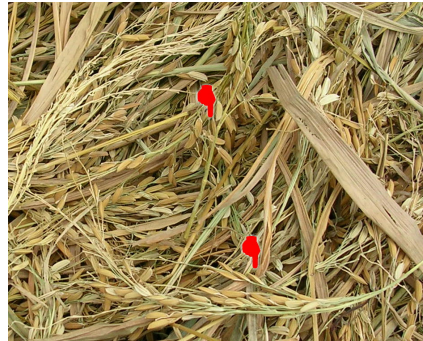


- The stem of the rice is cut close to the ground by serrated sickles.
- This method of harvesting is much faster than harvesting by panicle using a knife.



Threshing

- Threshing can be done by beating with sticks against a log or using thresher.
- However, threshing by beating increases the chances of broken grains at milling.



↑ Beating with sticks After beating, many paddy are remained ↑



↑ Manual thresher



↑ Engine driven thresher

Winnowing

- Before drying, winnow empty grains and straw away.
- Open air drying under the hot sun heat is widely practiced in the tropics.
- Preferably drying should be done on a tarpaulin or a clean drying floor free of stones.



Drying

- The rice should be 4 - 5 cm thick and needs to be turned over 30-60 minutes to allow equal exposure to the sun heat. It is important to monitor moisture reductions, less than 3% reductions are recommended per day.
- Rapid drying lead to broken rice when milling. **DRY SLOWLY!**



Keep 4-5 cm thickness for sun dry



Rapid drying cause broken rice

Seed Production

- Since rice is self-pollinated plant, rice seed can be produced by farmers (Not necessary buy seeds every season, unlike maize)
- For example,
1 kg of seed planting in 200 m² → 50 kg of seed can be harvested.
50kg of seed planted → 3,000kg of seed can be harvested.
- Genetic purity of rice varieties can be maintained by removing the off-types detected in the field

Some characteristics for identifying off-types is as follows;



Stem Colour

Time to maturity



Apiculus Colour

without awn

with awn

Purification through the removal of off-types ensures uniformity in

growth and stability of yields of rice.

Cost Benefit Analysis for One Acre of Lowland Rice Cultivation

A case study for lowland rice cultivation with 1 acre

Expenditure		
Seeds	15 kg x 1,500	22,500
Fertilizer DAP(18-46-0)	25 kg x 2,000	50,000
Urea(46-0-0)	50 kg x 2,000	100,000
Sacks	20 bags x 1,000	20,000
Slashing		60,000
Digging		80,000
Paddling and leveling		80,000
Transplanting		60,000
Hand weeding	50,000 x 2 times	100,000
Bird scaring	2,000 x 30 days	60,000
Harvesting and threshing		60,000
Transport		40,000
Milling cost	1,300 x 100	130,000
	Total	862,500
Income		
20 bags x 100 kg	2,000 kg x 65% (milling rate)	
Milled rice 1,300 kg	1,300 kg x 1,800	2,340,000

$$\begin{aligned} \text{Benefit} &= \text{Income} - \text{Expenditure} \\ &= 2,340,000 - 862,500 = 1,477,500 \end{aligned}$$

