RICE

The *Rabi* (Dry Season) starts in the month of November and continues up to May in Telangana State. Short duration varieties with cold tolerance are recommended for *Rabi* season. Extra early varieties have to be grown from December 10\(^{th}\) onwards to avoid cold at panicle development stage. In Telangana, the duration of the crop is extended even up to one month depending on the intensity of cold at vegetative stage. In addition to this, increase of salinity, especially in low rainfall areas is resulting in mortality of the seedlings in nurseries as well as in the transplanted crop. Therefore, special packages are recommended to raise a successful crop in rabi season. The crop should be terminated in April to avoid hail storms in summer.

**Suitable Varieties**

| Early duration varieties                                      | Cotton dora Sannalu (MTU 1010), Tellahamsa (RNR 10754), Nelloremahsuri (NLR 34449), Anjana (JGL 11118), Jagtial Samba (JGL 3844) Satya (RNR-1446). |
| Extra early duration varieties                                | Rajendra (RNR 12329), Pradhymna (JGL 17004), Varalu (WGL 14377) |

**Pre Release**

RNR 15048: Very super fine, 120 days, resistant to blast, 5.5 – 6.5 t/ha.

KNM 118: Long slender type like MTU 1010, 125 days

JGL 18047: Long slender type like MTU 1010, 125 days

Depending on cold, the short duration varieties may mature in 140-145 days, whereas extra early varieties in 130-135 days. In Nalgonda, where mean minimum temperatures do not fall very low, the rice varieties matures in same period as in *kharif* season.

**Brief Description of Rice Varieties**

<table>
<thead>
<tr>
<th>Variety</th>
<th>Duration (Days)</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Short duration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MTU 1010 (Cotton dora sannalu)</td>
<td>125</td>
<td>LS grain, BPH and blast tolerant variety</td>
</tr>
<tr>
<td>RNR 10754 (Tellahamsa)</td>
<td>120</td>
<td>LS grain, Cold tolerant variety with good cooking</td>
</tr>
<tr>
<td>Variety Code</td>
<td>Variety Name</td>
<td>Duration</td>
</tr>
<tr>
<td>--------------</td>
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</tr>
<tr>
<td>NLR 344449</td>
<td>(Nellore Mahsuri)</td>
<td>125</td>
</tr>
<tr>
<td>JGL 11118</td>
<td>(Anjana)</td>
<td>115</td>
</tr>
<tr>
<td>JGL 3844</td>
<td>(Jagtiyal Samba)</td>
<td>125</td>
</tr>
<tr>
<td>RNR 1446</td>
<td>(Satya)</td>
<td>120</td>
</tr>
</tbody>
</table>

**Extra early duration**

<table>
<thead>
<tr>
<th>Variety Code</th>
<th>Variety Name</th>
<th>Duration</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>RNR 12329</td>
<td>(Rajendra)</td>
<td>105</td>
<td>Long slender with good cooking quality</td>
</tr>
<tr>
<td>JGL 17004</td>
<td>(Pradumnya)</td>
<td>105</td>
<td>Gall midge resistant and cold tolerant fine grain variety</td>
</tr>
<tr>
<td>WGL 14377</td>
<td>(Varalu)</td>
<td>105</td>
<td>Gall midge resistant and cold tolerant variety</td>
</tr>
</tbody>
</table>

**Sowing time and nursery management (Wet)**

- Sowing of nurseries November 10th to December 15th
- Prepare nursery field by ploughing twice subsequently by puddling 2-3 times at an interval of 5-6 days.
- In case of soils with slight salinity, soon after puddling drain out the standing water
- Level the field after final puddling and prepare the raised beds of one-meter width and of convenient length duly forming channels for irrigation and proper drainage.
- Apply well-decomposed FYM/compost @ 200 kg/5cents nursery to improve soil condition.
- Treat the seed with carbendazim 1g or Dithane M-45 @ 2.5 g per kg of seed.
- Soak the paddy seed for 24 hours and incubate for 24-36 hours and sow the sprouted seed in the raised nursery beds.
- Apply 2 kg Nitrogen (4.4 kg of Urea), 1 kg of ‘P₂O₅’ (6.25 kg of SSP) and 1kg of ‘K₂O’ (1.6 kg of MOP) for a nursery bed of 5 cents (200 m²).
- Apply total ‘P’ & ‘K’ fertilizers and ½ ‘N’ as basal and thoroughly mix in the soil at the time of final leveling.
- Apply the remaining ½ ‘N’ at 10-15 days after sowing depending up on seedling growth.
• Sow the sprouted seed @ 5 kg/cent (40 m²) in nursery bed and 25 kg seed in 4-5 cents nursery is sufficient for one acre of main field.
• Cover with polythene sheets entire nursery bed in the night and remove in the morning to avoid the effect of cool temperatures on germination and growth of nursery.
• Irrigate nurseries with fresh water in the morning to speed up nursery growth in cold
• To avoid the salt injury, frequently drain out the water and apply higher dose of nitrogen to speed up the growth.
• In case of zinc deficiency spray zinc sulphate @ 2.0 g per liter.
• If the blast incidence is observed spray Tricyclazole 0.6 g (300 g/ha) or Carbendazim 1 g (500 g/ha) or Isoprothiolone @ 1.5 ml (750 ml/ha) or Kasugamycin @ 2.5 ml (1250 ml/ha) Ediphenphos 1 ml/l (500 ml/ha) of water. Alternate the chemicals

Main Field
• Initiate puddling at least 15 days before transplanting
• Tractor / power tiller puddling to a depth of 15 cm is enough.
• Level the field perfectly after final puddling and allow it to settle for 2-3 days before transplanting in heavy soils which helps in better water and weed control.
• Transplant 4-6 leaf age rice seedlings. However, in case of soils with slight salinity, avoid transplanting of tender seedlings. Drain out the main field frequently and do inter cultivation to avoid the mortality due to salinity and cold.
• Transplant minimum 44 hills/m² at 2-3 cm depth @ 2-3 seedlings /hill

Water Management
• Proper water management facilitates good tillering, increased nutrient use and reduce weed infestation.
• Maintain shallow depth of water (1-2 cm) at the time of transplanting.
• Increase the water level up to 5 cm depth after transplanting till crop establishment
• Maintain shallow depth of water (2-3 cm) during tillering phase of crop.
• Maintain 5 cm of water during panicle initiation to physiological maturity (10 Days before harvest) of the crop.
• Crop should not face water stress at panicle initiation, flowering and milk stages.
Nutrient Management

- Soil fertility and productivity of rice can be improved and maintained through integrated use of organic, inorganic and bio fertilizers in a balanced manner.
- 25-30% of recommended N through Green manures/compost /FYM/ poultry manures results in sustainable yields.
- Apply N, P\textsubscript{2}O\textsubscript{5} and K\textsubscript{2}O @ 120: 60: 40 kg/ha. Apply entire ‘P\textsubscript{2}O\textsubscript{5}’ & ‘K\textsubscript{2}O’ as basal while ‘N’ in three equal splits (Basal + Active tillering + Panicle initiation stage). In light textured soils apply ‘K\textsubscript{2}O’ in two splits-half at basal and half at panicle initiation along with last top dressing of ‘N’. Increase the nitrogen dose even up to 140 kg/ha depending on the soil type in rabi. Apply 1/3 excess phosphorus as basal dose to increase the uptake in cold areas.
- Drain out the field before N topdressing and irrigate the field after 2 days only.
- Avoid top dressing of Phosphorus or Phosphorus containing complex fertilizers after 15 days of planting.
- Apply Zinc Sulphate @ 50 Kg / ha to avoid Zn deficiency. Deficiency in the standing crop can be corrected by spraying zinc sulphate @ 0.2% (2 g /l of water). The spraying should be repeated at 5 days interval depending on the severity of the problem.

Weed Management

- The crop should be maintained weed free especially till 45 DAT.
- Hand weeding at 20 and 40 days after transplanting in areas where sufficient manual labour is available
- To overcome weed problem apply any one of the following herbicides keeping thin film of water. Butachlor @ 1.25 litres /acre (or) Anilophos @ 500 ml/acre (or) Pretilachlor @ 600 ml /acre (or) Oxadiargyl @ 40 grams (mixed with one litre of water) with in 3 to 5 days of of transplanting or spray Pyrazosulfuran ethyl @ 80-100 g/ acre at 8-12 DAT or Bensulfuron methyl @ 35 g /acre as pre to post emergence (3-25 DAT). 2,4- D SS @400 g / acre at 20-25 DAT to control broadleaved weeds.
### Insect Pests and Diseases

<table>
<thead>
<tr>
<th>Insect pest</th>
<th>Stage of crop</th>
<th>Economic Threshold level</th>
<th>Chemical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stem borer*</td>
<td>Nursery and Tillering</td>
<td>One adult or egg mass per sq.m or 10% of dead hearts per sqm. or 25-30 moths/trap/week</td>
<td>Spray acephate @ 1.5g or Cartap hydrochloride 50WP @ 2g or Chlorantraniliprole @ 0.4ml/l of water or apply Carbofuran 3G@10kg or Cartaphydrochloride 4G@8kg or Chlorantraniliprole 0.4% @ 4kg/acre.</td>
</tr>
<tr>
<td></td>
<td>P.I to booting</td>
<td>in pheromone traps</td>
<td></td>
</tr>
<tr>
<td>BPH/WBPH</td>
<td>Tillering</td>
<td>10-15 insects per hill</td>
<td>Spray acephate @ 1.5g or monocrotophos @2.2ml or ethofenprox @ 2.0ml or fenobucarb @ 2.0ml or Buprofezin @1.6ml or Imidacloprid + Ethiprole 80WDG @ 0.25g or Dinote furan @0.4g/ l of water.</td>
</tr>
<tr>
<td></td>
<td>After Flowering</td>
<td>20-25 insects per hill</td>
<td></td>
</tr>
<tr>
<td>Leaf folder</td>
<td>Post flowering</td>
<td>Three damaged leaves with live larvae per hill</td>
<td>Spray acephate @ 1.5g or Cartap hydrochloride 50WP @ 2g or Chlorantraniliprole @ 0.4ml or flubendiamide 20WDG @ 0.25g or 48Sc @ 0.1ml/l of water.</td>
</tr>
<tr>
<td>Leaf mite</td>
<td></td>
<td></td>
<td>Spray wettable sulphur @3g or dicofol @ 5ml/l of water</td>
</tr>
<tr>
<td>Thrips /Whorl maggot</td>
<td>Tillering</td>
<td>Only in case of severe incidence</td>
<td>Spray monocrotophos @ 1.6ml/l</td>
</tr>
<tr>
<td>Cut worm</td>
<td>Reproductive stage</td>
<td></td>
<td>Irrigate the field and spray in the evening hours with combination of dichlorovos 1.0 ml + chlorpyr phos 2.5 ml/litre of water.</td>
</tr>
</tbody>
</table>

* Monitor with pheromone traps @ 3 /acre or mass trap @ 8/acre

**Note:** Do not use resurgence causing chemicals like chlorpyrphos or profenophos or lamda cyhalothrin or synthetic pyrethroids or their combinations during early vegetative stage of the crop.
<table>
<thead>
<tr>
<th>Diseases</th>
<th>Time of application</th>
<th>Chemical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaf blast</td>
<td>At the initiation of the disease under favourable weather conditions</td>
<td>Spray Tricyclazole 0.6g or Isoprothiolane @ 1.5 ml/ l or Kasugamycin 3SL @2.5ml/l. Alternate the chemicals for effective management of blast.</td>
</tr>
<tr>
<td>Neck blast</td>
<td>Under disease favourable weather conditions just before panicle emergence stage</td>
<td>Spray Tricyclazole 0.6g or Isoprothiolane @ 1.5 ml/ l or Kasugamycin 3SL @2.5ml or Kresoxim Methyl @ 1ml/l of water. Alternate the chemicals for effective management of blast.</td>
</tr>
<tr>
<td>Sheath blight</td>
<td>At the initiation of the disease. Normally around 45 days after transplanting in kharif and 30 days after transplanting in rabi</td>
<td>Hexaconazole 5EC @ 2ml or Validamycin 3L @ 2ml or Propiconazole 25 EC @ 1ml or Trifloxystrobin + Tebuconazole @0.4g/l of water (alternating the sprays twice at 15 days interval)</td>
</tr>
</tbody>
</table>

**Rodent Control**

**For Endemic Areas**

- Destruction of rodent harborage and observe rat moment.
- Reducing the number and size of field bunds
- Complete the sowing and planting uniformly in one area.
- From puddling to one month after planting, setup local traps @ 20 /acre.
- Installation of permanent bait stations from planting to flowering stage @ 5 /ha; Four at corners of the field-one meter inside the cropped area from the field bund and one at the centre. Bromadiolone bait @ 30 g per bait station should be replenished twice in a week.
- During crop period baiting with bromadiolone 0.005% in baits prior to primordial initiation stage of the crop.
- From primordial initiation to crop harvest smoking of burrows with “burrow fumigator” developed by APRRI & RARS, Maruteru.

**Management of Rodents with Bromadiolone 0.005%**

- Identify live burrows and simultaneously place 15 gm freshly prepared bromadiolone (2% poison) loose bait in packets inside the burrow when LBC is 50/ha.
- Repeat bromadiolone (2% poison) loose baiting in the active /live burrows as and when the incidence is above ETL.
Note: Control schedules should be executed on community basis to check cross infestation through migration.

Harvesting and Storage

- Harvesting should be done when at least 80% of the grains are matured. If the crop is not harvested at proper maturity time, it leads to loss of viability of seeds and broken during the process of milling.
- The grain should be free from inert material after threshing and winnowing.
- The winnowed grains should be sun dried until the moisture content reaches less than 17%. In case of seed it should be dried upto 12% moisture.
- Both over drying and under drying will lead to breakage of the grain during milling and slow drying in the field and threshing floor is highly desirable.
- High moist content during storage leads to loss of viability due to increased grain respiration and attack of storage insects and pests.

MECHANIZED SYSTEM OF RICE INTENSIFICATION (MSRI)

Rice cultivation is labour intensive and water consuming which are becoming scarce every year by year to make rice cultivation difficult. SRI is good technology for water saving, but it was not successful due to labour intensive transplanting and inter culture operations. To overcome this, SRI was modified to suit mechanized way of rice intensification by following other conditions like maintaining moisture at field capacity, incorporation of weeds with mechanical intercultural operation. The techniques of mechanized system of rice intensification (MSRI) are as follows.

1. Land preparation

   After summer ploughing, proper leveling of the field is necessary to save irrigation water. To envisage proper leveling, use of laser guided land leveler is preferred over manually operated leveling blade. After leveling, puddling should be done with low horse power (35 HP) 4 wheel drive tractors with rotavator. First time of rota-tiling need to be operated in 1st speed of load gear and then second operation can be operated with higher speeds of load gear. The puddling with rotavator will help in distracting surface soil structure and over settlement, it creates better semi impervious layer through which deep percolation loss is minimized.

2. Nursery preparation

   In mechanized transplanting tray or mat nursery is necessary. Trays are having dimension of 58 x 28 cm need to be filled with pulverized soil free from clods. Soil used for nursery tray filling is usually the mixture of 3: 1 Soil : FYM/vermi compost. Seed rate of 8-10 kg for
fine, 10-12 kg for medium and 12-15 kg for coarse varieties is sufficient for one acre. Before sowing the seed it must be subjected to germination test. The selected seed is again put in salt water (1.2 kg salt for 10 lit of water) to further clean / separate from ill filled and damaged seeds. Floating seeds are removed and the seed at bottom of the salt water is collected and cleaned with good water till the taste of salt is lost. The selected seed is soaked for 24 hrs and kept under tight gunny bag for another 24 hrs for germination. On the third day seeds are allowed to dry under shade to attain free fall. To attain uniform density the automatic tray filling machines can be successfully used. Seed rate of 80 (very fine) to 180 (very coarse) grams per tray is possible with automatic machine. After spreading of seeds on the soil bed (bottom) of tray, a layer of rich FYM or vermicompost soil mixture is used to cover the layer. Watering is done through automatic seeding machine by ascertaining continuous water supply till nursery tray are filling. Approximately 75-85 trays are required to transplant one acre. After filling the tray with seeds irrigation must be gentle with rose cans with out disturbing seed masses. After draining of water from the trays, they can be transported to the fields where transplantings to be taken up. In tractor trolley 450 – 500 trays can be moved. The trays must be kept on well leveled raised beds and all around trays irrigation and drainage channels must be prepared. Shifting of trays should be done either in the morning or evening when sun intensity is low. Cover the trays with paddy straw or old gunny bags or shade nets to protect from direct sunlight. The paddy straw covered should be of the same variety to avoid mixtures. Sprinkle water with cans daily three times and remove the straw/ gunny bags/ shade nets after 7 days and thereafter give regular irrigations. If necessary apply 0.5 to 1 g nitrogen one or two times per tray. Nursery of 15 cm height with 3 leaves and weighing 4-4.5 kg is good for transplanting with machine.

3. Transplantation

The transplanting field should be puddled well in advance and soil should be allowed to settle. Thin layer of water (1-2cm) to be applied before machine enters the field, for smooth rolling of wheels and better scouring of finger after dibbling. Trays are loaded both on the board and transplanting unit tray. Since the row to row distance is fixed, hill to hill spacing can be adjusted based on farmers choice. The operator should start transplanting with 100% consciousness without any distractions. Marker unit must invariably be used to get parallel rows, then only mechanical weeding is possible at a later part of crop period. The transplanter must be operated in steady pace without jerkings and jothings for clog free transplantation. Speed must be selected based on soil and field conditions and maintained same throughout the operation.

4. After care
After successful transplanting, field must be carefully maintained, excess water if any must be drained and saturated field condition be maintained for 3-4 days. Once crop is established, management of irrigation to maintain the soil always at field capacity is necessary. To reduce and incorporate weed mass in the fields, 2-3 mechanical weeding are administered from 20th day of transplanting onwards at 10 days interval. Thus 2-3 weedings with motorized weeders not only reduces water and nutrient competition but also it aerates root zone mechanically, more over abrasive action on roots will help in development of more tillers. Once the crop crosses 50 days age normal irrigation (5 cm ponding water) to be followed.

**Advantages of MSRI**
- Minimizes the dependency on labour
- Timely attendance of field operations (Transplanting, weeding)
- Reducing the cost of cultivation
- Increased crop yield and efficient utilization of scarce inputs like water and labour

**Limitations of MSRI**
- Perfect leveling is necessary and the technology is not suitable for low lying as well as saline soils.

**Wet direct seeding (Wet seeded rice)**
- Where ever possible, sprouted seed can be either broadcasted or drum seeded to save cost of cultivation, water and time. The advantage of the system is we can save seed of 15-20 kg seed, 7-10 days time, expenditure upto Rs. 3000/- per acre, without dependence on the labour.
- This system is not suitable for saline soils and under severe cold situation.
- Seed rate 10-15 kg /acre depending on the size of the seed.
- Select varieties with sturdy stem to avoid lodging
- Soak the seed for 24 hours and incubate for 36 hours to ensure sprouted seed for broad casting purpose whereas, for drum seeding soak the seed for 12 hours and incubate for 24 hours.
- With respect to main field, ensure thorough land preparation, good puddling and perfect leveling.
- If possible use lazar guided levelers because perfect leveling is necessary to ensure good crop establishment, water management and fertilizer use efficiency.
- Make provision for removing the excess water soon after sowing of the sprouted seed, in case of big holdings, make into small plots by false bunding.
• In case of drum seeding one person can drum seed 3 acres taking 2 hours per acre and 2 persons are required for 1 acre.

• In case of nitrogen application apply 1/3 nitrogen at 15-20 days, 1/3 at 40-45 days and 1/3 at 60-65 days age.

• Pretilachlor + Safener (Sofit) – 0.6 lit/acre at 5-6 DAS (Mixed with sand), Anilophos 0.5 lit, Butachlor 1 lit, Oxadiargyl 35-40 g 8-10 DAS mixed with sand, spray Bispyribac sodium (Nominigold) 100ml / acre (100 litres of water) 15 DAS at 4-6 leaf stage, for broad leaved 2,4-D EE 5 kg / acre 20 days after planting, for dry nurseries or dry seeding spray Pendimethalin 1.2–1.5 lit/acre