

METHOD OF PLANTING RICE

Rice crop is established in the field either through direct seeding or through transplanting.

Direct seeding - Seeds are sown directly in the main field either by wet or dry method

Transplanting - Seedlings are first raised in the nursery and are planted in the main field

Direct seeding :

1. Dry system of cultivation: Dry seeds are used

2. Wet system of cultivation:

For direct seeding in wetlands, pre-germinated seed with a radicle length of 1 to 2 mm is used. Plump, well developed seeds are selected, cleaned and winnowed. Seeds are soaked in water for 12-16 hours. Then taken out, drained and incubated for 36-48 hours in a warm shaded place. It should never be allowed to dry up. If kept for more than 48 hours, radicle and plumule elongates and seeds become difficult to separate. For wet sowing excess water should be drained and soil particles are allowed to settle before sowing, otherwise the settling mud covers the seeds and restricts O₂ supply. Depth of water should be 1-2cm and this will prevent birds from picking up the seeds. Excess water is also detrimental as the seeds will float and will not anchor properly. Water is drained off on the next day. Then water is let in after a day and made to stand 1-2 cm deep.

Seed rate

Transplanting - 60-85 kg/ha

Broadcasting - 80-100kg/ha

Dibbling - 80-90 kg/ha

Kuttanad - 125 kg/ha

[Note: The above seed rates are specified for farmers' field on the basis of minimum germination of 80%.]

Seed treatment

1. Dry method:

Pyroquilon (Fongorene 50WP)/ Bavistin 50 WP / Beam 75WP @ 2g/kg of seed.

2. Wet method: Soak seeds for 12-16 hrs. in solution of 0.25 Fongorene/ 0.2% Bavistin

@ 2g/ kg of seed/ litre of water

Seed treatment protects the seedlings from blast up to 30-60 days after sowing (DAS).

3. Treatment with **Pseudomonas**: **Protect the crop from blast, Sheath blight and BLB**

4 ways as follows:

1. Soak the seed for 12hrs @ 10g/kg of seed, drain out and keep it for 24 hrs, for germination

2. Pseudomonas 2kg/acre – mix it with Rajphos or FYM- incorporate in the soil before sowing

3. Dip the seedling root in 2 % Pseudomonas solution for 30 min. before transplanting

4. Spray 2 % solution of Pseudomonas 30 DAT

Drum seeding: Drum seeding is technique for sowing seeds in lines. Sprouted seeds are taken in a drum which are provided with holes at appropriate spacing. When the drum is dragged along the field, seeds are dropped in lines at the required spacing. The seeds taken in the drum seeder have to be at the just emerging stages of the radical otherwise the seedlings will get entangled. There should not be standing water in the field, as dragging will be difficult, and also lines cannot be maintained. Only a thin film of water should be there.

Different types of drum seeders are available for different seasons and different varieties. Drum seeding makes weeding with conoweeder easy (20-25DAS). Drum seeders suitable for rice legume intercropping are also available. Drum seeding can be safely adopted in puncha season and also in rabi/second crop. During kharif due to heavy rains, it is difficult to use the drum seeder.

Points to be remembered while using seed drum

1. The seed drum should be used only one day after land preparation and flooding, so that fine soil particles settle down.
2. Seeds which have just started sprouting should be used. If the roots are too long, the seeds will not drop easily through the holes.
3. Only a thin film of water should be present in the field at the time of sowing.
4. The seed drum cannot be used when there is heavy rain.

Advantages of direct seeding

- Low labour cost is the major advantage - reduce production cost, particularly in areas where labour cost is high.
- Rice may mature 7 to 10 days earlier than transplanted rice. This saving in time is important especially where multiple cropping pattern is used.

Disadvantages of direct seeding

- Seeds exposed to bird and rodent attack. So high seed rate is needed.
- If heavy rains follow sowing, seeds are washed away. High weed population
- Seedlings of optimum age planted in the puddle field manually or mechanically. They have to be raised in the nursery. There are different methods of raising nurseries.

Transplanting

Dry nursery: This method is practiced in areas where sufficient water is not available and the time of planting is uncertain. During first crop season, wherever transplanting is done depending upon receipt of rainfall, it is safer to adopt this method since growth of the seedlings can be controlled.

Plough the nursery area to a fine tilth. Prepare raised beds of 1 to 1.5 m width, 15 cm in height and of convenient length. Apply compost or cattle manure at the rate of 1 kg/m² of the nursery bed and mix well with the soil at the time of preparation of the field. Sow the seeds evenly over the bed and cover with fine sand / soil. Water the nursery as and when required depending upon the receipt of rains.

Note: Rice seedlings from solarised nursery beds showed high initial growth, early maturity and resistance to leaf blast disease (ad hoc recommendation).

Wet nursery: The wet method can be adopted in areas where water is available as in the second crop season. The seedbed should be prepared in advance, so that the pre-germinated seeds can be sown in time. Fertile lands with irrigation and drainage facilities should be selected for raising the nurseries. Lands should be suitably located to receive full sunlight.

The following are the steps in raising wet nursery.

- Plough and harrow the fields two or three times until the soil is thoroughly puddled and levelled.
- Prepare raised beds 5 to 10 cm high 1 to 1.5 m wide and of convenient length with drainage channels between the beds.
- **The total seedbed area should be 1000 m² for each hectare of the field to be transplanted.**
- Apply compost or cattle manure @ 1 kg per m² of the nursery bed and mix well with the soil at the time of preparation of the field.
- Treat the seeds by wet method. Sow germinated seeds on the third day. Delay will result in poor seedling stand.
- Irrigation may be commenced on the 5th day after sowing and continued up to the 7th, to a depth of about 5 cm. After this period, irrigate the seedbed continuously to a depth of about 5 cm in order to control weeds.
- Drain occasionally to encourage production of vigorous seedlings with short roots. Flooding the soil with too much water for long periods produces tall and weak seedlings, which do not readily recover during transplanting.
- If symptoms of nitrogen deficiency are observed, broadcast urea at the rate of 1 kg for 100 m² as top dressing about 10 days prior to pulling out of seedlings, depending upon the duration of variety.

Seedlings raised by the wet bed method can be harvested one week earlier.

Dapog/ Mat Nursery: This method is commonly prevalent in Philippines. The essential feature of this method is to have a very thick seeding without any contact with the soil. Raised beds are prepared just like wet nursery and covered with banana leaves/ plastic sheet. Pre germinated seeds are sown @ 3 kg/m² uniformly on the bed. For 3-4 days the seedlings are kept moist by sprinkling water. The seedling will be ready for transplanting within 12-14 days.

Modified Mat Nursery: A modified mat nursery establishes seedlings in a layer of soil mix on a firm surface. Seedlings are ready for planting within 15–20 DAS. 4 m³ of soil mix is needed for each 100 m² of nursery. Mix 70–80% soil + 15–20% well-decomposed organic manure + 5–10% rice hull or rice hull ash for soil mix. Incorporate around 20 kg N/ha for every 100 m² of nursery area. For laying the soil mixture, place a wooden frame of 0.5 m long, 1 m wide and 4 cm deep divided into 4 equal segments on the plastic sheet or banana leaves. Fill the frame almost to the top with the soil mixture. Sow the pre-germinated seeds uniformly and cover them with a thin layer of dry soil. (Approximately 1 seed/cm²). Seedlings reach sufficient height for planting in 15–20 DAS. Lift the seedling mats and transport them to the main field.

The bubble tray nursery: The bubble tray nursery is a good system to develop 12-15 day old seedlings with "root balls". The seedlings are raised on plastic trays of 59 cm by 34 cm with 434 embedded holes. It needs around 750 trays per hectare of paddy.

Seedling boxes for mechanical transplanting: Mechanized transplanting requires techniques that are different from hand transplanting. Usually seedling boxes are used that are adapted to the type of transplanter. In a seedling box, seedlings are grown on a thin layer of soil in 30 cm x 60 cm trays. In some instances, seedlings are grown on larger areas and then cut into rectangular strips (mats of seedlings) that fit into the planting trays of the transplanter.

Advantages and disadvantages of transplanting

Advantages

- Better weed control
- Water management and intercultural operations are easier.
- Plant population assured
- Nurseries raised in advance enable the crop to be planted at the right time.
- Higher yield

Disadvantages

- High labour cost
- Due to transplanting shock, plants tend to grow more slowly than direct seeding because of the recovery time after transplanting. However, it has been proved that if timely sowing is done, optimum plant population is maintained and weeds are taken care of, direct seeding is also as good as transplanting.

Main field preparation for sowing seeds/ transplanting seedlings:

The field is ploughed thoroughly to incorporate weeds and straw into the soil. Once the rain begins and water rises to a depth of 2.5 cm, the land is ploughed, and then worked with a tractor with cage wheel. It is then levelled with a leveller, and 2.5 cm of water is maintained to allow the green manure to rot inside the puddle for a minimum of 7 -15 days. FYM or compost is applied and incorporated into the soil while ploughing. Bunds have to be cleaned and mud plastering to be done on the sides and top of the bunds. Plastering helps to check weed growth and prevent harbouring of insect pests. The field is levelled with a levelling board. After ploughing and puddling, excess water is drained and only a thin film of water is maintained. Fertilizers are applied on the drained soil at the time of final ploughing and levelling and thoroughly mixed into the soil. Then seeds are broadcasted or transplanting is done

Transplant 2-3 seedlings /hill. Leave wider spacing of 30 cm after every 3 m for spraying and other operations. Transplant seedlings at a depth of 3-4 cm. Drum seeding and cono weeding can be adopted in areas where water management is possible – For short duration (SD) var. 15cm spaced and for medium duration (MD) var. 20 cm spaced seed drum is used.

Age of seedling

- In general 4-5 leaf stage
- SD var. 18-21 days; MD Var. 20-25 days; LD Var. 30days

- SRI system – 10-12 days old seedlings
- In virippu season age of seedling can go up to 25 days in SD Var, and 35 days in MD Var.

Aged seedlings are to be planted at a closer spacing with 3-4 seedlings/hill. Apply extra dose of 5 kg N as basal dressing. Irrigate seed beds a day before pulling out the seedlings. Pull out one or a few seedlings at a time to reduce damage. Wash off mud and soil from the roots and tie the seedlings into bundles of convenient size for transplanting. Pruning of the top portion and root is not recommended as it inflicts wounds through which disease causing organisms may subsequently enter.

Spacing

season	duration	Spacing	No of hills/ m ²
First crop	Medium	20cm x 15 cm	33
	Short	15cm x 10 cm	67
Second crop	Medium	20cm x 10 cm	50
	Short	15cm x 10 cm	67
Third crop	Medium	20cm x 10 cm	50
	Short	15cm x 10 cm	67

Too close spacing - Increased cost of transplanting and lodging

Too wide spacing - Lower no. of plants and less yield

Improved varieties with high tillering capacity can be planted at a wider range of spacing.

Closely spaced rice competes better with weeds.

Mechanical transplanting: Mat Nursery Preparation

Well puddled soil, incorporated with cow dung, free of stones and stubble may be spread over the sheet without clods at a thickness of 10-15mm. Just sprouted seeds (4th day of soaking) may be uniformly spread over the mat area @ 0.4 to 0.6 kg dry seed m⁻². Seedbed may be mulched preferably using green leaves, just spreading it over the seedbed. Sprinkle water over the seedbed for four days in the morning and in the afternoon and keep soil in saturated condition. On fourth day remove the mulch and keep the seedbed submerged to a height of 3/4th of seedling height. Keep this condition till 6-12 hours before cutting the mat for transplanting. Closely observe the mat for pest and disease attack and adopt control manures if required. Never allow mat to dry up. When seedlings reach a height of 150mm mat is ready for transplanting. Drain the required mat area 6-12 hours before cutting. Cut the mat strips 225mm wide and 450mm long to feed to the transplanter. Do not allow nursery to over grow, over growing will lead to entanglement of seedlings with fingers of transplanter and clogging of fingers due to thick and hard mat roots

Main field: Prepare the main field adequately, without clods and stubble interfering with functioning of fingers of the transplanter. Final preparation may be done on the day of transplanting in case of sandy loam soil, but may be done 3-4 days prior to planting in case of

clayey soils, depending upon settling time of the puddle to consolidate. A thin film of water is needed in the main field at the time of transplanting; too much water in the field leads to floating of seedlings and too dry condition leads to non-anchoring of seedlings. Main field may have irrigation and drainage facility. Wetting of mat may be required while transplanter is in operation.

Seasons of rice cultivation in Kerala

Agroclimatic situations	Seasons	Period	
		From	To
General	Virippu (I crop / autumn)	April-May	Sept-Oct
	Mundakan (II crop / winter)	Sept-Oct	Dec-Jan
	Puncha (III crop / summer)	Dec-Jan	March-April
Onattukara	Virippu (I crop / autumn)	April	August
	Mundakan (II crop / winter)	Aug-Sept	Dec-Jan
Kuttanad	Additional crop	May-June	Aug-Sept
	Puncha	Oct-Nov	Feb-March
Kole (single cropped area)	Mundakan (<i>Kadumkrishi</i>)	Aug-Sept	Dec-Jan
Pokkali	Virippu (I crop / autumn)	May-June	Sept-Oct
	Oorumundakan	Aug-Sept	Dec-Jan
Kaippad	Mundakan (II crop / winter)	Sept-Oct	Dec-Jan
	Puncha (III crop / summer)	Dec-Jan	March-April
High ranges	Nancha	May-June	Oct-Nov
	Puncha	Dec-Jan	April-May