



Cereal Systems Initiative for South Asia

8

Tips for Higher Rice Yields in Odisha





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8 Tips - At a glance

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An aerial photograph of a vast, vibrant green rice paddy field. The field is divided into rectangular plots by narrow, winding irrigation channels. In the foreground on the right, a large, detailed palm frond extends into the frame. The background shows a dense line of tropical trees and a small, multi-story building with a yellow roof. The sky is a pale, overcast white.

Tip 1: Variety

Choose the most suitable high-yielding variety recommended for your rice growing environment

High -yielding varieties and hybrids recommended for Odisha

To get the most of a non rice winter crop by ensuring timely planting, choose a shorter duration high-yielding variety or hybrid.

Short duration varieties and hybrids include:

Khanadagiri, Jyotirmayee, Parijat, MTU 1001, Kalinga 111, Sidhant, Shahbhagi Dhan (drought tolerant) and few hybrids like, Arize 6129, Ajay, Suruchi 5401, Rajlaxmi, US323

Choose medium and long duration varieties for areas that stay wet till the end of December.

Medium and long duration varieties include:

Lalat, Surendra, Pratikshya, Konark, Naveen, Hiranmayee, Swarna (MTU7029), Mahsuri (BPT 5204), Savitri, Pooja, CR1014, Ramchandi, Gayatri, Mahanadi and SwarnaSub1 (submergence tolerant) and hybrids like Arize 6444



Choosing the right variety for an area is critical
Illustrated in these pictures is the example of Swarna sub1, a submergence tolerance variety capable of withstanding flash floods of up to 15 days



Tip 2: Seed Quality

Good seeds make healthy and strong seedlings and a uniform crop stand

How to ensure the use of quality seeds

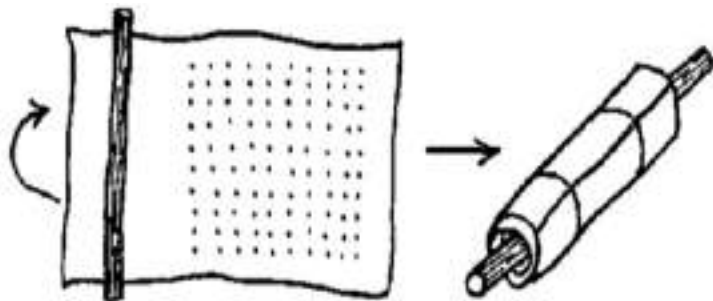
- Buy certified seed from a reliable source, or
- Produce your own good seed. If using your own seeds, seeds should be:
 - ♦ clean (containing no weed seed, soil, or stones)
 - ♦ pure (only one variety)
 - ♦ healthy (same color, fully filled grains, no cracks)

The following steps can help assess and improve the quality of your own seeds:

1. Germination test

Materials required: seed, 3-5 handkerchief-sized rags, 3-5 small sticks, short lengths of string or rubber band

- Soak the rags in clean water and spread them out on a flat surface
- From the seed sample, count 100 grains for each rag and distribute the grains evenly around the cloth (ten rows of ten grains facilitates counting)
- Carefully roll each rag around a separate stick, leaving the seeds undisturbed inside



- Fasten the rags to the sticks with string and store in a warm moist place for five days
- Ensure that the cloth remains moist
- After five days, unroll the rags and count the number of seeds with roots. If each rag contains exactly 100 seeds, the number of sprouted seeds will equal the germination rate of the sample (e.g. if 85 seeds out of 100 sprouted, the germination rate equals 85%)
- If germination percentage is less than 70, reject the seed lot and use new seeds. If germination percentage is between 70 and 85, adjust the seed rate accordingly cleaning the seed

2. Seed cleaning by flotation

Before soaking your seeds for nursery preparation, clean them by extracting all empty and partially-filled grains. These grains will produce weak seedlings the seed into a bucket containing clean water and stir gently. Discard all grains which float to the surface.



Use healthy seeds free of impurities. The picture above illustrates diseased seed and some common impurities in the seed.



When you soak the seeds in water, empty seeds will usually float to the surface. These should then be removed.



Tip 3: Nursery Management

A well prepared and managed nursery produces healthy seedlings and gives the crop a better start

How to prepare and manage a nursery

- Land for the nursery should be near a reliable source of irrigation
- Plough sufficiently, level well, and keep the seed bed free of weeds
- Use good seeds (see Tip 2)
- Use pre-germinated seeds in the nursery bed. Submerge seeds in water and keep for 7-8 hrs. After soaking, drain and incubate (cover and keep moist) the soaked seeds in a gunny bag and place under shade. Seeds are ready for sowing when sprouting begins



Use pre-germinated seeds

- Use raised nursery beds to avoid stagnation of water
- Use a bed of the following dimensions: 1.2 to 1.5 m width and 10-15 cm height
- For 1 ha rice field distribute the seeds evenly over an area of 1000 m² and

use 40 kg seed for manually transplanted rice (use only 15 kg seed for hybrids)

- Use 500 kg manure or compost or 20 kg fertilizer (through DAP 18-46-0) for a 1000 m² area
- Ensure that seedlings are transplanted at an appropriate age, 20-25 days for manual transplanting



Use a well prepared seed bed for the nursery

Table below shows nursery management specifications according to area of main field

Field Area (ha)	Dimension Nursery (sq.m)	Seed Rate		Fertilizer Rate
		HYV	Hybrid	(DAP in kg)
0.25	250	10	3.75	5
0.5	500	20	7.5	10
0.75	750	30	11.25	15
1	1000	40	15	20
1.25	1250	50	18.75	25
1.5	1500	60	22.5	30
1.75	1750	70	26.25	35
2	2000	80	30	40



Tip 4: Land Preparation

Leveled fields with proper bunding have fewer weeds and higher water use efficiency

How to prepare your field

- Ensure levelled fields without any high and low spots
 - ◆ For puddled conditions, the soil should be allowed to settle for 12-24 hours followed by planking
 - ◆ Under non-puddled conditions, use one dry and shallow tillage using harrow/cultivator followed by planking. In wet conditions, one passage of harrow/cultivator should be followed by planking
 - ◆ New technologies like laser land levelling can also be used to efficiently achieve field uniformity
- Incorporate crop residues and weeds with tillage
- Repair the bunds and destroy rat burrows



Land levelling ensures equal distribution of inputs to the field. Rice grows well and evenly in the entire field, and weed problems are minimal. The crop will ripen at the same time in the whole field and yield will be higher.



A healthy crop in a well levelled field

A group of women are working in a flooded field, planting rice seedlings. They are bent over, carefully placing young green plants into the muddy water. The women are wearing colorful saris and blouses. In the background, another person is visible standing in the field. The scene is outdoors, with trees and a fence in the distance.

Tip 5: Crop Establishment

Young seedlings that are evenly distributed in the field make better use of nutrients and water, and make weeding easier

How to establish your crop

- Prepare the field well before transplanting (Tip 4)
- Use healthy seedlings (Tip 3)
- Uproot the seedlings from the nursery with care to avoid damage
- For uniform spacing, use ropes as guides to establish the crop in regularly-spaced lines
- Use an inter-row spacing of 15 cm and inter-plant spacing of 10 cm for early varieties; increase inter-row spacing to 20 cm for medium and long duration varieties
- Transplant seedlings in an upright position at a soil depth of 1.5 to 3 cm
- Transplant 2 to 3 seedlings per hill



For uniform spacing, use planting guides made of jute rope with appropriate spacing. Maintain alley ways for ease of operation





Tip 6: Weed Management

Weeds compete with rice plants for sunshine, nutrients and water, and decrease yields



How to effectively control weeds in rice

- Use rice seed that is not contaminated with weed seeds (Tip 2)
- Keep your nursery weed free (Tip 3)
- Prepare and level your field well and make sure that the field is weed free at transplanting (Tip 4)
- Control weeds when they are small and during the early stages of crop growth
- If using manual or mechanical methods such as the conoweeder, control weeds at 15 and 30 days after transplanting (DAT)
- If using chemical methods, pre-emergence herbicides like butachlor, or pretilachlor or pendimethalin, or oxadiargyl at 2-3 DAT (in standing water) or post-emergence herbicides like bispyribac sodium, or pyrazosulfuron ethyl at 10-15 DAT or 2,4-D ethyl ester at 20-25 DAT, alone or their appropriate combination can be used
- Use flat fan nozzle with a multiple nozzle boom for application of herbicide
- When applying herbicides, follow the indicated safety guidelines and labelled rate recommendations



Spraying the herbicide at the right time, with the right equipment (like the flat fan nozzle in the inset) and the right technique is critical. Contact your local input dealer or extension agent for guidance on herbicide application techniques.



Tip 7: Fertilizer Management

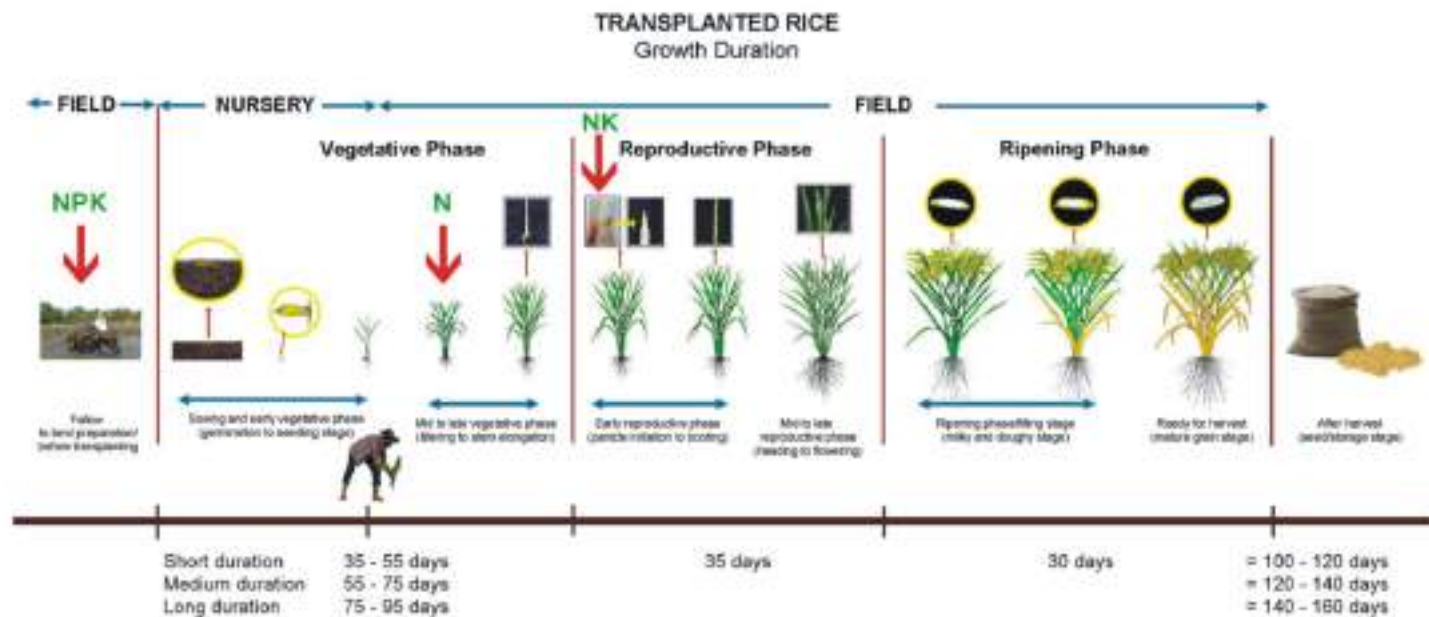
Nutrients from fertilizers in the right amount at the right time increase yields and maintain soil health

How and when to apply fertilizers

- For short duration varieties apply a minimum of 80-40-40 kg/ha of N- P_2O_5 - K_2O
- For medium and long duration high yielding varieties with assured irrigation apply 120-60-60 kg/ha
- Apply Nitrogen (N) in 3 splits: 25% at planting, 50% at active tillering, and 25% at panicle initiation stage
- Apply all Phosphorus (P) at planting. Apply Potassium (K) in two equal splits at planting and then at panicle initiation
- Apply 25 kg $ZnSO_4$ /ha at planting

Table below shows nutrient management specifications according to area of main field

Field Area (ha)	Fertilizer requirement in main field (kg)					
	Short duration Varieties			Medium & Long duration Varieties		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O
0.25	20	10	10	30	15	15
0.5	40	20	20	60	30	30
0.75	60	30	30	90	45	45
1	80	40	40	120	60	60
1.25	100	50	50	150	75	75
1.5	120	60	60	180	90	90
1.75	140	70	70	210	105	105
2	160	80	80	240	120	120



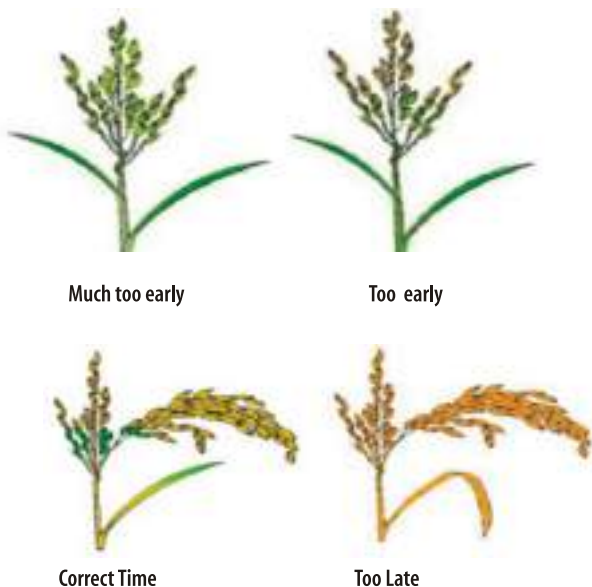
A person is shown from behind, crouching in a field of tall, golden-yellow rice. They are wearing a light green tank top, blue shorts, and a red and white checkered cloth wrapped around their head. The field is dense with rice stalks. In the background, there is a line of green bushes and several tall palm trees under a clear blue sky.

Tip 8: Post Harvest Management

Harvesting on time improves grain quality and reduces losses

How to ensure a timely harvest and reduce losses:

- Transplant pure seedling containing only one variety (Tip 2)
- Achieve even crop ripening through good field levelling (Tip 3)
- **Cutting:** Cut crop when 80-85% of the grains are straw-colored. in the lower part of the panicle should be in the hard dough stage (approximately 30 days after flowering) at 20-25% moisture content.
- **Threshing:** Freshly cut crop should be threshed and dried within 24 hours after cutting. field drying or prolonged stacking whenever possible as this results in high losses from insects, birds, rodents, disease, and molds.



Harvesting too early results in a larger percentage of unfilled or immature grains. too late will lead to excessive losses from shattering and deterioration of grain

- **Drying:** If mechanical dryers are not available, sun dry paddy on mats, plastic sheets, or canvas to avoid direct contact and absorption of moisture from the ground. should be spread in a layer 4 cm deep or less. the grain once every 30 minutes for even drying. Avoid high grain temperatures (above 43°C) and prevent re-wetting of grain from rain or dew.
- **Storage:** Store in a dry and clean area, preferably in a sealed or hermetic container. Recommended moisture content for storing is <14% for grains and <12% for seed.



Threshing and drying within 24 hours is best practice for reducing physical and quality losses. options also provide farmers and rural entrepreneurs incoming generating opportunities from services.

Agriculture is the life line of the people of Odisha with rice as the principal food crop. In spite of a conducive environment, the productivity of rice in the State is well below the national and global average. With the adoption of improved package or practices the productivity could be enhanced significantly. 82% of the farming community are in the small and marginal category and are completely dependent on rice for their living.

The Cereal Systems Initiative for South Asia (CSISA) is mandated to enhance farm productivity and increase incomes of these resource-poor farm families in South Asia through the accelerated development and inclusive deployment of new varieties, sustainable management technologies, partnerships and policies. The project is implemented by the CGIAR institutions of CIMMYT, IFPRI, IRRI and is supported by the US Agency for International Development and the Bill & Melinda Gates Foundation.

This publication is an effort of CSISA to highlight the 8 critical steps in rice production and improved agronomic management of the crop leading towards increased production.



Cereal Systems Initiative for South Asia

The Cereal Systems Initiative for South Asia (CSISA) is a regional initiative to sustainably increase the productivity of cereal-based cropping systems, thus improving food security and farmers' livelihoods in Bangladesh, India and Nepal. CSISA works with public and private partners to support the widespread adoption of resource-conserving and climate-resilient farming technologies and practices. The initiative is led by the International Maize and Wheat Improvement Center (CIMMYT), implemented jointly with the International Food Policy Research Institute (IFPRI) and the International Rice Research Institute (IRRI), and is funded by USAID and the Bill & Melinda Gates Foundation.

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