

## Preparation of Crop Weather Calendar and Crop Advisories for Kharif Rice in different districts of Odisha

### Abstract:

The crop weather calendar is a pictorial representation of summarized information on crop growth stages, normal water requirements of crop, warnings to be issued based on prevailing weather conditions favourable for development of pest and diseases. These calendars are useful and handy tools for farmers and other stakeholders for taking appropriate decision on crop planning, irrigation scheduling and plant protection measures for successful crop production. The crop weather calendars are prepared in different languages for better understanding to farmers and explain the usage importance; and plan farm operation and activities by taking decisions as per the prevalent crop weather conditions in fields. It plays a vital role for important crops and various varieties through research and development-based process at village/ panchayat level, and also helpful in improving the quality of medium range weather forecast based Agro-Advisory Services. An investigation was carried out on studies of crop weather calendar on Kharif Rice crop in different districts of Odisha by All India co-ordinated research project on Agrometeorology, Bhubaneswar centre with the support of Agro Meteorological Field Unit (AMFU), Bhubaneswar and crop calendar has been prepared with objective to study climate normal of past 30 years (1993-2023). Climatic data of Rice crop in Kharif season has been taken 25<sup>th</sup> SMW to 42<sup>nd</sup> SMW for medium duration (125 days) and 26<sup>th</sup> to 49<sup>th</sup> SMW for long duration (150 days) Kharif Rice varieties in both English and Odia (local) languages for the coastal districts i.e (Khordha, Puri, Kendrapada and Jagatsinghpur) of Odisha. From the crop weather calendar the medium duration of rice crop, it was found that for sowing to seeding the mean temperature is 29<sup>o</sup>C, before the transplanting and the water requirement of 670-690 mm is found congenial for better yield of the crop. The growth of the crops severely affected where the temperature falls below 20<sup>o</sup>C, for high yielding of Rice crop during the kharif season the favourable weather conditions are T<sub>max</sub>: 30<sup>o</sup>C, T<sub>min</sub>: 26<sup>o</sup>C, Rainfall: 78 mm to 110 mm during the 29<sup>th</sup> to 30<sup>th</sup> week with RH 87%. For the pest likes stem borer and leaf folder the congenial weather conditions are Temperature:20 to 30<sup>o</sup>C, RH:87%, Wind speed (Km/h) <5 and Rainfall: 00-30 mm. Similarly for Blast and BLB diseases, the favourable conditions during the 28<sup>th</sup>-31<sup>st</sup> week to 48<sup>th</sup> week, when the temperature range 20-30<sup>o</sup>C, RH=> 90 %, Wind speed < 5 (Km/h) RH:30-50%. It has been found that the severity of pest and diseases increases with decreases in temperature and High RH and very low rainfall.

**Key words:** Crop Weather Calendar, Rice, Long Duration, Medium duration, AMFU & Agro advisory services.

### 1. Introduction:

Weather is one of the most important factors affecting the agricultural production. The increase in climatic variability and associated extreme weather episodes such as erratic rainfall distribution, abrupt change in day and night temperatures during crop season and sudden outbreaks in pest disease population, especially in developing countries, are throwing challenges to sustaining production levels of different crops. One

Formatted: Highlight

Commented [I1]:

Commented [I2R1]: Sentence may be re-written

Formatted: Highlight

strategy that farmers can adopt to sustain or increase crop yields in the face of a highly variable climate is to manipulate the crop environment through improved management strategies for adaptation.

Agriculture is one of the most important sectors in Odisha. Proper planning for this sector requires relevant and reliable information in timely manner. Information on crop, its stages and the week-by-week weather during the crop season is essential for proper management of agriculture. Thus, farm operations planned in conjunction with weather information are very likely to curtail the costs of inputs and various field operations

Rice is grown under varying eco-systems on a range of soils under varying climatic and hydrological conditions ranging from waterlogged and poorly drained to well drained situations in Odisha. Rice is also grown in different ecologies from irrigated to upland, rain-fed lowland, deep water and very deep or tidal wetland ecologies. Upland rice is grown in around 6.0 million ha of well-drained soil where the moisture stress and blast are the major constraints and productivity is around 1t/ha. Mostly early maturing varieties of 80 to 110 days duration are grown, depending upon the rainfall pattern and soil topography. Rice is also grown in Coastal wetlands, where tidal water fluctuates as per Moon cycle and period of day. Soil salinity is a problem in areas near the creeks in wet season and in dry season rice.

Crop weather calendar is a comprehensive guide for farmers. It is a tool that provides information on average weather of every week, planting, sowing and harvesting periods of locally adapted crops in a specific Agro-ecological zone. Further, stage-wise pest disease infestation information can also be added. It also provides information on the sowing rates of seed and planting material and the main agricultural practices. This tool supports farmers and agriculture extensionists in taking appropriate decisions on crops and their sowing period, respecting the agro-ecological dimension. It also provides a solid base for emergency/ contingency planning of the rehabilitation of farming systems after disasters. The concept of using crop-weather calendar is not new. For instance, FAO calendars provide information on the crop sowing and harvesting dates, seed rate, operation timings of mechanical equipment in the period etc. This calendar describes the month wise weather and operations to be taken up during the period.

The crop weather calendar is a pictorial representation of summarized information on crop growth stages, normal water requirements of crop growth, warnings to be issued based on prevailing weather conditions and meteorological conditions favourable for development of pest and diseases. These calendars are useful and handy tools for farmers and other stakeholders for taking appropriate decision on crop planning, irrigation scheduling and plant protection measures for successful crop production.

All India co-ordinated research project on Agrometeorology, Bhubaneswar centre with the support of Agro Meteorological Field Unit (AMFU), Bhubaneswar has prepared such Crop Weather Calendar (CWC) for medium (125 days) and long duration (150 days) paddy varieties in both English and Odia (local) languages for the coastal districts (Khordha, Puri, Kendrapada and Jagatsinghpur) of Odisha. The methodologies adopted for preparation of such calendars as under.

Crop weather calendar is a comprehensive guide for farmers. It is a tool that provides information on average weather of every week, planting, sowing and harvesting periods of locally adapted crops in a specific Agro-ecological zone.

## 2. Materials and method

**2.1 Collection of Data:** The daily Weather data i.e maximum, minimum temperature, Relative Humidity (Max and Min), Rainfall, Rainy Days Sunshine hours, wind speed and evaporation data for the last 30 years (1993-2023) were collected from the Department of Agricultural Meteorology, OUAT and India Meteorological Department (IMD), Bhubaneswar. Weekly climatic normal for SMW (25<sup>th</sup> to 42<sup>th</sup>) for medium duration and (26<sup>th</sup>-49<sup>th</sup>) for long duration Kharif Rice data collected from Department of Economics & Statistics, Govt. of Odisha. These normal meteorological data sets were arranged in weekly format for cropping season from the month of sowing to harvesting of the Kharif rice crop for the study area. The data for phenology of rice have been obtained from field experiments conducted under the ACRIPAM center, OUAT, Bhubaneswar.

## 2.2 Study Area

Four coastal districts of Odisha i.e., Khordha, Jagatsinghpur, Kendrapara and puri were chosen for developing the crop weather calendars. These districts are located in the east and south eastern coastal plain agroclimatic zone of Odisha.

District	Latitude	Longitude	Remark
Khordha	19° 55' to 20° 25' E	84° 55' to 86° 5' E	The district comes under hot and humid climate having lateritic, alluvial, red and mixed red & black soil groups. It is surrounded by Cuttack district at its north, puri at its East and Ganjam and Nayagarh at its south. Major crops grown are rice, groundnut and pulses (greengram, blackgram etc.). The Length of growing period (LGP) is around 175 days with cropping intensity (CI) of 163%.
Jagatsinghpur	19° 58' to 20° 23' N	86° 03 to 86° 45' E	The district comes under hot and humid climate having mostly alluvial and saline soils. It is bounded by cuttack district as its west, Kendrapara as its North, Puri at its south and Bay of Bengal at its East. Major crops grown are rice, groundnut and pulses (Greengram, blackgram etc.). the LGP (Length of growing season) ranges between 182 -203 days with cropping intensity (CI) of 203%.

Kendrapara	20 <sup>0</sup> 20' to 20 <sup>0</sup> 37' N	86 <sup>0</sup> 14' to 87 <sup>0</sup> 01' E	The district comes under hot and humid climate having mostly alluvial, saline and black soils. It is surrounded by Jagatsinghpur district at its south, Bhadrak at its North, Jajpur at its north -west, cuttack at is west and Bay of Bengal at its East. Major crops grown are Rice, Groundnut, Jute and Pluses (Greengram, Blackgram etc.) The LGP ranges between 168-210 days with cropping intensity (CI) of 180%.
Puri	19 <sup>0</sup> 28' to 19 <sup>0</sup> 58' N	85 <sup>0</sup> 41 to 85 <sup>0</sup> 56' E	The district comes under hot and humid climate having mostly alluvial and saline soils. It is bounded by Jagatsinghpur district at its north, Ganjam at its south and Bay of Bengal at its east. Major crops grown are Rice, groundnut, pulses (Greengram, Blackgram etc.) and plantation crops like coconut and banana. The LGP ranges between 175-266 days with cropping intensity (CI) of 205%.

## 2.3 Methodology

### 2.3.1 Structure of crop weather calendar:

The structure of crop weather calendar designed by AICRPAM consist of the three parts in the main body as depicted in figure. The crop weather calendar is prepared by using three parts A, B & C.

**Table:1 Crop weather calendar template (Part: A, Part: B & Part: C)**

<i>Part-A</i>	Months
	Standard Meteorological week (SMW)
Name of meteorological parameters	Climatic Normal
<i>Part- B</i>	Name & pictures of phenological stages of crops

Stage wise climate normal for high yield of crops	
Part-C	
Climatic normal for diseases	
Name of Diseases, insect pests of crop	Climatic normals required for major diseases of the crop along with susceptible crop phenological stages.

The CWC consists of three parts:

- Part A:** Upper most part represents the actual climatic normals on weekly basis. using the historical meteorological data for maximum temperature (°C), minimum temperature (°C), maximum relative humidity (%), minimum relative humidity (%), sunshine hours (hours/day) and wind speed (km/hr). Total weekly rainfall (mm), number of rainy days and evaporation (mm) were computed as per availability of data.
- Part B:** This part contains the information on crop phenological events of the crop are represented in a weekly time frame and favourable climate parameter to realize potential or high yield of crop.
- Part C:** This lower part of the calendar contains the information regarding the favourable weather conditions for development of the insects-pest and diseases incidence.

In this crop weather calendars (CWC) contains six parts.

- The uppermost portion (1<sup>st</sup> part) of the crop weather calendar consists of weather warnings like extreme rainfall, wet spell duration, cloudy weather, drought and high wind.
- The 2<sup>nd</sup> part of the CWC contains district level long term average (LTA) meteorological data (maximum temperature, minimum temperature, rainfall & BSH) of respective standard meteorological weeks (SMW). Weekly averages were worked out using 30 years observed data of OUAT meteorological observatory.
- The 3<sup>rd</sup> part of the CWC indicates the phenological stage-wise congenial weather conditions for realizing maximum yield of the crop. District level crop yield data was obtained from the Department of Economics & Statistics, Govt. of Odisha for identifying the high productivity crop years. The range of meteorological parameters (Maximum temperature, minimum temperature, rainfall & GDD) for each phenological stage corresponding with the SMW was worked out from the actual meteorological data especially for the high productivity crop years.
- The 4<sup>th</sup> part of the CWC gives information on the water requirement for rice crop at different stages. The stage-wise crop water requirement was derived by multiplying PET with crop coefficient for rice (FAO method). Further the water required for special operations was added at each stage to obtain the total water requirement for the corresponding stage.
- The 5<sup>th</sup> part of the CWC gives information on climatic average required for major pest or diseases of the crop as well as susceptible crop phenological stages. If the climatic conditions are conducive and the pathogen is present, there are chances of occurrences of the pest and

Commented [I3]: SMW full form should come as first use

Commented [I4]: Spell check

Formatted: Highlight

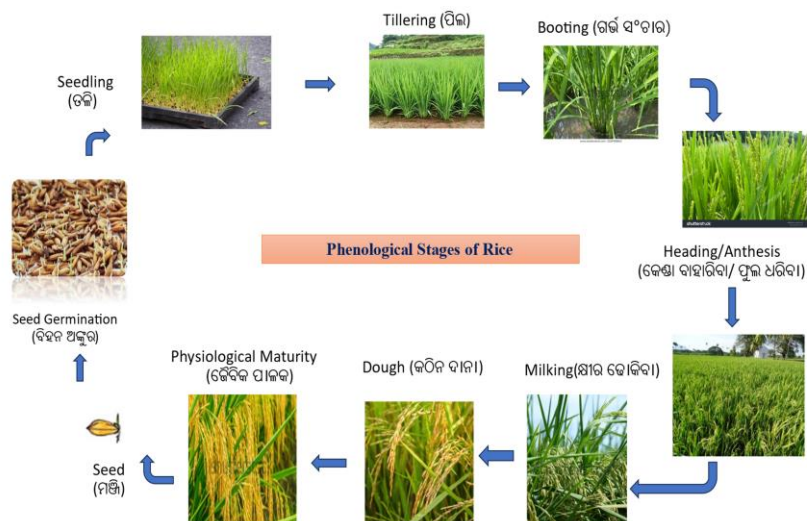
diseases. The chance of infestation is shown w.r.t. SMW and growth stages. The photographs of the major pest and diseases infections are also placed for better understanding.

6. The final 6<sup>th</sup> part of the CWC depicts different growth stages of rice crop such as sowing, seedling, transplanting, tillering, panicle development, flowering, physiological maturity and harvest with respect to SMWS and months. The phenological stages for rice crop were computed using the crop data generated from long term experiments if “All India coordinated research project on Agrometeorology”, Bhubaneswar centre.

CWC for rice was formulated by combining the weekly climatic averages and phenological calendar for the crop along with optimum weather criteria needed at different phenological stages of the kharif Rice. For knowing the high yielding values for optimum climate normal data from last 10 years (2013-2023) was used to find out the stage wise phenophases normal for high yield. The data for high productivity year of the crop, collected from the Department of Economics & Statistics, Govt. of Odisha. The range of different meteorological parameters for the high productivity of rice crop was worked out from the actual meteorological data of high productivity year. Weather conditions that favour pest incidence and the nature of weather alerts were gathered. The objective of this study was preparation of crop weather calendar and rice cultivation advisory for the farmers during the kharif season. The goal of this study to find out the relation between weather and diseases & pest interaction in rice crop during the kharif season. The research is based on pest and diseases interaction along with weather condition, the data is collected from Department of Entomology and pathology, OUAT and weather data averaged over the last 10 years.

Commented [I5]: Spell check

**Fig: 1 Phenological stage of Rice crop:**



### 3. Results and discussion:

#### 3.1 Crop weather calendar of medium & long duration rice crop for Khordha, Puri, Jagatsingpur & Kendrapara District

The CWC for kharif rice of different districts of Odisha (Khordha, Jagatsingpur, Puri & Kendrapada), the entire growth period of the rice in these districts were divided into five phenological stages (SMW) starting from sowing and seedling (25- 28 SMW), Transplanting (29-31 SMW), Tillering to panicle development (32 to 34 SMW), Flowering (35-38 SMW) and Grain filling to maturity (39 to 42 SMW) for medium duration rice. For long duration of Rice, it was from 4<sup>th</sup> week June to December 1<sup>st</sup> week (26 SMW- 49 SMW) for sowing & seedling (26- 29 SMW), Transplanting (30-32 SMW), tillering to panicle development (33-39 SMW), flowering (40-43 SMW), **flowering (40 to 43 SMW)** & Grain filling to maturity (44 to 49 SMW). Similarly for long duration kharif rice duration from 26<sup>th</sup> SMW to 49<sup>th</sup> SMW.

**Data pertaining to climate normal for different weather parameters (averaged over 30 years) have been presented in the Fig:2.** The climatic normal for kharif rice has been taken for both medium duration (25 to 42 SMW) and long duration (26 to 49 SMW) from

Commented [I6]: repeated

Formatted: Highlight

Formatted: Highlight

Commented [I7]: figure 2 is included ??

Formatted: Highlight

Formatted: Highlight

sowing to maturity. The different weather warnings issued for both medium and long duration kharif rice like rainfall, wet spell duration, cloudy weather, drought and High wind. The rainfall warning during the 25 to 38 SMW (>200 mm/day) and from 39 to 42 SMW (>100 mm/day). The wet spell duration (>125mm for 3 days) from during the 25 to 38 SMW. During the crop growth high wind warnings (> 62mm/hr) from 35 to 42 SMW.

In Khordha district for rice crop the highest normal rainfall was found 89 mm during the 29<sup>th</sup> SMW followed by 84.4 mm and 84.2 mm during the 31<sup>st</sup> and 34<sup>th</sup> SMW. The highest normal maximum temperature (34<sup>o</sup>C) found during 25<sup>th</sup> week and temperature minimum (23.3<sup>o</sup>C) was found during 42<sup>nd</sup> SMW. The BSH (bright sunshine hour) recorded highest in 42<sup>nd</sup> week (6.4). The crop sown during 25<sup>th</sup> & 26<sup>th</sup> SMW is a long and warm season kharif rice crop so it can be successfully grown as a kharif crop during the monsoon season.

Similarly for long duration the weather warnings are same, the highest rainfall received during the 29<sup>th</sup> week (89mm) followed by (84.4 mm) in the 30<sup>th</sup> week. The Tmax (33.4<sup>o</sup>C) and Tmin (15.4<sup>o</sup>C) for long duration of Rice. The highest BSH recorded 7.3 hr/day in the 47<sup>th</sup> SMW. In Jagatsingpur district the mean rainfall 105mm, Maximum/minimum temperature 30.8 to 18.9<sup>o</sup>C and RH -88-70%. Similarly, in Kendrapada and puri district the rainfall on 29<sup>th</sup> SMW 105.7 mm/day & 106.6 mm/day, the maximum and minimum temperature 30.8<sup>o</sup>C & 18.9<sup>o</sup>C and the relative humidity 88 to 70%.

### 3.2 Phenophases wise weather for high yield of Kharif Rice

**Sowing to seedling period:** In medium duration rice crop this period extends from 25<sup>th</sup> to 28<sup>th</sup> week and the range of maximum and minimum temperature 31<sup>o</sup>C-34<sup>o</sup>C & 25<sup>o</sup>C-26<sup>o</sup>C, RH: 81-86% and the water requirement of crop 250-300 mm. Similarly for long duration Rice this period extends from 26<sup>th</sup> to 29<sup>th</sup> SMW, the range of Tmax (30-34<sup>o</sup>C) & Tmin (25-28<sup>o</sup>C), RH: 78-87% and the water requirement same as medium duration. These are the favourable climatic normal for potential productivity of Rice.

**Transplanting:** For transplanting growth stage, the period from 29<sup>th</sup> to 31<sup>th</sup> SMW and the range of the relative humidity 83 to 87%, the maximum and minimum temp 32-33<sup>o</sup>C & 25-26<sup>o</sup>C.

**Tillering to panicle development:** From tillering to panicle development of the crop, the RH 82-90%, temperature maximum & minimum 29-33<sup>o</sup>C ,25-26<sup>o</sup>C respectively and BSS was found 5.6-5.2 hr/day. Rainfall during tilling to PD 85mm was found congenial for the expansion of the leaves and chlorophyll content and hence for the better yield for the plant.

**Flowering:** anthesis is the most important stage for the rice crop, during the flowering period the Maximum & minimum temperature 29-33<sup>o</sup>C & 25-26<sup>o</sup>C and the RH is 80-90%. The water requirement during the anthesis period 250-300 mm.

**Commented [18]:** Did author mean BSH?

**Commented [19]:** PD full form may be mentioned at the first time use

**Formatted:** Highlight

**Grain filling to maturity:** This period extends from 39 to 42 SMW (for medium duration) & 44 to 49 SMW (for long duration). The range of actual weekly maximum/minimum temperature are for grain filling (70-77) & (30-32), the RH 70-77% and for maturity (63-66) & (30-31), the RH 63-66%. The water requirement during this period is 100-200 mm.

**GDD:** For high yielding of Rice crop the medium duration GDD requirement was from 25<sup>th</sup> to 31<sup>th</sup> SMW i.e 670-690<sup>o</sup>C, from 32 to 34 (370-390), 35<sup>th</sup> to 38<sup>th</sup> (390-410), 39<sup>th</sup> to 42<sup>th</sup> (510-520). For long duration (150 days) of rice crop the GDD requirement was from 26<sup>th</sup> to 32<sup>nd</sup> week i.e 660-680, from 33<sup>th</sup> to 37<sup>th</sup> week i.e (370-390), from 38<sup>th</sup> to 43<sup>th</sup> week i.e (910-930) and from 44<sup>th</sup> to 49<sup>th</sup> week i.e (470-490).

#### **Congenial weather conditions for pest and diseases of Rice:**

The bottom part of the crop weather calendar which contain the climatic normal required for major pest and diseases of Kharif Rice as well as susceptible crop phenological stages of the crop. The major pest and diseases of the study area i.e stem borer, leaf folder, BPH, WBPH & GLH and Case worm were observed during the transplanting to flowering stage due to Temperature more than 30<sup>o</sup>C, wind speed (km/h): <5, rainfall:(0-50) mm and the RH =>70% are the favourable weather conditions for the pest of the Rice crop. In different diseases like Blast, BLB, Sheath Blight, Sheath Rot, Brown spot and foot root are observing from the 27<sup>th</sup> SMW to 43<sup>th</sup> SMW (sowing to flowering stage). The favourable weather conditions for diseases like Temperature: 20-30<sup>o</sup>C, RH= > 90%, wind speed <5 km/hr and Rainfall >50 mm. these are observed from sowing- seedling to transplanting, transplanting to tillering/ panicle development, PD to flowering due to insufficient rainfall and aberrant weather conditions.

#### **Crop Advisories for paddy cultivation:**

##### **Paddy:**

##### **Varietal selection**

- Upland rice varieties (Matures in 100-120 days) like Khandagiri, Sahabhazi Dhan, DRR-42, DRR-44, DRR-46, Mandakini, Naveen, GB-1, Bina-11, MTU-1010, Satyabhama, Swarna Shreya etc. can be cultivated.
- Medium land rice varieties (Matures in 120-140 days) like MTU 1156, MTU 1153, CR Dhan 310, RGL 2538, Lalat, Improved Lalat, Manaswini, MTU-1001, Sampada, Gitanjali, Nua acharmati etc can be cultivated.
- Low land rice varieties (Matures >140 days) like Pratikshya, Swarna, Swarna Sub-1, RGL-2537, MTU-1075, Mrinalini, Hashanta, Rani Dhan, CR 1009, CR 1009 Sub-1, DRR 50, Pooja, MTU-1064, CR-1018, Sarala, Durga, Pradhan Dhan, Nua Kalajeera, Nua chinikamini, CR Sungadhi Dhan-907 etc can be cultivated.

### **Seed Treatment**

Seed treatment is necessary before sowing of Paddy. It will control Seed borne diseases to some extent. Before sowing, seed treatment can be done with Carbendazim 50 % WP @ 2- gram/ kg of seeds or Carboxin 37.5 % + Thiram 37.5% D.S WP or thiram 75 % WS @ 3 gm/kg of seeds.

### **Seed sowing:**

- Sow the paddy seeds in line preferably with seed drill or three tyne cultivator-cum-seed drill or behind the country plough at 15 x 15 cm or 20 x10 cm spacing. Seed should be placed at a depth of 4-6 cm.
- Use 24-30 kg of paddy seeds/acre for broadcasting and 12- 16 kg seeds/ acre for sowing by seed drill depending on the test weight of the seed.

### **Dry Nursery Field Preparation**

For one-acre area of paddy transplanting 400 m<sup>2</sup> (10 Decimal) size of land is required for nursery raising. Selected nursery field should be ploughed 3- 4 times. Apply 1 tonne of FYM and mixed it properly during last ploughing. Divide nursery area into smaller plots of 1.5-metre-long, 10 cm height and convenient length. Irrigation channels of size 30 cm in breadth should be made along the beds for irrigation/drainage.

### **Wet Nursery Field Preparation**

Irrigation should be done in nursery field and puddle it 2-3 times followed by planking. Apply 200 kg of FYM , 4 kg of DAP ,2.5 kg of MOP and 1 kg of Zinc sulphate during last puddling. Sprouted Seeds should be sown @ 40-50 gram/ m<sup>2</sup> area of seed bed by line sowing with 5 cm gap between each line or direct broadcasting and put dried compost over seeds. Apply light irrigations to the nursery area particularly in the evening so that the field remains wet and do not keep standing water.

### **Basal fertilizer management in direct seeded rice:**

Incorporate well decomposed Farm Yard Manure or cow-dung @ 8 quintals /acre during the final land preparation in direct seeded rice. Apply full dose of Phosphorus and Potash @ 12kg each /acre (preferably 75 kg SSP or 27 kg DAP + 20 kg MOP) as band placement behind the plough or by fertiliser cum seed drill in upland rice as basal dose.

### **Weed management:**

- Spray Bispyribac sodium 10% SC @ 120ml/acre in 8 tanks of 16 litre capacity sprayer at 8- 10 days after sowing or when the weeds are at 2-3 leaf stage in moist soil as an alternative to manual weeding or Metsulfuron Methyl 10%+ Chlorimuron Ethyl 10 % WP @ 8 gram / acre at 15-20 DAS (When the weeds are at 3-4 leaf stage) by mixing in 200-litre of water or apply tank mix of Fenoxaprop-p-ethyl + Ethoxysulfuron @ 260 + 50 g/acre at 15- 20 DAS as an alternate to manual weeding.
- Use pre-emergence herbicide Pretilachlor @ 800 ml/acre or Oxadiargyl 80%W. P @ 30gm/acre or Pyrazosulfuron Ethyl 10% W.P @ 80gm/acre at 1-3 DAT. Spray the herbicide by mixing it in 200 litres of water per acre or Mix the herbicide with 20 kg of sand and broadcast it uniformly. Always use flat-fan or flood-jet nozzle and clean water for herbicide spraying.

#### **Fertilizer management in Nursery:**

Apply 200 kg of FYM, 4 kg of DAP, 2.5 kg of MOP during last puddling in 10-decimil nursery area. Apply light irrigations to the nursery area so that the field remains wet and do not keep standing water. Apply 4 kg of Urea at 15 DAS to the nursery area.

#### **Nursery pest management:**

Apply Chlorantraniliprole 0.4 % G @ 400-gram or Cartap Hydrochloride 4% GR @ 800-gram or Fipronil 0.3% GR @ 1-kg in the 10 decimal nursery area 7-days before transplanting to manage gall midge, stem borer, caseworm, leaf folder and root knot nematode up to 3 weeks after transplanting.

#### **Beushaning**

In paddy field where herbicide has not been applied, “Beushaning” may be done after accumulation of enough water (at least 7-10 cm standing water) at 25-30 days after sowing. After “Beushaning” apply 35 kg of urea/acre as top dressing. If fertilizer has not been applied during sowing, apply 35 kg of DAP, 15 kg of MOP and 15 kg of Urea per acre after “Beushaning”. Do not go for “Beushaning” if the crop is more than 45 days old.

#### **Seedling treatment**

If granular pesticide has not been applied, then dip the root of paddy seedlings with solution of 1 ml chlorpyrifos/ liter of water for 8 to 10 hours before transplanting.

#### **Basal fertilizer management in transplanted rice:**

Apply 35 kg DAP, 27 kg Potash and 8 kg Urea per acre during last puddling. For sandy soil apply 35 kg DAP, 15 kg Potash and 8 kg Urea per acre during last puddling. Transplanting of 20-25 days old seedlings should be done at a spacing of 20x15 cm, plant 2-3 seedlings per hill for high yielding varieties.

#### **Pest management:**

##### **Stem borer**

To manage stem borer in paddy at early stage of crop, apply Cartap Hydrochloride 4 % G @ 8-kg/acre or Chlorantraniliprole 0.4 % GR @ 4-kg/acre or Imidacloprid 0.3% GR @ 6-kg/acre by mixing it with sand at 1:1 ratio.

##### **Leaf folder and case worm**

Due to cloudy weather, there is a chance of leaf folder and case worm infestation. To manage this pest in paddy spray Fipronil 5% SC @ 400-ml/acre or Profenophos 50% EC @ 400-ml/acre or Chlorantraniliprole 18.5% SC @ 60-ml /acre.

##### **BPH and WBPH-**

The high humid weather condition is favourable for Brown Plant Hopper (BPH) and White Backed Plant Hopper (WBPH) infestation in paddy. To manage BPH and WBPH in paddy avoid excess use of nitrogenous fertilizer. Do not keeping standing water in the field for longer period. Alter the micro-climate of the rice field by alternate wetting and drying technique. Make alleys at 6 feet spacing for sunlight entry

and proper aeration below the crop zone. If >10-15 hoppers/hill noticed, spray Pymetrozine 50% WG @ 120 g/acre or Dinotefuran 20 % SG @ 80 g/acre or Flonicamid 50 % WG @ 60- gram/acre or Triflumezopyrim 10% SC @ 100 ml / acre at the base of the plant.

**Disease management:**

**Bacterial leaf blight**

To control Bacterial leaf blight in paddy dip the roots of seedlings in Streptomycin solution by mixing 1 g in 10 litre of water for 20 minutes before transplanting.

To manage this disease chemically, spray Copper Hydroxide 53.8% DF @ 600-gram/acre or 200-gram Plantomycin along with Copper Oxy Chloride 50% WP @ 600-gram/acre.

**Blast**

To Manage Blast diseases first drain out excess water from the paddy field. Spray Hexaconazole @ 400-ml/acre or Azoxystrobin+ Difenoconazole @ 200-ml/acre or Tebuconazole + Trifloxystrobin @ 80-gram/acre.

**Sheath blight**

For controlling this disease, spray Tebuconazole 50%+ Trifloxystrobin 25 % WG @ 80-gram/acre or Propiconazole 25% EC @ 200ml/acre.

**Sheath rot**

To control sheath rot disease spray Carbendazim 50% WP @ 400- gram/acre or Propiconazole 25% EC @ 200-ml/acre or Iprodione 25% + Carbendazim 25% WP @ 500-gram/acre by mixing in 200-litre of water.

**Foot rot**

To control foot rot disease in paddy spray Metalaxyl 8% +Mancozeb 64% WP @ 400- gram/acre or Carbendazim 12% +Mancozeb 63% WP @ 400-gram/acre.

**Conclusion:**

The crop weather calendars were developed in the present study for medium and long duration rice crop at different phenological stages by combining the information on weekly normal meteorological data, with ranges of meteorological parameters for high production of the crop. In Odisha, the highest production of Rice crop achieved with the range maximum/minimum temperature, relative humidity, Bright sunshine hours and rainfall from 31 to 34°C/ 26-28°C and 89 mm-105 mm rainfall respectively during the sowing and seeding to maturity. This calendar and crop advisory are most useful for issuing the Agro Advisory services for the Rice crop. These calendars are useful for crop planning, irrigation, Scheduling and plant protection measures, which are of vital importance for effective crop planning and for maximizing and stabilizing food production in the country.

**Reference:**

1. Kaur P, Bala A, Singh H, Sandhu SS (2013) "Guidelines to prepare crop weather calendar. All India Coordinate Research Project in Agrometeorology. Department of Climate change and Agricultural Meteorology, Punjab Agricultural University, Ludhiana. 2013:1-18
2. Karunakar A. (2015) crop weather calendar of Soyabean -Akola. District level crop weather calendars of major crops in India. Central Research Institute for dryland Agriculture, 2015.
3. Prabhjyot-Kaur and Bala A (2013) Development of crop-weather pest calendars for wheat crop in Punjab. Journal of research, Punjab Agriculture University 50:90-109
4. Prabhjyot-Kaur and Bala A (2013) Development of crop-weather pest calendars for Rice crop in Punjab. Journal of research, Punjab Agriculture University 51:18-27
5. Singh K K (2011) weather forecasting and agromet advisory services in India: Tech Bull 22, 8<sup>th</sup> edn. pp 240-43. Indian Meteorological Department , Ministry of Earth Sciences, Mausam Bhavan, New Delhi.






CROP WEATHER CALENDAR -RICE (125 DAYS-MEDIUM DURATION) OF KHORDHA DISTRICT																															
SMW		25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42												
Weather warnings	Rainfall	>200mm/day										>200mm/day					>50mm for 3 days														
	Wet spell Duration	>125mm for 3 days										>125mm for 5 days					>50mm for 3 days														
	Cloudy Weather																Cloudy														
	Drought	10 days										15 days					20 days														
	High Wind											>62 km/hr					>62 km/hr														
Weekly Normal Weather	Rainfall (mm)	56.4	59.7	65.4	63.7	89.0	63.6	84.4	79.2	70.4	77.8	76.1	64.2	62.1	84.2	52.6	59.6	52.5	37.0												
	Tmax (°C)	34.0	33.4	32.8	32.8	32.2	32.2	32.0	32.0	32.2	32.3	32.0	32.0	32.4	32.3	32.7	32.6	32.4	32.1												
	Tmin (°C)	25.9	25.8	25.7	25.7	25.6	25.5	25.4	25.5	25.5	25.5	25.4	25.2	25.2	25.1	25.0	24.6	24.1	23.3												
	BSH	4.3	4.1	3.5	4.1	4.5	4.1	3.8	4.2	3.9	4.7	4.9	4.2	5.0	5.2	5.6	5.7	6.3	6.4												
Climatic Normal for High Yield	RH (%)	81-86					83-87					89-92					80-90					84-92					74-84				
	Tmax(°C)	31-34					32-33					29-33					29-33					31-32					31-33				
	Tmin(°C)	25-26					25-26					25-26					25-26					24-25					21-24				
	GDD	670-690					370-390					390-410					390-410					510-520					510-520				
Water Requirement		250-300					500-550					250-300					50-100					50-100									
Congenial weather conditions for pest & diseases of rice																															
STEM BORRER												Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0																			
LEAF FOLDER												Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0-30																			
BPH, WBPH &GLH												Temp (°C): >30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0-30																			
CASE WORM												Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): >5, RF (mm):30-50																			
BLAST												Temp (°C):20-30, RH (%): >90, Wind Speed (Km/h): <5, RF (mm):30-50																			
BLB												Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):>50																			
SHEATH BLIGHT												Temp (°C):20-30, RH (%): >70, Cloudy weather																			
SHEATH ROT												Temp (°C):20-30, RH (%), Wind Speed (Km/h): <5, RF (mm):30-50																			
BROWN SPOT												Temp (°C):20-30, RH (%): >90, Wind Speed (Km/h): >5, RF (mm):30-50																			
FOOT ROT												Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0-30																			
Growth Stage																															
		Sowing & Seedling					Transplantin g					Tillering to PD					Flowering					Grain filling to maturity									
SMW		25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42												
Month		June					July					August					September					October									



Table 2. CROP WEATHER CALENDAR -RICE (125 DAYS-MEDIUM DURATION) OF KHORDHA DISTRICT

**CROP WEATHER CALENDAR -RICE (150 DAYS-LONG DURATION) OF KHORDHA DISTRICT**







SMW	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42								
<b>Weather warnings</b>	Rainfall	>200mm/day											>200mm/day													
	Wet spell Duration	>125mm for 3 days											>125mm for 5 days					>50mm for 3 days								
	Cloudy Weather	Cloudy																								
	Drought	10 days											15 days					20 days								
	High Wind												>62 km/hr					>62 km/hr								
<b>Weekly Normal Weather</b>	Rainfall (mm)	59.7	65.4	63.7	89.0	63.6	84.4	79.2	70.4	77.8	76.1	64.2	62.1	84.2	52.6	59.6	52.5	37.0	32.3	26.5	10.1	9.2	2.5	0.1	4.8	
	Tmax (°C)	33.4	33.4	32.8	32.8	32.2	32.2	32.0	32.0	32.2	32.3	32.0	32.0	32.4	32.7	32.6	32.4	32.1	32.0	31.0	31.1	30.7	30.6	30.0	29.3	
	Tmin (°C)	25.8	25.8	25.7	25.7	25.6	25.5	25.4	25.5	25.5	25.5	25.4	25.2	25.2	25.0	24.6	24.1	23.3	22.0	21.3	20.3	19.1	17.9	16.5	15.4	
	BSH	4.1	3.5	4.1	4.5	4.1	3.8	4.2	3.9	4.7	4.9	4.2	5.0	5.2	5.6	5.7	6.3	6.4	6.8	6.7	6.4	6.8	7.3	7.2	7.1	
<b>Climatic Normal for High Yield</b>	RH (%)	82-86				86-92				89-90				80-90				84-92				74-84				
	Tmax(°C)	31-34				29-33				29-33				31-32				31-33								
	Tmin(°C)	25-26				25-26				25-26				25-26				24-25				21-24				
	GDD	660-680				600-650				370-390				910-930				470-490								
<b>Water Requirement</b>	250-300				600-650				350-400				100-200													
<b>Congenial weather conditions for pest &amp; diseases of rice</b>																										
<b>STEM BORRER</b>	Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0																									
<b>LEAF FOLDER</b>	Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0-30																									
<b>BPH, WBPH &amp; GLH</b>	Temp (°C): >30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0-30																									
<b>CASE WORM</b>	Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): >5, RF (mm):30-50																									
<b>BLAST</b>	Temp (°C):20-30, RH (%): >90, Wind Speed (Km/h): <5, RF (mm):30-50																									
<b>BLB</b>	Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):>50																									
<b>SHEATH BLIGHT</b>	Temp (°C):20-30, RH (%): >70, Cloudy weather																									
<b>SHEATH ROT</b>	Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):30-50																									
<b>BROWN SPOT</b>	Temp (°C):20-30, RH (%): >90, Wind Speed (Km/h): >5, RF (mm):30-50																									
<b>FOOT ROT</b>	Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0-30																									
<b>Growth Stage</b>																										
	Sowing & Seedling				Transplanting				Tillering to PD				Flowering				Grain filling to maturity									
	SMW				25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42				
	Month				June				July				August				September				October				November	
																										

Table 3. CROP WEATHER CALENDAR -RICE (150 DAYS-LONG DURATION) OF KHORDHA DISTRICT






CROP WEATHER CALENDAR – RICE (125 DAYS-MEDIUM DURATION) OF JAGATSINGPUR DISTRICT																									
SMW		25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42						
Weather warnings	Rainfall (mm)	>200 mm/day						>200 mm/day						>100mm/day											
	Wet spell duration	>125 mm for 3 days						>125 mm for 5days						>50 mm for 3 days											
	Cloudy weather													Cloudy											
	Drought	10 days						15 days						20 days											
	High wind							>62 km/hr						>62km/hr											
Weekly normal weather	Rainfall (mm)	67.2	58.8	64.3	58.0	105.7	70.9	83.8	72.1	61.7	63.5	68.4	73.6	69.8	84.6	47.3	56.9	43.7	36.1						
	Tmax (°C)	31.0	30.8	30.5	30.4	30.2	29.8	29.9	30.0	29.7	29.9	29.8	29.7	29.7	29.7	29.8	30.0	29.3	29.5						
	Tmin(°C)	27.9	27.8	27.6	27.5	27.5	27.2	27.1	27.3	27.2	27.0	27.1	27.0	26.9	27.0	26.6	26.7	26.0	25.2						
	RHI	82	83	87	85	87	87	87	86	87	87	87	87	87	88	87	86	85	85						
	RHII	854	85	86	86	86	87	87	88	88	87	87	88	87	87	85	83	82	80						
Climate Normal for high yield	RH(%)	78-87				83-87				83-86				80-88				79-84				71-80			
	Tmax (°C)	31-32				31-32				30-32				30-33				32-33				32-33			
	Tmin (°C)	27-28				26-27				26-27				25-28				26-27				25-26			
	GDD	670-690						370-390						390-410						510-520					
Water requirement		250-300				670-690				250-300				50-100											
Congenial weather conditions for pest & Diseases of Rice																									
STEM BORRER		TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):0																							
Leaf Folder		TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):0-30																							
BPH, WBPH & GLH		TEMP: >30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):0-30																							
CASE WORM		TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):30-50																							
BLAST		TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):30-50																							
BLB		TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):>50																							
SHEATH BLIGHT		TEMP: 28-32°C, RH (%): >90, CLOUDY WEATHER																							
SHEATH ROT		TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):30-50																							
BROWN SPOT		TEMP: 20-30°C, RH (%): >90, WIND SPEED(Km/h): <5, RF(MM):30-50																							
FOOT ROT		TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):0-30																							
GROWTH STAGES		 Sowing & Seedling				 Transplanting				 Tillering to PI				 Flowering				 Grain filling & maturity							
SMW		25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42						
MONTH		JUNE				JULY				AUGUST				SEPTEMBER				OCTOBER							

Table 4. CROP WEATHER CALENDAR – RICE (125 DAYS-MEDIUM DURATION) OF JAGATSINGPUR DISTRICT






CROP WEATHER CALENDAR – RICE (125 DAYS-MEDIUM DURATION) OF KENDRAPARA DISTRICT																								
SMW		25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42					
Weather warnings	Rainfall (mm)	>200 mm/day										>200 mm/day					>100mm/day							
	Wet spell duration	>125 mm for 3 days										>125 mm for 5days					>50 mm for 3 days							
	Cloudy weather																Cloudy							
	Drought	10 days										15 days					20 days							
	High wind											>62 km/hr					>62km/hr							
Weekly normal weather	Rainfall (mm)	64.8	52.3	61.7	63.3	106.6	67.6	83.1	69.0	57.4	62.7	70.4	69.3	65.8	78.5	48.0	56.7	44.4	30.9					
	Tmax (°C)	30.5	30.4	30.2	29.9	29.8	29.8	29.7	29.8	29.6	29.6	29.5	29.6	29.6	29.6	29.9	29.9	29.8	29.4					
	Tmin(°C)	28.3	28.3	28.1	28.0	28.0	27.2	27.7	27.3	27.7	27.7	27.8	27.7	27.8	27.8	27.6	27.7	27.4	26.8					
	RHI	81	83	87	85	87	87	86	86	87	87	87	87	86	88	87	86	85	85					
	RHII	84	84	85	85	86	87	85	85	86	85	85	85	84	84	82	80	78	76					
Climate Normal for high yield	RH(%)	75-82				78-87				79-81				79-84				75-82				63-71		
	Tmax (°C)	32-33				31-33				31-33				30-33				32-33				32-33		
	Tmin (°C)	26-27				25-26				26-27				25-27				26-27				25-26		
	GDD	670-690						370-390						390-410						510-520				
Water requirement		250-300				500-550				250-300				50-100										
Congenial weather conditions for pest & Diseases of Rice																								
STEM BORRER		TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):0																						
Leaf Folder		TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):0-30																						
BPH, WBPH & GLH		TEMP: >30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):0-30																						
CASE WORM		TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):30-50																						
BLAST		TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):30-50																						
BLB		TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):>50																						
SHEATH BLIGHT		TEMP: 28-32°C, RH (%): >90, CLOUDY WEATHER																						
SHEATH ROT		TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):30-50																						
BROWN SPOT		TEMP: 20-30°C, RH (%): >90, WIND SPEED(Km/h): <5, RF(MM):30-50																						
FOOT ROT		TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):0-30																						
GROWTH STAGES		 Sowing & Seedling				 Transplanting				 Tillering to PI				 Flowering				 Grain filling & maturity						
SMW		25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42					
MONTH		JUNE				JULY				AUGUST				SEPTEMBER				OCTOBER						

Table 5. CROP WEATHER CALENDAR – RICE (125 DAYS-MEDIUM DURATION) OF KENDRAPARA DISTRICT






CROP WEATHER CALENDAR – RICE (125 DAYS-MEDIUM DURATION) OF PURI DISTRICT																										
SMW		25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42							
Weather warnings	Rainfall (mm)	>200 mm/day										>200 mm/day					>100mm/day									
	Wet spell duration	>125 mm for 3 days										>125 mm for 5days					>50 mm for 3 days									
	Cloudy weather																Cloudy									
	Drought	10 days										15 days					20 days									
	High wind											>62 km/hr					>62km/hr									
Weekly normal weather	Rainfall (mm)	64.8	52.3	61.7	63.3	106.6	67.6	83.1	69.0	57.4	62.7	70.4	69.3	65.8	78.5	48.0	56.7	44.4	30.9							
	Tmax (°C)	30.5	30.4	30.2	29.9	29.8	29.8	29.7	29.8	29.6	29.6	29.5	29.6	29.6	29.6	29.9	29.9	29.8	29.4							
	Tmin(°C)	28.3	28.3	28.1	28.0	28.0	27.2	27.7	27.3	27.7	27.7	27.8	27.7	27.8	27.8	27.6	27.7	27.4	26.8							
	RHI	81	83	87	85	87	87	86	86	87	87	87	87	86	88	87	86	85	85							
	RHII	84	84	85	85	86	87	85	85	86	85	85	85	84	84	82	80	78	76							
Climate Normal for high yield	RH(%)	75-82					78-87					79-84					75-82									
	Tmax (°C)	32-33					31-33					31-33					30-33									
	Tmin (°C)	26-27					25-26					26-27					25-27									
	GDD	670-690					370-390					390-410					510-520									
Water requirement		250-300					500-550					250-300					50-100									
Congenial weather conditions for pest & Diseases of Rice																										
STEM BORRER												TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):0														
Leaf Folder												TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):0-30														
BPH, WBPH & GLH												TEMP: >30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):0-30														
CASE WORM												TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):30-50														
BLAST												TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):30-50														
BLB												TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):>50														
SHEATH BLIGHT												TEMP: 28-32°C, RH (%): >90, CLOUDY WEATHER														
SHEATH ROT												TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):30-50														
BROWN SPOT												TEMP: 20-30°C, RH (%): >90, WIND SPEED(Km/h): <5, RF(MM):30-50														
FOOT ROT												TEMP: 20-30°C, RH (%): >70, WIND SPEED(Km/h): <5, RF(MM):0-30														
GROWTH STAGES		 Sowing & Seedling					 Transplanting					 Tillering to PI					 Flowering					 Grain filling & maturity				
SMW		25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42							
MONTH		JUNE				JULY				AUGUST				SEPTEMBER				OCTOBER								

Table 6. CROP WEATHER CALENDAR – RICE (125 DAYS-MEDIUM DURATION) OF PURI DISTRICT

**CROP WEATHER CALENDAR -RICE (150 DAYS -LONG DURATION) OF KENDRAPADA DISTRICT**

SMW		26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	
Weather warnings	Rainfall (mm)	>200mm/day												>200 mm/day						>100 mm/day						
	Wet spell duration	>125 mm for 3 days												>125 mm for 5 days						>50 mm for 3 days						
	Cloudy weather																			cloudy						
	Drought	10 days												15 days						20 days						
	High wind													>62km/hr						>62km/hr						
Weekly normal weather	Rainfall (mm)	58.8	64.8	58.0	105.7	70.9	83.8	72.1	61.7	63.5	68.4	73.6	69.8	84.6	47.3	56.9	43.7	36.1	40.8	11.8	12.6	11.4	1.3	0.1	19.3	
	Tmax(°C)	30.8	30.5	30.4	30.2	29.8	29.9	30.0	29.7	29.9	29.8	29.7	29.7	29.7	29.8	30.0	29.3	29.5	29.0	28.5	28.1	27.5	27.2	26.7	26.0	
	Tmin(°C)	27.8	27.6	27.5	27.5	27.2	27.1	27.3	27.2	27.0	27.1	27.0	26.9	27.0	26.6	26.7	26.0	25.2	24.1	23.4	22.4	21.6	20.7	19.8	18.9	
	RHI	83	87	85	87	87	86	87	87	87	87	87	87	88	87	87	86	85	83	82	80	83	82	79	79	80
	RHII	85	86	86	86	87	87	88	88	87	87	88	87	87	87	85	83	82	80	77	78	76	75	73	72	70
Climate normal for high yield	RH (%)	78-87				83-87				80-88				71-80				70-85				72-80				
	Tmax(°C)	30-32				29-31								31-33				29-31				29-30				
	Tmin(°C)	26-28				26-27								23-26				20-24				18-19				
	GDD	660-680								370-390				910-930				470-490								
Water Requirement	250-300				600-650								350-400				100-200									
<b>Congenial weather conditions for pest &amp; diseases of Rice</b>																										
STEM BORRER					Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0																					
LEAF FOLDER					Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0-30																					
BPH, WBPH & GLH													Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0-30													
CASE WORM													Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):30-50													
BLAST	Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):30-50																									
BLB					Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):30-50																					
SHEATH BLIGHT					Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):>50																					
SHEATH ROT					Temp (°C):20-30, RH (%): >90, CLOUDY WEATHER																					
BROWN SPOT	Temp (°C):20-30, RH (%): >90, Wind Speed (Km/h): <5, RF (mm):30-50																									






<b>FOOT ROT</b>	Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0-30																								
<b>GROWTH STAGE</b>	 <b>Sowing and seedling</b>				 <b>Transplanting</b>			 <b>Tillering and panicle development</b>							 <b>Flowering</b>				 <b>Grain filling to maturity</b>						
<b>SMW</b>	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	
<b>Month</b>	July				August							September				October				November					

Table 7. CROP WEATHER CALENDAR -RICE (150 DAYS -LONG DURATION) OF KENDRAPADA DISTRICT

**CROP WEATHER CALENDAR -RICE (150 DAYS -LONG DURATION) OF KENDRAPADA DISTRICT**

SMW		26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49							
Weather warnings	Rainfall (mm)	>200mm/day												>200 mm/day						>100 mm/day												
	Wet spell duration	>125 mm for 3 days												>125 mm for 5 days						>50 mm for 3 days												
	Cloudy weather	cloudy																														
	Drought	10 days												15 days						20 days												
	High wind													>62km/hr						>62km/hr												
Weekly normal weather	Rainfall (mm)	58.8	64.8	58.0	105.7	70.9	83.8	72.1	61.7	63.5	68.4	73.6	69.8	84.6	47.3	56.9	43.7	36.1	40.8	11.8	12.6	11.4	1.3	0.1	19.3							
	Tmax(°C)	30.8	30.5	30.4	30.2	29.8	29.9	30.0	29.7	29.9	29.8	29.7	29.7	29.7	29.8	30.0	29.3	29.5	29.0	28.5	28.1	27.5	27.2	26.7	26.0							
	Tmin(°C)	27.8	27.6	27.5	27.5	27.2	27.1	27.3	27.2	27.0	27.1	27.0	26.9	27.0	26.6	26.7	26.0	25.2	24.1	23.4	22.4	21.6	20.7	19.8	18.9							
	RHI	83	87	85	87	87	86	87	87	87	87	87	87	88	87	87	86	85	83	82	80	83	82	79	80							
	RHII	85	86	86	86	87	87	88	88	87	87	88	87	87	87	85	83	82	80	77	78	76	75	73	72	70						
Climate normal for high yield	RH (%)	78-87				83-87				80-88				71-80				70-85				72-80										
	Tmax(°C)	30-32				29-31								31-33				29-31				29-30										
	Tmin(°C)	26-28				26-27								23-26				20-24				18-19										
	GDD	660-680								370-390								910-930								470-490						
Water Requirement	250-300				600-650								350-400								100-200											
<b>Congential weather conditions for pest &amp; diseases of Rice</b>																																
STEM BORRER													Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0																			
LEAF FOLDER													Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0-30																			
BPH, WBPH & GLH													Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0-30																			
CASE WORM													Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):30-50																			
BLAST													Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):30-50																			
BLB													Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):30-50																			
SHEATH BLIGHT													Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):>50																			
SHEATH ROT													Temp (°C):20-30, RH (%): >90, CLOUDY WEATHER																			
BROWN SPOT													Temp (°C):20-30, RH (%): >90, Wind Speed (Km/h): <5, RF (mm):30-50																			
FOOT ROT													Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0-30																			






<b>GROWTH STAGE</b>	 Sowing and seedling				 Transplanting			 Tillering and panicle development							 Flowering				 Grain filling to maturity					
	<b>SMW</b>	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
<b>Month</b>		July				August				September				October				November						

Table 8. CROP WEATHER CALENDAR -RICE (150 DAYS -LONG DURATION) OF KENDRAPADA DISTRICT

**CROP WEATHER CALENDAR -RICE (150 DAYS -LONG DURATION) OF JAGATSINGHPUR DISTRICT**

SMW		26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49							
Weather warnings	Rainfall (mm)	>200mm/day												>200 mm/day						>100 mm/day												
	Wet spell duration	>125 mm for 3 days												>125 mm for 5 days						>50 mm for 3 days												
	Cloudy weather																			cloudy												
	Drought	10 days												15 days						20 days												
	High wind													>62km/hr						>62km/hr												
Weekly normal weather	Rainfall (mm)	58.8	64.8	58.0	105.7	70.9	83.8	72.1	61.7	63.5	68.4	73.6	69.8	84.6	47.3	56.9	43.7	36.1	40.8	11.8	12.6	11.4	1.3	0.1	19.3							
	Tmax(°C)	30.8	30.5	30.4	30.2	29.8	29.9	30.0	29.7	29.9	29.8	29.7	29.7	29.7	29.8	30.0	29.3	29.5	29.0	28.5	28.1	27.5	27.2	26.7	26.0							
	Tmin(°C)	27.8	27.6	27.5	27.5	27.2	27.1	27.3	27.2	27.0	27.1	27.0	26.9	27.0	26.6	26.7	26.0	25.2	24.1	23.4	22.4	21.6	20.7	19.8	18.9							
	RHI	83	87	85	87	87	86	87	87	87	87	87	87	88	87	86	85	85	83	82	82	81	81	79	79	80						
	RHII	85	86	86	86	87	87	88	88	87	87	88	87	87	87	85	83	82	80	77	78	76	75	73	72	70						
Climate normal for high yield	RH (%)	78-87				83-87				80-88				71-80				70-85				72-80										
	Tmax(°C)	30-32				29-31				29-33				31-33				29-31				29-30										
	Tmin(°C)	26-28				26-27				25-28				23-26				20-24				18-19										
	GDD	660-680								370-390								910-930								470-490						
Water Requirement	250-300				600-650								350-400								100-200											
<b>Congential weather conditions for pest &amp; diseases of Rice</b>																																
STEM BORRER													Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0																			
LEAF FOLDER													Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0-30																			
BPH, WBPH & GLH													Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0-30																			
CASE WORM													Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):30-50																			
BLAST													Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):30-50																			
BLB													Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):30-50																			
SHEATH BLIGHT													Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):>50																			
SHEATH ROT													Temp (°C):20-30, RH (%): >90, CLOUDY WEATHER																			
BROWN SPOT													Temp (°C):20-30, RH (%): >90, Wind Speed (Km/h): <5, RF (mm):30-50																			
FOOT ROT													Temp (°C):20-30, RH (%): >70, Wind Speed (Km/h): <5, RF (mm):0-30																			






<b>GROWTH STAGE</b>	 Sowing and seedling				 Transplanting			 Tillering and panicle development							 Flowering				 Grain filling to maturity						
	<b>SMW</b>	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
<b>Month</b>		July				August							September				October				November				

Table 9. CROP WEATHER CALENDAR -RICE (150 DAYS -LONG DURATION) OF JAGATSINGHPUR DISTRICT