



## Quality Seed Production of Paddy (*Oryza sativa* L.)

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### Abstract

Paddy is the second most important cereal in the world. It is the staple food for more than 50% of the population. It is propagated by seeds, whose quality is very crucial for a successful seed production. It requires better skills and techniques as compared to grain production. From land selection to seed storage, seed growers have to adhere to the prescribed standards. Farmers generally lack knowledge regarding the production of pure disease-free seeds. Therefore, it is inevitable to improve the knowledge of farmers about technical and management activities, including increment in the production of quality seeds.

**Keywords:** Paddy, quality seed, standards, storage

### 1. Introduction

Paddy plays a major role in diet, economy, employment, culture and history. India grows Paddy in an area of 45 Mha with a production of 178.30 million tons (MT) and average productivity of 3.96 t ha<sup>-1</sup> (FAO, 2020). Seed is prime input in the agrarian enterprise. The use of quality seeds alone could increase 15-20% yield under optimum management (Tomar and Yalamalle, 2020). Sustained increase in agriculture production and productivity is dependent, to a large extent, on the development of new and improved varieties of crops and an efficient system for the timely supply of quality seeds to farmers.

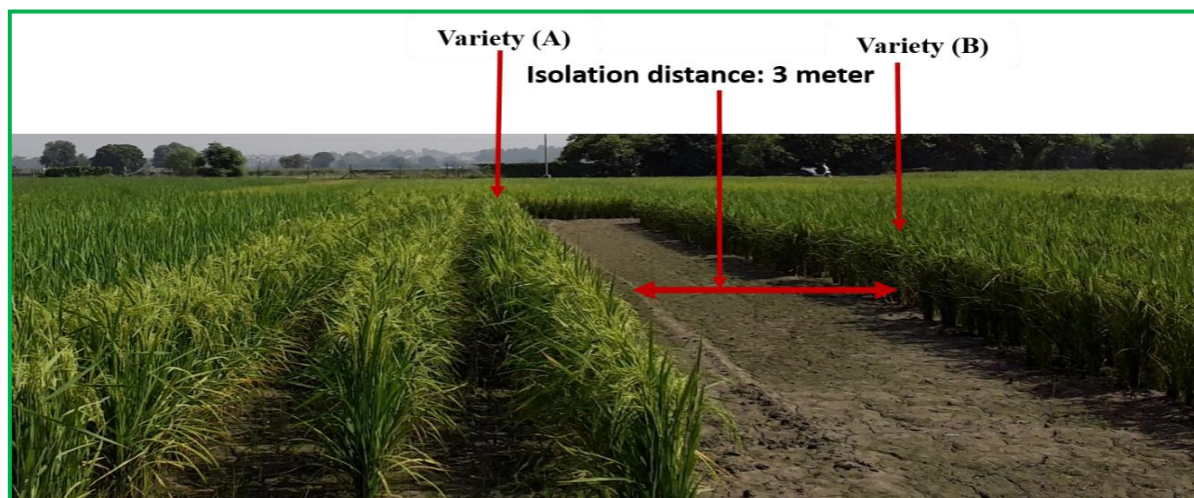
### 2. Crop husbandry

**2.1 Selection of variety:** Variety recently released, recommended in particular areas/zones of cultivation and with high potential yield recovery have to be selected for multiplication. The information on basmati and non-basmati paddy varieties released ICAR-Indian Agricultural Research Institute, New Delhi are presented in Table 1.

**Table 1: Popular paddy varieties recommended in Northern plains and their sowing time**

Rice varieties	Date of sowing	Varieties suitable
Short duration basmati varieties	10 - 15 <sup>th</sup> June	Pusa basmati (PB) 1509, PB-1692, PB-1847
Long duration basmati varieties	25 <sup>th</sup> May to first week of June	Pusa basmati (PB) 1121, PB-1401/PB-6, PB-1, PB-1718, PB-1885, PB-1885
Short Non-basmati varieties	10 - 15 <sup>th</sup> June	Pusa sugandh-5, Pusa 1612, Pusa 1592

**2.2 Isolation distance:** Paddy is a self-pollinated crop and hence, quality seed production requires an isolation distance of 3.0 meters maintained between varieties to avoid unwanted cross-fertilization (Fig 1).



**Figure 1: Field layout of paddy seed crop**

**2.3 Sowing Time:** It mainly depends upon the prevailing weather conditions and duration of the varieties. However, in North India paddy is grown almost in the *kharif* season (Pathak et al., 2020).

**2.4 Seed treatment and nursery raising:** The seed rate of Paddy varies based on the methods of sowing/transplanting. Under the transplanting method seed rate of 12.5-15.0 kg/ha is recommended. Seed treatment is done by dissolving 25-30g carbendazim (Bavistin) + 12.5-15.0g streptomycin per 12.5 kg seeds in 20-25 litre of water. The seed should be soaked for 24 hours before sowing or transplanting. The soaked seeds are kept covered till it is sprouted. For raising one hectare of paddy, 800 m<sup>2</sup> nursery is needed. The land should be prepared by flooding the area one or two days before ploughing and allowing the water to soak into a depth of 2.5cm. Then the land is ploughed well. A thin film of water should be maintained in the nursery, and the sprouted seeds of paddy should be broadcasted uniformly on the seedbed.

**2.5 Field Preparation and transplanting:** The field is ploughed during summer and exposed in the sun for 15-20 days to kill insect pest and weed seeds. Water the field so that soil will soften and the volunteer plants will either germinate or decay. After 10-12 days, puddle the field with help of a tractor. After 5-7 days do the second wet ploughing (puddling) followed by laddering. Generally, 21 days old seedlings were used for transplanting. Spacing of 15 cm × 20 cm should be given between plants and rows, respectively. In seed production plots transplant one seedling per hill (Sahu et al., 2020).

**2.6 Fertilization:** Green manuring with Daincha, which can be incorporated into the soil at about 45 to 55 days after sowing and reduce the nitrogen dose by 20-25 kg/acre. 120:60:60 Kg N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O ha<sup>-1</sup> are recommended and N is applied in 3 split doses. Apply Zinc Sulphate Heptahydrate at 25 kg/ha or Zinc Sulphate Monohydrate at 15 kg/ha. Spray FeSO<sub>4</sub> 0.5% to prevent yellowing of plants in calcareous soils.

**2.7 Water management:** After transplanting maintain a 2-3 cm depth of water in the field for a month. Once tillers emerge, maintain a 3-5 cm depth of water in the field till the milking stage. Shortage of water during the panicle initiation and milking stage leads to more chaffy grains in the panicle. After the milking stage, reduce the water level in the field to 2-3 cm only. Before 15 days of harvesting drain the total water from the field and allow it to dry.

**2.8 Weed Management:** Pretilachlor 50 EC at 1500 ml/ha (or) Pyrazosulfuron Ethyl 10% WP at 300g/ha 3-7 days after transplanting in a flooded field. Apply (weeds are in the 3-4



leaf stage) any one of the post-emergence herbicides viz., Nominee gold (Bispyribac sodium) at 250 ml /ha in 500 litres of water. Controls major grasses, sedges and broadleaf weeds of paddy.

**2.9 Roguing:** The line sowing must be followed, and after 08-10 lines, a gap of 50 cm should be given for easy field inspection. Seed plots must have uniformity and should not have any seed-borne diseases. Most of the time off-types are easily recognised based on morphological differences, such as differences in height, leaf characters (leaf size, shape, colour), flowering time, flag leaf shape, size and position, and type of panicles, grain characters etc.

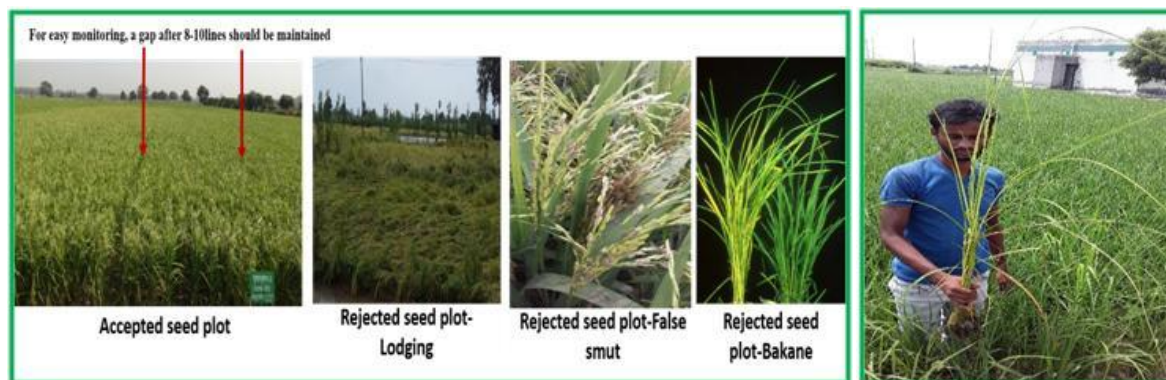


Figure 2: Roguing of off-types plants.

### 3. Insect Management

The important pests of rice and their management are as follows

- ✓ **Termite:** Chlorpyrifos 50% EC at 3.75 litre/ha, which control termite infestation.
- ✓ **Stem borer:** Ampligo (Chloratranilprole (10%) + Lambdacyhalothrin (5%) ZC) at 200 ml/ha/ 500 litre of water, Reagent (Fipronil 5 SC, 5% w/w) at 10-12kg/ha CartapHydrochloride 4G at 12 kg/ha,
- ✓ **Leaf Folder:** Ampligo (Chloratranilprole (10%) + Lambdacyhalothrin (5%) ZC) at 200 ml/ha/ 500 litre of water, Reagent (Fipronil 5 SC, 5% w/w) at 10-12kg/ha, Monocrotophos 36 EC at 1000ml/ha.
- ✓ **Brown Plant Hopper:** Pexalon (Triflumezopyrim 10% SC) at 235 ml/ha/500 litre of water, Glamore (Ethiprole + Imidacloprid 80 WG (40 + 40% w/w) at 150g/ha apply after 70-80days after transplanting in 500-600 litre of water, Carbofuran 3G at 20 kg/ha or Imidacloprid 18.5at 100 ml/ha or Dichlorvos 76 WSC at 350 ml/ha, which control brown planthopper infestation.

### 4. Disease Management

The major diseases affecting rice crop and their management practices are

- ✓ **Bacterial Leaf Blight:** Kasugamycin 3% at 500g/acre
- ✓ **Bakanae:** Seed treatment using fungicides such as Carbendazim 50%WP at 2g/ litre of water is effective before planting.
- ✓ **Sheath Blight:** Hexaconazole 5 % EC at 750 ml/ha or Propiconazole 25 % EC at 500 ml/ha.
- ✓ **Blast:** Tebuconazole +Trifloxystrobin at 500 g/ ha with 500 litres of water (or) Azoxystrobin + Difenoconazole at 625 ml/ha with 500 litres of water
- ✓ **False smut:** Apply Propiconazole at 500 ml/ha at the booting stage or 5-10% panicle emergence stage, in 500 litres of water, which control the disease.

### 5. Field inspection

The seed crop is checked for proper isolation from other varieties, ensuring the removal of off-types. Two to four field inspections are recommended during the seed production of crops (Fig 3).



**Figure 3: Field inspection by team of experts**

## 6. Seed purity standards

A series of tests should be undertaken to assess the quality seed. Generally, such tests are conducted in designated seed testing laboratories. The seed standards prescribed in the Indian Minimum Seed Certification standards (Table 2).

**Table 2: Indian Minimum Seed Certification standards for paddy**

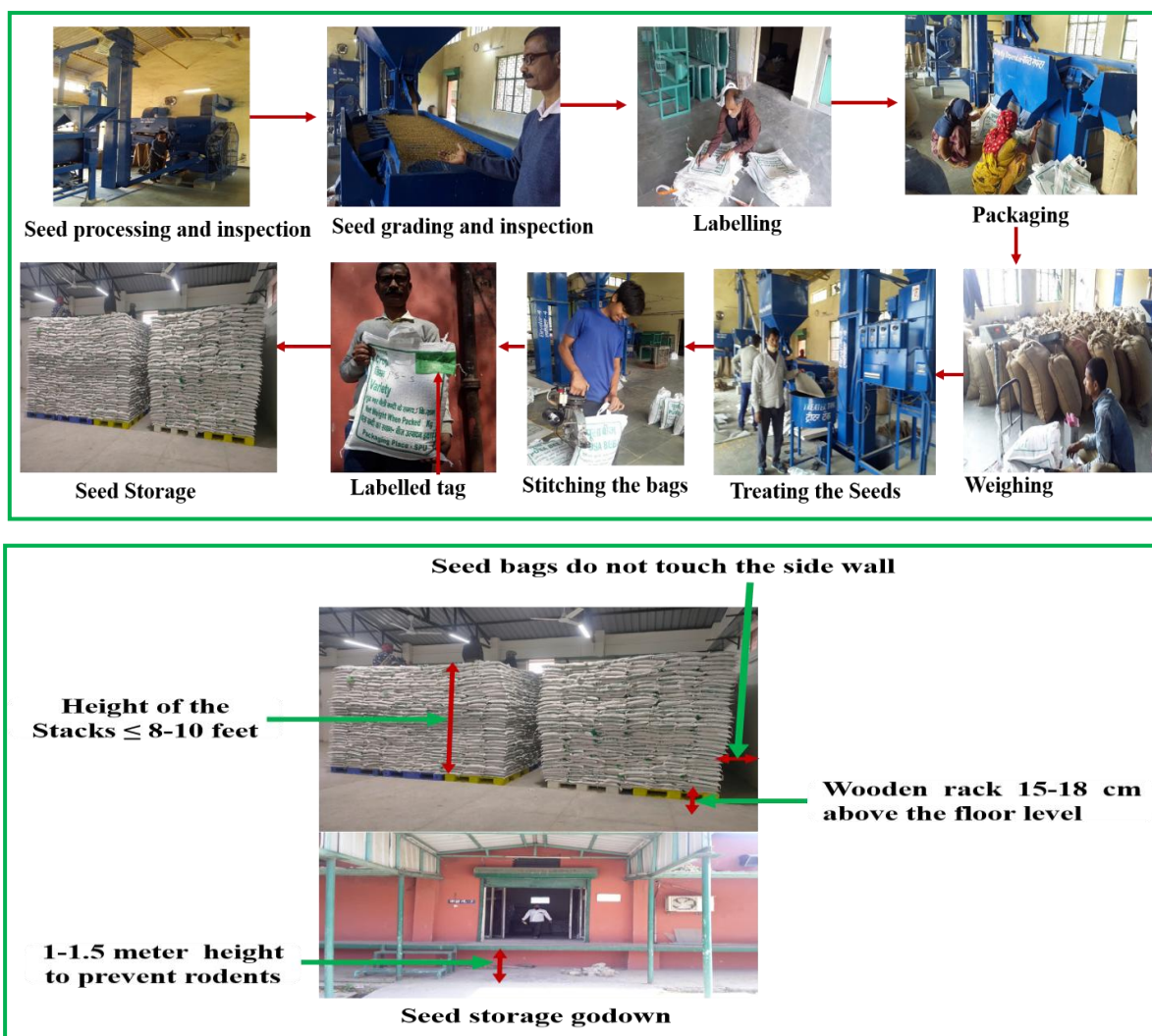
Factor	Seed Standards for each class	
	Foundation seed	Certified seed
Isolation distance	3 meter	3 meter
Pure seed ( maximum)	98.0%	98.0%
Inert matter (maximum)	2.0%	2.0%
Huskless seed (maximum)	2.0%	2.0%
Seeds infected with paddy bunt ( <i>Neovossiahorrida</i> (Tak.) ( maximum)	0.10% (By number)	0.50% (By number)
Germination ( Minimum)	80-85%	80-85%
Moisture (maximum)	11-12%	11-12%
For vapour proof containers (maximum)	8.0%	8.05%
Off types	0.050	0.20
Objectionable weed plants	0.010	0.020
Diseased plants	0.1	0.5
Inseparable other crop plants	0.01	0.05
Other crop varieties (Max.)	0.1	0.2
Other varieties (Max.)	0.1	0.2

## 7. Harvesting and post-harvest handling

The crop should be harvested when the grains turn yellow and moisture content is below 20-25%. Mechanical harvesting by reaper or combine harvester is not advisable in seed plots. When using a combine harvester ensure the machine is cleaned properly. After threshing and cleaning the seed should be dried to a moisture level of 10-12% or less so that the seed can be stored for a long duration. Grading is the removal of smaller and shrivelled seeds from the well-filled healthy seeds. Air and screen machine are extensively used for cleaning and grading paddy seeds. Keep the processed and well-dried seed in a gunny bag and stitch the opening. Prepare a wooden rack 15-18 cm above the floor level and see that the seed bags do not touch the sidewall (Fig 4).

## 8. Conclusion

Seed production of paddy requires a lot of skill and consistent efforts in raising a successful crop. Proper planning by sourcing authenticated/ pure seeds along with following the filed standards for paddy farmers can reap a quality seed harvest.



**Figure 4: Seed processing and seed storage.**

## 9. References

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