Nursery establishment

Factsheets for Rice Production, East Africa

Fig 1. Preparing bands

Fig 2. Certified rice seed

Fig 3. Coated rice seed

Nursery establishment

Rice cultivation involves a series of processes to achieve the desirable product.
The nursery is the first step for supply of clean healthy transplanting seedlings.

Types of nursery beds

1. Wet nursery bed

- This is the most common in places with sufficient water and is prepared about 25 days before transplanting.
- A suitable place is selected that has easy water flow, fertile soil free of debris.
- The land is ploughed manually and harrowed into a smooth tilth using hoe or fork jembe.
- This can be done when dry or wet and after about 10 days it is puddled 2 times
- It is then raised a bit about 5cm by heaping soil and levelled before sowing seeds if the place is prone to flooding.
- Well prepared nursery bed allows good seed germination and weed control

Sowing seeds:

- The prepared seed bed is broadcasted with NPK at the rate of 1 kg N, 0.4 kg P_2O_5 and 0.5 kg K_2O for 100m^2 to ensure good seedling establishment.
- Certified seeds of the preferred variety are pre-germinated by soaking for 36-48 hours in water in a warm place.
- The seed rate is about 35 kg ha^{-1}.
- The pre-germinated seeds are broadcasted evenly to avoid overclouding that can result in week seedlings.
- The bed is kept moist for the first few days and care should be taken to avoid birds and rodents from eating the seeds.
- When seedling attain 2-2.5cm keep the bed submerged in a thin layer of water.
- Diseases and pests should be controlled in the nursery to avoid transferring them to the main field when transplanting.
- Depending on the system used, e.g. SRI, 14-21 old seedlings are transplanted in the main production field that is well prepared.
- Young seedling <30 days recover easily from transplanting shock.

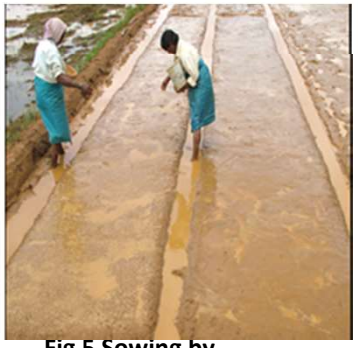

Fig 5 Sowing by broadcasting seeds

Fig 6. Wet bed Seedling nursery

Contact experts: Kimani, J (john.kimani@kalro.org), Wandera, F; Thuranira, D., Wasike, V., Otipa, M., Kega, V., Nyamongo, D., Magoti, R., Ochieng, V., Kirigua, V., Wasilwa, L., Wayua, F., Mugambi, C., Ndungu, J., Too, A., Ngari, B., Musila, R., Esilaba A.O. Mutiga, S (ILRI-BeCA); Nyongesa, O (IRRI), Zhou, B (IRRI); Mitchell T. (OSU); Wang, G. L (OSU); Were, V (TSL); Ouedraogo, I (INERA); Rotich, F (UoEm); Correll, J. C. (UARK) and Talbot, N. J. (TSL). *E-Guide for Rice Production in East Africa (2019)*

Nursery establishment ……..Continued

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Fig 7, Dry nursery bed

Fig 7. Pregerminated seeds

Fig 8. Seedling in nursery

Fig 9. Dry bed nursery seedlings

Removing seedling from nursery bed

- Older seedling more than 30 days severely suffer from stem and root damage.
- Two to three seedlings are held between the thumb and forefinger as close to the base as possible.
- Pull gently at angle of 30 degree and if too much mud stick to seedlings, it is washed by shaking roots in water,
- The seedling bundle about 5-8cm is tied with a soft material and protected from drying.
- These are now ready for transplanting.

Advantages of wet nursery bed

- It led to use of less seed per unit area.
- Faster and steady growth resulting in strong healthy seedlings.
- It can be specified thus avoiding seedling waste.
- Slight salinity can be tolerated.
- It is easy to establish and manage.
- Any type of soil can be used.
- Located right in the field.
- Good for dry season crops.

Disadvantages of wet nursery bed

- Heavy rains if they occur just after sowing can carry seeds away.
- Nursery bed preparation and pulling of seedling are labourious
- Plenty of water is required that may result in delayed transplanting.
- Seedling growth can not be controlled.
- Under good conditions seedlings can not extend stay in nusery as they develop nodes and tiller.
- Drought can easily damage the seedlings
- It eats into land meant for crop production as it requires more space.

2. Dry seed bed nursery

- A level or gently sloping place is selected to allow water flow.
- The piece is ploughed and harrowed twice to obtain a smooth tilth at about 10-15cm.
- Add well decomposed manure, straw or husk ash to aid in uprooting seedlings.

Dry seed bed nursery

- Level the bed with a piece of timber and breakdown any big soil clods.
- Then broadcast pre-germinated seeds.
- Cover the seeds with a thin layer of soil.
- If there is danger of birds or rains use leaves, fronds or nets to cover the seed bed.
- Water the bed thoroughly after sowing and twice every day as these are completely dependent of hand watering or rains.
- Seedling are ready for transplanting after 21 days as growth is slower than in wet bed.

Advantages of dry bed nursery

- Seedlings are loosely held thus easy to uproot.
- They can be made near the farm house for ease of management.
- Seedlings have excellent rooting.

Fig 10.Dry nursery bed

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Nursery establishment ……..Continued

Fig 11. Ready dapog nursery

Fig 12. Dapog nursery

Fig 13. Ready dapog seedlings

3. Dapog nursery

- This method does not use soil as seeds have stored food in the endosperm for growth up to 14 days.
- Dapog nursery can be established anywhere provided water is available.
- Make a rised level earth bed 1m^2 and cover with polythene sheeting, green banana leaves or plastic sheeting.
- Make the surface level with slightly raised edges to hold a thin layer of water and seeds.
- Soak to pre-germinate seeds but use slightly more seeds as seedlings are small when being transplanted and thus difficult to separate.
- Spread the pre-germinated seeds in a solid thin layer on the sheeting about 5-6 seeds thick or 2cm depth.
- Sprinkle water over the seeds gently not to dislodge them.
- As seeds expand in the next few days, firmly press to compact them with a board.
- Keep the seeds moist all the time as any slight drying can kill them.
- For transplanting, roll up the entire seedlings mass and place it over and carry to the field.

Advantages of dapog nursery bed

- It is a portable nursery.
- It is quite fast.
- Require small area.
- Seedling recover very fast as they are not uprooted
- Good for replacement of seedlings destroyed by pests/ diseases.
- Can be done ear farmers house.

Fig 14. Seedlings of dapog

Fig 15. Rolled up seedlings ready for transplanting

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Fig 16 Rice seedlings raised in individually in pots within trays

Fig 17. Tray seedlings being panted at KALRO-ICRC Mwea

Fig 18. Rice seedlings raised in trays

4. Other types of nurseries

A. Trays/ plate/ basin nurseries

- These are very important when many varieties are being grown as it allows proper ordering and labelling
- Well prepared soil mixed with properly decomposed manure and inorganic fertilizer are place in each try, plate or basin and levelled.
- The particular seeds either dry or soaked are placed in and covered with a thin layer of soil on the well arranged pots in an open field.
- The watering is done using a water can ensuring that no seed is displace.
- This has the advantage in that many varieties can be used and management is easy.
- They have less weeds, diseases and pests problem and once seedlings are ready are easily transported with suffering and thus transplanting shock is minimized.

B. Emerging nurseries

- There are specialized nurseries that youth can engage in to produce particular varieties for farmers.
- Farmers can enter into contract seedling managements.
- These have advantage of ensuring varietal purity, health seedlings and reducing time and cost of seedlings for farmers
- These require modest structures where conditions can be optimized and stacking to maximize on space.
- The seeds are soaked for 24hrs before sowing them in stacked trays that are arranged according to different varieties.
- The seeds are kept moist and monitored for any sign of pest, diseases, physiological problems or any other emerging issues..
- This method is convenient as farmers are assured of quality seedlings.

Fig 19. Transplanting seedling

Fig 20. Rice seedlings germinating in trays

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5. System of Rice Intensification (SRI)

- The SRI principles are use of young 8-15 days 2-3 leave seedlings to enhance tillering and rooting, use of row weeders to aerate soil and control weeds, alternate wetting and drying, planting single seedling at wider spacing 25x25cm and put emphasis on use of organic manure.
- Nursery seed bed is prepared near transplanting field to avoid long seedlings transport time.
- Select a place with flat or slight slope of about 100m^2 for seedlings production for 1 ha and near by water.
- Prepare a seed bed with shallow depression by dry ploughing twice and use a plastic sheet or polythene gunny bags and spread the soaked seeds evenly.
- The sheet prevent roots from growing down the soil and thus minimize roots damage.
- Or the seeds are soaked for 24hrs and any floating seed is thrown away before these seeds are incubated for 24hrs to sprout and when radical is 2-3mm long sow.
- The soaked seeds are put in a sack and placed in warm heaped compost or placed in warmed ground by fire for 24hrs.

Nursery establishment Contd

Fig 1. Soil mixing with manure

Fig 5. Seedlings ready for planting

Fig 2. Seed selection by floatation

Fig 6. SRI right seedling

http://agropedia.iitk.ac.in/content/sri-rice

Fi g 3. Pouring soil into boxes

Fig 7. Wide spacing of SRI

Fig 4.Row weeder in SRI

Fig 8. Row planting in SRI

- The nursery soil is well mixed with compost at rate of 100kg per 10m^2. 4m^3 of soil is required for 100m^2 nursery. 70% soil is mixed with 20% of properly and well decomposed manure and 10% of rice husk/hull.
- Sometime to get good results, a wooden frame of 0.5m length by 1m wide and depth of 4cm is placed on top of sheet and filled up with the soil mixture.
- Before broadcasting sprouted seeds, spread a thin layer of well decomposed fine manure especially chicken one or black soil in the bed to nourish the seeds as they grow.
- Apply basal DAP or urea, or super phosphate depending on soil test results.
- Broadcast the pre-germinated (200g per 3m^2) seeds and cover them with a thin layer of soil.
- Seeds should not be sown at same time but on every day to ensure transplanting same old seedlings.
- Water the seed bed to maintain it moist but not flooding or keeping it continuously wet.
- At 2 leaf stage (8-15 days) transplant seedlings.

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