Making Agriculture Climate Smart

A Compendium of Weather-Based Advisories for Management of Paddy, Finger Millet and Summer Groundnut in Akole Block of Ahmednagar District, Maharashtra
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FOREWORD

With increasing frequency of erratic weather events, farmers are in particular need of services that provide them advance information and suggestions on how to respond to risks and opportunities.

This publication is an attempt to meet 4 specific needs of the farmer – advice on adaptive crop management practices under different weather scenarios; improving farm productivity; maintaining eco-system health; and improving soil health, the latter two being most crucial for sustainability.

Since agriculture is a local affair, the approach adopted and recommendations made are particular to the Akole Taluka of the Ahmednagar District in Maharashtra. It focuses on the 3 key crops in the region, namely, paddy, finger millet and summer groundnut.

Based on different weather scenarios, recommendations across key aspects of crop management - crop varieties, irrigation, nutrient, pest and disease management and cultural practices - have been made. An integrated approach that emphasizes use of locally available material and nature-friendly practices has been adopted. The objective is to make farming both viable and sustainable.

This publication is a result of a collaborative effort between the Watershed Organisation Trust (WOTR), the India Meteorological Department (IMD), the Central Research Institute for Dryland Agriculture (CRIDA) and the Mahatma Phule Krishi Vidyapeeth (MPKV), the State Agricultural University in whose jurisdiction the Ahmednagar district falls.

I would like to thank the management and scientists from these institutions who reviewed material and generously guided us. My sincere thanks to the Swiss Agency for Development and Cooperation (SDC) and the National Bank for Agriculture and Rural Development (NABARD) who generously funded WOTR’s Climate Change Adaptation Project, through which this publication has been developed.

This work would not have been possible without the dedication of the Agro-Meteorology Team in WOTR who undertook the challenge of researching and writing this publication. This Ag-Met Team has also been responsible for designing and launching, in partnership with the above mentioned institutions, a pioneering service that provides integrated weather-based, crop specific advisories to farmers through a multi-media format - SMSs, public address systems, wall papers and on-farm extension support. This publication has also benefitted from this experience.

This is a work in progress and we solicit and welcome any feedback from users and readers which could help improve the content of this work to the benefit our farmers.

Dr. Marcella D’Souza
Executive Director,
WOTR
PREFACE

Timely onset and distribution of rainfall are critical for realizing maximum yields under rainfed conditions. Adequate amount of rainfall during the south west monsoon period not only supports production of major crops such as cereals, pulses, oilseeds but also determines the success of rabi crops through enough carryover moisture during the rabi season. However, delay in onset of monsoon and/or intermittent dry spells at different stages of crop growing season are commonly encountered and often limits production and productivity. The intensity of damage varies from crop to crop and from location to location. When the onset of monsoon gets delayed, farmers face difficulties in timely planting and do not realize economic yields, as happened during 2014 in several districts of Maharashtra.

With the realization that climate change is inevitable, it is necessary to make the farming community prepared sufficiently well in advance to address weather aberrations. Contingency crop planning, crop insurance, better weather advisories, adoption of better management practices etc. are few of the initiatives which could be suggested to farmers. It has been widely believed that due to climate change, there would be an increased frequency of droughts as well as high intensity rainfall which would be affecting agriculture production. We are increasingly witnessing drought, flood like situations, high intensity storms, unseasonal rains coupled with hailstorms during the same season. The year 2014 was one such example, wherein this phenomena was observed at all India level. Contingency plans, which look at these adverse weather events, need to be prepared for situations such as drought, flood, heat wave, cold wave, etc. to make informed decisions for addressing this variability. With the active support from Ministry of Agriculture, Government of India, CRIDA has prepared such contingency plans at district level for different states of India.

I am happy to note that WOTR (Watershed Organisation Trust), in collaboration with CRIDA, the State Agriculture University (MPKV) and the India Meteorology Department (IMD) has prepared a Weather Based Crop Management Plan for 3 main crops of Akole Block of Ahmednager District in Maharashtra for different scenarios of rainfall and other weather parameters and suggested management practices to be followed on a weekly basis for entire crop growing season. I am sure that the publication of this nature would be very helpful in managing the crop with continuous flow of information on weather being made available to farming community. I am happy to note that a network of weather stations has been put in place, the relevant weather information is being collected and management advisories are issued based on forecasted and observed weather parameters. The generation of weather information at such high resolution coupled with weather based advisories would go along way in real time successful managements of crops.

I compliment the efforts of WOTR and their staff for bringing out this useful publication.

Dr. Ch. Srinivasa Rao,  
FNAAS, FISSS  
Director, CRIDA, Hyderabad  
2 July 2015
MESSAGE

Climate variability, climate change, weather extremes, rain-fed agriculture with low productivity, smallholder, resource-poor farmers, deteriorating soil quality are all challenges that come together to impact negatively on agricultural productivity in India. In recent past, Maharashtra state has been experiencing unfavorable weather conditions in the form of drought, hailstorm etc., which ultimately has reduced agricultural productivity substantially. Besides, poor rainfall affecting all the irrigation projects in the drought affected regions of the State has caused low crop production. Under such circumstances it has become extremely difficult for the people who are dependent upon agriculture for their livelihood.

In view of the above, the initiatives of Watershed Organisation Trust (WOTR) in preparation of informative crop calendars based on Weather Based Management of key crops of the Akole Taluka, Ahmednagar District is really appreciated. It includes information and advisories regarding various management practices under normal weather for crop growth, different weather conditions, recommendations based on likely effects of anticipated weather changes, meteorological conditions favorable for incidences of crop pests and diseases and their remedial measures.

This calendar would be very much useful in terms of crop planning, irrigation scheduling and plant protection measures for farmers in the Akole region of Maharashtra and the regions having similar agro-ecological climate characteristics in the country. Also, information contained in the calendars give broad indications of the direction of development which may prove useful to the planners, agricultural administrators, plant breeders and farming communities in formulating policy matters regarding plant breeding, crop adoption, drought proofing, supplemental irrigation, maximising the yield, etc.

I appreciate the efforts taken by Watershed Organisation Trust in bringing out such an informative publication. I wish all the best in this endeavor to render meaningful service to the farming community.

Dr. N. Chattopadhyay
Deputy Director General of Meteorology,
Agricultural Meteorology Division,
India Meteorology Department,
Shivajinagar, Pune
6 July 2015
MESSAGE

Climate Change is considered to be one of the most serious threats to sustainable development with adverse impacts expected on the environment, human health, food security, economic activity and finally agriculture. The climate of a region determines the nature of crops to be grown; but prevailing weather conditions during the crop growth period decides the final crop yield. It has been proved that when other inputs are supplied at the optimum level, the variation in the productivity of crops is attributed to the prevailing weather conditions like rainfall, solar radiation, humidity, temperature, etc. The genetic potential of a genotype cannot be fully exploited unless the optimum weather conditions and integrated crop management practices have been followed during the entire crop growth period.

I am happy to note that the scientists from the M.P.K.V, Rahuri, CRIDA, the IMD and the Watershed Organisation Trust (WOTR) have made such an attempt in developing weather-based crop calendars of important field crops. The major objective of this publication is to help the farmer as a decision support input to plan out various agricultural practices in an integrated manner in the context of climate variability.

I congratulate Prof. A. A. Shaikh and Prof. T. S. Bhondave, Associate Professors of Agronomy, College of Agriculture, Pune and the Watershed Organisation Trust, (WOTR) for bringing out this publication on “Crop Weather Calendars”. These calendars combine integrated nutrient management, weed management, water management and pests and disease management schedules for different important field crops which helps the farming community to face the challenges of climate change in Akole region of Ahmednagar district (M. S.). I am sure this effort will be beneficial for resource managers and planners for input management. It will also be helpful for breeding and selection of suitable genotypes of various dry land crops which suit location specific conditions.

I appreciate the efforts put in by authors to deal with the subject in a simple language, especially the relationship between weather parameters, agronomic practices, pests and disease incidence and in bringing out advisories in this bulletin-like publication.

Dr. R.S.Patil
Director of Research,
MPKV, Rahuri
1 July 2015
INTRODUCTION

Agriculture in India is highly vulnerable to climate change especially in rain-dependent regions which constitute over 60% of India’s cultivated area.

Maharashtra, India’s second largest state on the western seaboard, is particularly vulnerable with 83% of its cultivated area directly dependent upon the monsoons for agricultural production. Changing weather patterns - early or late onset and withdrawal dates of monsoons, unseasonal dry and wet spells, erratic rainfall, extreme temperature fluctuations and unexpected events like hailstones, cloud bursts and storms - increase risks to crops, livestock and livelihoods thus making the farmer vulnerable to losses and damages. Unfamiliar weather patterns and shifts in local weather dynamics are increasingly leaving farmers at a loss as to how to cope. Their traditional knowledge and experience, honed over millennia, needs to be complemented by advance information of likely weather occurrences and science-based advisories as to what measures they need to undertake to protect their crops and livestock while increasing productivity. These advisories, however, must be crop and locale-specific as agriculture is highly dependent on local meteorological, hydrological, soil and landscape conditions. Farmers must be provided crop advisories specific to their crop stage based on local weather conditions.

This publication is a step forward in this direction. Its target group is the farmers growing paddy (Early, Midlate and Late), Finger Millet and Summer Groundnut in the Akole region of the Ahmednagar District. Its purpose is to provide information and advisories regarding various management practices that the farmer would need to undertake under different weather conditions that may arise locally. Adopting these recommended practices and interventions would help farmers cope with unexpected and different weather events, reduce risks and losses and build their resilience to nature’s vagaries.

The Watershed Organisation Trust (WOTR) has been working in the Akole Block since the last 22 years, organizing communities to regenerate the watersheds they live in and adopt sustainable agricultural practices. As part of its Climate Change Adaptation project being implemented in 12 villages of this block, WOTR, in collaboration with the Central Research Institute for Dry land Agriculture (CRIDA), the Mahatma Phule Krishi Vidyapeeth (MVK) and the India Meteorological Department (IMD) has undertaken this effort to develop weather-related contingency and adaptive strategies for 3 key food crops (Paddy, Finger Millet and Groundnut) that farmers cultivate in the Akole Block of Ahmednagar District.
Agro-Climatology of Akole Block

The Maharashtra state is divided into nine broad Agro-Climatic Zones. Akole block comes under Transition Zone II. The rainfall in transition zone II ranges from 700 to 1200 mm. This zone is predominantly a kharif tract suitable for single rained crop. Principal crops grown in kharif and rabi season are paddy, pearl millet, groundnut, wheat, gram & finger millet. (http://mahaagri.gov.in/CropWeather/AgroClimaticZone.html#ts2). Soils of the Akole block are classified as Shallow (up to 30 cm), Medium (30-60 cm) and Deep soils (60-90 cm).

Agro-Climatic Zones of Maharashtra with specific reference to Akole Block of Ahmednagar District

Rainfall | Normal Rainfall
---|---
SW Monsoon (June-Sept) | 807.7
NW Monsoon (Oct-Dec) | 112.8
Winter (Jan-Feb) | 4.7
Summer (Mar-May) | 19.5
Annual (Total) | 944.7
Weekly climatic normals (30 years data analysis) of weather parameters \textit{i.e.} rainfall (mm), maximum and minimum temperatures (°C), relative humidity (%), bright sunshine hours and wind speed (km/hr) of Akole, Maharashtra, are presented diagrammatically below:

**Maximum, Minimum and Mean Temperature (°C)**

**Maximum, Minimum and Mean Relative Humidity (%)**
Bright Sunshine (BSS) Hours and Wind Speed (Km/hr)

Rainfall (mm)

Source: IMD (gridded data for rainfall and temperature), Zonal Agricultural Research Station, Igatpuri (data for relative humidity, BSS and wind speed)
Methodology and Classifications Used

For preparing this weather-based crop weather management compendium, thirty years weather data of Akole Block has been studied for all major weather-related aberrations including extreme events viz., droughts, high temperature, low temperature, high intensity rainfall, frost and hailstorms, together with major cropping systems. Moreover, data on soil profile, land use systems and irrigation sources has been used to develop coping strategies for different meteorological occurrences such as untimely rains, dry spells, low and high relative humidity, unseasonal temperatures, etc. However, since Akole block is largely subjected to periodic dry spells, irregular and deficient rainfall, we have focused our advisories primarily on addressing this risk.

Weather Scenarios:
We have considered the following 8 likely weather scenarios that may occur during the season which would affect the growth and development of Paddy, summer Groundnut and Finger millet.

(i) Normal weather condition: This weather is what is generally experienced as a long term trend. We consider here the climatic normals of rainfall, temperature (minimum and maximum), relative humidity, (low and high), cloud cover and wind speed defined on a Standard Meteorological Week basis.

(ii) Rainfall received >15 mm in one or two consecutive days

(iii) Rainfall received >30 mm in one or two consecutive days

(iv) Sufficient rainfall followed by clear sky and high RH

(v) Light rainfall, intermediate cloudy sky/moderate humidity

(vi) No rains, cloudy sky, low RH

(vii) No rains, cloudy sky, high RH

(viii) No rainfall, hot and dry winds during day time

Nature of Recommendations:
Recommendations made are based on the growth stage of the crop as well as the likely weather patterns (including the "normal" weather) that may be experienced during the course of a Standard Meteorological Week (SMW) covering the entire life-cycle of the crop - from sowing to harvesting. Emphasis is given to integrated practices and interventions that promote soil health, are environmentally friendly, build upon effective traditional knowledge, are low cost and use locally available material and inputs, as far as possible. An Integrated System of Crop Intensification (SCI) that includes management practices and the use of biological, organic and chemical/inorganic formulations (the latter only when needed) has been developed with a view to increasing productivity sustainably and controlling pests and diseases. Moreover, since the growth and productivity of paddy (and other crops) critically depend on moisture availability, appropriate cultivars and plant population, emphasis has been given to in-situ moisture conservation, soil type specific varietal selection, crop geometry and integrated management practices.

The Appendix at the end of this publication gives instructions on preparation of organic and plant based formulations from locally available material for enhancing plant growth, soil health and controlling pest and diseases - Amritpani, Jeevamrit, Dashpurni ark and Neem ark (NSKE).

Recommendations are also made based on when the crops are sown ("Period of Sowing"), which is particularly important in the case of Paddy.

Pest and Disease Management: Details about control measures at various stages of crop growth are furnished in Annexure I (Pests) and Annexure II (Diseases) after each crop discussed.

The purpose of this publication is to address the challenges posed by climate change to farmers in rainfed regions of India. It is our hope that the various weather scenarios described and the related crop management advisories provided will help the dryland farmer anticipate, plan for and undertake the necessary operations that will minimize her/his crop losses and increase productivity.
Weather-Based Management of Paddy (*Oryza sativa* L.) Cultivation

1. **Introduction**

Paddy is the most important and extensively grown food crop in the world. It is the staple food of more than 60% of the world’s population. India is the second largest producer and consumer of rice in the world. About 90% of all paddy grown in the world is produced and consumed in the Asian region. Rice is primarily a high energy calorie food. The major part of rice consists of carbohydrate in the form of starch, which is about 72-75% of the total grain composition. The protein content of rice is usually 6 to 7%. The protein of rice contains glutelin which is also known as oryzalin. The nutritive value of rice protein (biological value = 80) is much higher than that of wheat (biological value = 60) and maize (biological value = 50) or other cereals. Rice contains about 4% phosphorus and most of the minerals are mainly located in the pericarp and germ.

Rice is a crop of tropical climate. However, it is also grown successfully in humid to sub-humid regions under subtropical and temperate climate. Rice is cultivated in almost all types of soils with varying productivity. Under high temperature, high humidity with sufficient rainfall and irrigation facilities, rice can be grown in any type of soil. The major soil groups where rice is grown are riverine alluvium, red-yellow, red loamy, hill and submontane, terai, laterite, coastal alluvium, red sandy, mixed red, black, medium and shallow black soils. Rice being a tropical and sub-tropical plant requires a fairly high temperature, ranging from 20° to 40°C. The optimum temperature of 30°C during day time and 20°C during night time seems to be most favorable for the growth and development of the crop.

Rainfall has direct impact on deciding the crop ecosystem. Paddy requires abundant rainfall, ranging from 150 cm to 200 cm. Paddy withstands water logged conditions. It is grown as lowland crop with standing water as well as upland crop under rainfed conditions. Paddy requires a rainfall of 125 cm during vegetative stage. Relative humidity (RH) directly influences the water relations of the plant and indirectly affects leaf growth, photosynthesis, pollination, occurrence of diseases and finally, economic yield. The incidence of insect pests and diseases is high under high humidity conditions. High RH favours easy germination of fungal spores on plant leaves. Majority of pest and diseases are commonly seen during rainy season while aphids, thrips, scales, mealy bugs and mites are relatively more severe during summer. Blast disease of rice is common in winter season. The incidence of gall midge is common during kharif as compared to rabi due to high RH requirement of the pest particularly in the early growth stages. Moderate rainfall, relative humidity of around 80% and a wide range of atmospheric temperature of between 20-33°C appear to be highly conducive to the Brown Plant Hopper.

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1 - This section has been taken and adapted from: http://agmarknet.nic.in/rice-paddy-profile_copy.pdf and Dr. C. Singh, P. Singh and R. Singh (2010), Modern Techniques of Present Field Crops, Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi
2 Phenological Growth Stages of Paddy

Since crop management recommendations depend crucially upon the phenological growth stage of a crop, we give below an overview of the different growth stages of Paddy and actions to be respectively undertaken.

Main field Preparation:
Deep plough the field once or twice (20-25 cm deep) with a soil turning (mould board) plough. Deep ploughing helps in eradication of weeds and improves the water holding capacity of the soil. It also exposes the eggs of harmful insects and pests to hot sun. Prepare bunds around the field to check loss of rain water by runoff. Keep the field flooded or saturated with water for about 15 days. This will help in decomposition of the chaff and straw of previous crops. Begin puddling two weeks ahead of transplanting, after erecting a 30 cm tall earthen bund around the field. Different types of bullock and tractor drawn puddlers can be used. Puddling helps to bury and destroy weeds. Puddle the field in standing water with 3-4 runs, and even out the soil surface. At the time of puddling mix leaves of neem, custard apple, pongamia, sesban, glyricidia, etc., on the field bunds to get adequate leaf litter for soil nutrition. Trees also attract birds that control insect pests.

Stage 1: Nursery preparation
For raising seedlings in the nursery, select a fertile, well-drained, upland field near the source of irrigation. For transplanting of 1 ha area, about 500 sq. m. nursery area is sufficient. In case of late sowing, increase the nursery area to 750-1,000 sq. m. Do not burn dry dung or leaf litter for nursery bed preparation. This is a common practice which needs to be halted.

Stage 2: Transplanting of seedlings
When seedlings are at 3-4 leaf stage and about 15-20 cm tall, they are ready for transplanting. Maintain 5-10 cm water level for two days prior to uprooting of seedlings. The optimum age of seedlings for transplantation is 3-4 weeks for short duration varieties; 4-5 weeks for medium; and 5-6 weeks for long duration varieties. Transplanting older or bigger seedlings causes poor tillering and early flowering, resulting in lower yield. Transplant 2 seedlings per hill, at 25 x 25cm distance, under normal conditions. Seedlings of 45 days need to be transplanted with 5-6 seedlings per hill. In each case, transplant seedlings at 2-3 cm depth. Do not plant seedlings deeper than 2-3 cm, as deeper planting delays and inhibits tillering.

Stage 3: Primary tillers development
This stage extends from the appearance of the first tiller until the maximum tiller number is reached. Tillers emerge from the auxiliary buds of the nodes and displace the leaf as they grow and develop. This seedling shows the position of the two primary tillers with respect to the main culm and its leaves.

Stage 4: Secondary tillers development
After emerging, the primary tillers give rise to secondary tillers. This occurs about 30 days after transplanting. The plant is now increasing in length and tillering very actively.

Stage 5: Active vegetative stage
Besides numerous primary and secondary tillers, new tertiary tillers arise from the secondary tillers as the plant grows longer and larger. By this stage, the tillers have multiplied to the point that it is difficult to pick out the main stem. Tillers continuously develop as the plant enters the next stage which is stem elongation.

Stage 6: Stem elongation and flag leaf stage
This stage may begin before panicle initiation or it may occur during the latter part of the tillering stage. The tillers continue to increase in number and height, with no appreciable senescence of leaves noticeable. Ground cover and canopy formation by the growing plants have advanced. Growth duration is significantly related to stem elongation. Stem elongation is more in varieties with longer growth duration. In this respect, rice varieties can be categorized into two groups: the short-duration varieties which mature in 105-120 days and the long-duration varieties which mature in 150 days.

Stage 7: Booting/Panicle emergence
The initiation of the panicle primordium at the tip of the growing shoot marks the start of the reproductive phase. The panicle primordium becomes visible to the naked eye about 10 days after initiation. At this stage, 3 leaves will still emerge before the panicle finally emerges. In short-duration varieties, the panicle becomes visible as a white feathery cone, 1.0-1.5 mm long. It occurs first in the main culm and then in tillers where it emerges in uneven pattern. It can be seen by dissecting the stem. As the panicle continues to develop, the spikelets become distinguishable. The young panicle increases in size and its upward extension inside the flag leaf sheath causes the leaf sheath to bulge. This bulging of the flag leaf sheath is called booting. Booting is most likely to occur first in the main culm. At booting, senescence (aging and dying) of leaves and nonbearing tillers are noticeable at the base of the plant.

Stage 8: Heading
It's also known as panicle exertion stage. Heading is marked by the emergence of the panicle tip from the flag leaf sheath. The panicle continues to emerge until it partially or completely protrudes from the sheath.

Stage 9: Flowering
It begins when anthers protrude from the spikelet and then fertilization takes place. At flowering, the florets open, the anthers protrude from the flower glumes because of stamen elongation, and the pollen is shed. The florets then close. The pollen falls on the pistil, thereby fertilizing the egg. The pistil is the feathery structure through which the pollen tube of the germinating pollen (round, dark structures in this illustration) will extend into the ovary.
Flowering occurs a day after heading. Generally, the florets open in the morning. It takes about 7 days for all spikelets in a panicle to open. At flowering, 3-5 leaves are still active. The tillers of this rice plant have been separated at the start of flowering and grouped into bearing and nonbearing tillers.
Stage 10: Milk grain stage
In this stage, the grain has begun to fill with a milky material. The grain starts to fill with a white, milky liquid, which can be squeezed out by pressing the grain between the fingers.

Stage 11: Dough grain stage
During this stage, the milky portion of the grain first turns into soft dough and later into hard dough. The grains in the panicle begin to change from green to yellow. Senescence of tillers and leaves is noticeable. The field starts to look yellowish. As the panicle turns yellow, the last two remaining leaves of each tiller begin to dry at the tips.

Stage 12: Mature grain stage
The individual grain is mature, fully developed, hard, and has turned yellow. The upper leaves are now drying rapidly although the leaves of some varieties remain green. A considerable amount of dead leaves accumulate at the base of the plant.

Stage 13: Harvesting
The whole grain is hard and ready for harvest. This stage is reached at approximately 20 to 22% moisture in the grain.
3 Period of Sowing

The normal sowing period of paddy in Akole Taluka is from 4th-10th June (23rd SMW). During this period, early, mid-late and late maturity varieties may be sown. For late sowing of crops during the period 25th June to 1st July (26th SMW), early or mid-late maturing varieties should be used. Recommendations are provided for normal and late sown Paddy for Akole Block of Ahmednagar District. The Tables 1-3 below indicate the various varieties (including indigenous varieties) that are suitable for the Akole Block, together with growth period and expected yield.

**Table 1: Early maturing varieties of Paddy**

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Variety</th>
<th>Days to maturity</th>
<th>Yield (q/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Terna</td>
<td>100-110</td>
<td>20-25</td>
</tr>
<tr>
<td>2</td>
<td>Daptari-9</td>
<td>100-100</td>
<td>40-42</td>
</tr>
<tr>
<td>3</td>
<td>Poonam</td>
<td>90-100</td>
<td>38-40</td>
</tr>
<tr>
<td>4</td>
<td>Suhasini</td>
<td>90-100</td>
<td>38-40</td>
</tr>
<tr>
<td>5</td>
<td>Varangal</td>
<td>90-100</td>
<td>23-25</td>
</tr>
<tr>
<td>6</td>
<td>Laxmi</td>
<td>100-110</td>
<td>40-45</td>
</tr>
<tr>
<td>7</td>
<td>Dhavul</td>
<td>90-100</td>
<td>20-25</td>
</tr>
<tr>
<td>8</td>
<td>Tamkud</td>
<td>100-110</td>
<td>18-20</td>
</tr>
<tr>
<td>9</td>
<td>Kolapi</td>
<td>90-100</td>
<td>17-20</td>
</tr>
<tr>
<td>10</td>
<td>Ratna</td>
<td>115-120</td>
<td>40-45</td>
</tr>
</tbody>
</table>

**Table 2: Mid-late maturing varieties of Paddy**

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Variety</th>
<th>Days to maturity</th>
<th>Yield (q/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jaya</td>
<td>125-130</td>
<td>45-50</td>
</tr>
<tr>
<td>2</td>
<td>Phule Maval</td>
<td>125-130</td>
<td>45-50</td>
</tr>
<tr>
<td>3</td>
<td>Vaishnavi</td>
<td>110-120</td>
<td>40-45</td>
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<tr>
<td>4</td>
<td>Phule Samrudhhi</td>
<td>125-130</td>
<td>45-50</td>
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<tr>
<td>5</td>
<td>Phule RG-N-6</td>
<td>125-130</td>
<td>45-50</td>
</tr>
<tr>
<td>6</td>
<td>Kalbhat</td>
<td>115-120</td>
<td>13-15</td>
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<tr>
<td>7</td>
<td>Raibhog</td>
<td>120-125</td>
<td>25-30</td>
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<tr>
<td>8</td>
<td>Pusa Basmati</td>
<td>125-130</td>
<td>40-45</td>
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<tr>
<td>9</td>
<td>Ambemohar</td>
<td>120-130</td>
<td>30-35</td>
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**Table 3: Late maturing varieties of Paddy**

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Variety</th>
<th>Days to maturity</th>
<th>Yield (q/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Suvarna</td>
<td>140-145</td>
<td>40-45</td>
</tr>
<tr>
<td>2</td>
<td>Indrayani</td>
<td>135-140</td>
<td>40-45</td>
</tr>
<tr>
<td>3</td>
<td>Rupali</td>
<td>130-140</td>
<td>40-45</td>
</tr>
</tbody>
</table>

4 Pest and Disease Management

Details about control measures at various stages of crop growth are furnished in Annexure I (Pests) and Annexure II (Diseases). Remedial actions may be initiated accordingly.
5 General points to be kept in mind

- Apply FYM/compost @ 10 t/ha before the last harrowing.
- If irrigation facilities are available, grow green manuring crops like Dhanicha, Sun Hemp and before flowering (at 45 DAS) bury them in the same field in order to improve soil fertility.
- Incorporate Glyricidia green leaf @ 3.0 t/ha at the time of puddling to improve soil fertility.
- 5 R area for SRI method and 10 R area for traditional method are sufficient for nursery preparation of seedling for transplanting in a field of one ha.
- Apply recommended dose of fertilizer, 100:50:50 NPK kg/ha.
- Apply nitrogen in three split doses to increase nitrogen use efficiency and yield.
- In case of SRI method apply 170 kg urea-DAP Briquette/ha at the time of transplanting.
- Grow 1/10 area of Basmati variety of rice at one side of field as a trap crop for Yellow Stem Borer.
- Remove weeds from bunds because weeds are an alternate host for pests and diseases.
# Weather-Specific Crop Advisories for Normal and Late Sown Paddy

## Standard Meteorological Week Number: 23 (4 June to 10 June)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAS (23°)</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hz)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>0</td>
<td>4 June to 10 June</td>
<td>34.4</td>
<td>24.8</td>
<td>80</td>
<td>60</td>
<td>5.6</td>
<td>7.0</td>
<td>34.4</td>
</tr>
</tbody>
</table>

### Anticipated weather likely to be observed

| Normal weather condition                     |
| Rainfall received >15 mm in one or two consecutive days |
| Rainfall received >30 mm in one or two consecutive days |
| Sufficient rainfall followed by clear sky and high RH (>75%) |
| Light rainfall, intermediate cloudy sky/ moderate humidity |
| No rains, cloudy sky, low RH                  |
| No rains, cloudy sky, high RH (>75%)          |
| No rainfall, hot and dry winds during day time |

### Crop Stage

| Nursery/ Seedling |
| (23 SMW sown crop) |

### Recommendations based on likely effects of anticipated weather changes

- Prepare nursery beds
- Apply-1. FYM/Compost @ 100 kg/R of nursery bed
- 2. Urea @ 1 kg + 3 kg SSP/R before sowing of seed in the nursery bed
- Seed treatment with 3% brine solution
- Seed treatment with Thiram / Captan @ 2.5-3 g/kg of seed
- Seed treatment with Azotobacter culture @ 25 g/kg of seed
- Seed treatment with *Pseudomonas fluorescens* taic @ 10g/kg of seeds
- Sowing of seeds @ 5 kg/ha in SRI method and 40 kg/ha for other methods

- Prepare nursery beds
- Do not sow seed in the nursery

## Standard Meteorological Week Number: 24 and 25 (11 June to 24 June)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAS (23°)</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hz)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>1</td>
<td>11 June to 17 June</td>
<td>32.8</td>
<td>24.3</td>
<td>86</td>
<td>71</td>
<td>4.4</td>
<td>8.6</td>
<td>37.9</td>
</tr>
<tr>
<td>25</td>
<td>2</td>
<td>18 June to 24 June</td>
<td>31.2</td>
<td>24.1</td>
<td>92</td>
<td>84</td>
<td>2.3</td>
<td>10.8</td>
<td>34.9</td>
</tr>
</tbody>
</table>

### Anticipated weather likely to be observed

| Normal weather condition                     |
| Rainfall received >15 mm in one or two consecutive days |
| Rainfall received >30 mm in one or two consecutive days |
| Sufficient rainfall followed by clear sky and high RH (>75%) |

### Crop Stage

| Seedling |
| (23 SMW sown crop) |

### Recommendations based on likely effects of anticipated weather changes

- Monitor the crop for incidence of Yellow Stem Borer, Gall Midge fly, Mealy Bug, Blast and Bacterial Blight
- Apply urea @ 1 kg/R after 15 DAS to nursery bed
- Apply *Jeevamrit* @ 200 lit/40 R nursery beds
- Weeding should be done to remove weeds because weeds are alternate host for the pest
- Avoid continuous water stagnation which reduces the microbial activities in soil

- Apply urea @ 1 kg/R after 15 DAS to nursery bed
Light rainfall, intermediate cloudy sky/ moderate humidity

No rains, cloudy sky, low RH

No rains, cloudy sky, high RH (>75%)

No rainfall, hot and dry winds during day time

- Apply Jeevamrit @ 200 lit/40 R nursery beds
- Weeding should be done to remove weeds because weeds are alternate host for the pest
- Monitor pest as indicated above

Details about control measures at various stages of crop growth are furnished in Annexure I (Pest) and Annexure II (Diseases). Control measures may be initiated accordingly

<table>
<thead>
<tr>
<th>Standard Meteorological Week Number: 26 (25 June to 1 July)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SMW no.</strong></td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>26</td>
</tr>
</tbody>
</table>

**Anticipated weather likely to be observed**

- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH (>75%)
- Light rainfall, intermediate cloudy sky/ moderate humidity
- No rains, cloudy sky, low RH
- No rains, cloudy sky, high RH (>75%)
- No rainfall, hot and dry winds during day time

**Crop Stage**

- Transplanting of seedlings and establishment in the field
  - (23 SMW sown crop)
- Nursery/ Seedling
  - (26 SMW sown crop)

**Recommendations based on likely effects of anticipated weather changes**

- Land preparation for transplanting of paddy seedlings
- Puddling operation should be carried out in order to obtain muddy soil condition
- Apply Phorate 10 G @ 3 kg/ha around the field bunds for control of crabs
- Uproot the paddy seedlings and clip off the leaf tips of seedlings to avoid any lodging due to winds
- Transplanting should be done in straight direction
- Transplant seedlings at spacing of 25 x 25 cm² in SRI
- Use 2 seedlings/hill
- Deep placement of urea-DAP briquettes @ 170 kg/ha in the middle of the square of four plants OR Apply 40% dose of N and full dose of P and K at the time of transplanting, i.e. 40:50:50 NPK kg/ha
- Monitor the field for proper establishment of the seedlings
- Puddling and transplanting of seedling should be avoided

- Nursery bed preparation, fertilizer management and seed treatments are same as 23 SMW sown crop
- Select early and mid-late mature type of variety
- Sowing of seeds @ 7 kg/ha in SRI method and 60 kg/ha other methods
- Recommendation same as 23 SMW sown crop
### Standard Meteorological Week Number: 27 and 28 (2 July to 15 July)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAT (23°)</th>
<th>WAS (26°)</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>1</td>
<td>1</td>
<td>2 July to 8 July</td>
<td>29.8</td>
<td>23.7</td>
<td>96</td>
<td>91</td>
<td>0.6</td>
<td>10.6</td>
<td>70.3</td>
</tr>
<tr>
<td>28</td>
<td>2</td>
<td>2</td>
<td>9 July to 15 July</td>
<td>29.6</td>
<td>23.7</td>
<td>97</td>
<td>92</td>
<td>0.4</td>
<td>10.0</td>
<td>48.3</td>
</tr>
</tbody>
</table>

### Anticipated weather likely to be observed

- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH (>75%)
- Light rainfall, intermediate cloudy sky/ moderate humidity
- No rains, cloudy sky, low RH
- No rains, cloudy sky, high RH (>75%)
- No rainfall, hot and dry winds during day time

### Crop Stage

#### Vegetative growth/primary tillers development

- (23 SMW sown crop)

#### Recommendations based on likely effects of anticipated weather changes

- Gap filling should be done so as to maintain optimum plant population (16 plants/m²)
- Avoid continuous water stagnation in field
- Setup light traps @ 5/ha
- Weeding should be done during dry period by cycle/rotary weeder at 15 DAT. It saves labor, increases soil aeration and activity of root zone
- Monitor the crop for incidence of Yellow Stem Borer, Gall Midge fly, Brown Plant Hoppers, Case Worm, Swarming Caterpillar and Cut Worm, Mealy Bug, Leaf Folder, Blast, Bacterial blight, Sheath Rot and Sheath Blight
- Observe field for primary tiller establishment
- Weeding should be done by cycle/rotary weeder at 15 DAT to reduce the evaporation losses from soil
- Monitor pest and diseases as indicated above
- Spray *Amritpani* @ 150 ml/15 l of water to increase growth and pest control
- Strengthen the bunds around the field so as to conserve rain water in field

#### Seedling

- (26 SMW sown crop)

#### Recommendations same as 23 SMW sown crop

#### Recommendations same as 23 SMW sown crop

#### Recommendations same as 23 SMW sown crop
### Standard Meteorological Week Number: 29 and 30 (16 July to 29 July)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAT (23rd)</th>
<th>WAT (26th)</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>3</td>
<td>0</td>
<td>16 July to 22 July</td>
<td>29.1</td>
<td>23.5</td>
<td>96</td>
<td>92</td>
<td>0.6</td>
<td>8.8</td>
<td>46.3</td>
</tr>
<tr>
<td>30</td>
<td>4</td>
<td>1</td>
<td>23 July to 29 July</td>
<td>29.0</td>
<td>23.3</td>
<td>96</td>
<td>93</td>
<td>1.0</td>
<td>9.3</td>
<td>77.9</td>
</tr>
</tbody>
</table>

### Anticipated weather likely to be observed

- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH (>75%)
- Light rainfall, intermediate cloudy sky/ moderate humidity
- No rains, cloudy sky, low RH
- No rains, cloudy sky, high RH (>75%)
- No rainfall, hot and dry winds during day time

### Crop Stage

- Secondary tiller development
  - **(23 SMW sown crop)**

### Recommendations based on likely effects of anticipated weather changes

- **Avoid continuous water stagnation**
- **Top dressing of 40 kg N/ha (87 kg urea) at vapsa condition, early in the morning or late in the evening to reduce volatilization losses, if urea DAP briquette not used**
- **Monitor the crop for incidence of Yellow Stem Borer, Gall Midge fly, Brown Plant Hoppers, Case Worm, Swarming Caterpillar and Cut Worm, Green Leaf Hopper, Blast and Bacterial blight**
- **Weeding must be done by cycle/rotary weeder**
- **Apply nitrogen as above**
- **Monitor for pest and diseases as indicated above**
- **Keep the field free from weeds**
- **Spray Amritpani @ 150 ml/15 ltr of water to increase growth and pest control**
- **Monitor pest and diseases as indicated above**

### Transplanting of seedlings and establishment in the field

- **(26 SMW sown crop)**

### Recommendations

- **Same as 23 SMW sown crop except put 3 seedlings/hill**
- **Apply half dose of N (50 kg/ha) and full dose of P (50 kg/ha) and K (50 kg/ha) at the time of transplanting for non SCI methods**

- **Same as 23 SMW sown crop**

*Transplanting of 26 SMW sown crop should be done at 29 SMW*
Standard Meteorological Week Number: 31 (30 July to 5 August)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAT (23°)</th>
<th>WAT (26°)</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td>5</td>
<td>2</td>
<td>30 July to 5 Aug</td>
<td>28.7</td>
<td>23.4</td>
<td>98</td>
<td>94</td>
<td>0.6</td>
<td>8.7</td>
<td>63.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anticipated weather likely to be observed</th>
<th>Crop Stage</th>
<th>Recommendations based on likely effects of anticipated weather changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal weather condition</td>
<td>Active vegetative stage</td>
<td>• Hand weeding should be done to keep weed free plot</td>
</tr>
<tr>
<td>Rainfall received &gt;15 mm in one or two consecutive days</td>
<td>(23 SMW sown crop)</td>
<td>• Apply Jeevanrit @ 200 lit/acre to increase soil microbial activities and improve soil fertility</td>
</tr>
<tr>
<td>Rainfall received &gt;30 mm in one or two consecutive days</td>
<td></td>
<td>• Monitor the crop for incidence of Yellow Stem borer, Gall Midge fly, Brown Plant Hoppers, Green Leaf Hopper, Case Worm, Swarming Caterpillar, Cut Worm, Leaf Folder, Blast, Bacterial Blight and Stem Rot</td>
</tr>
<tr>
<td>Sufficient rainfall followed by clear sky and high RH (&gt;75%)</td>
<td></td>
<td>• Hand weeding should be done to keep weed free plot</td>
</tr>
<tr>
<td>Light rainfall, intermediate cloudy sky/ moderate humidity</td>
<td></td>
<td>• Strengthen the bunds around the field so as to conserve rain water in field</td>
</tr>
<tr>
<td>No rains, cloudy sky, low RH</td>
<td></td>
<td>• Spray Amritpani @ 150 ml/15 llt of water to increase growth and pest control</td>
</tr>
<tr>
<td>No rains, cloudy sky, high RH (&gt;75%)</td>
<td></td>
<td>• Monitor pest and diseases as indicated above</td>
</tr>
<tr>
<td>No rainfall, hot and dry winds during day time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal weather condition</td>
<td>Vegetative growth/ primary tillers development</td>
<td>• Same as 23 SMW sown crop</td>
</tr>
<tr>
<td>Rainfall received &gt;15 mm in one or two consecutive days</td>
<td>(26 SMW sown crop)</td>
<td></td>
</tr>
<tr>
<td>Rainfall received &gt;30 mm in one or two consecutive days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sufficient rainfall followed by clear sky and high RH (&gt;75%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light rainfall, intermediate cloudy sky/ moderate humidity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No rains, cloudy sky, low RH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No rains, cloudy sky, high RH (&gt;75%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No rainfall, hot and dry winds during day time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Vegetative growth/primary tillers development of 26 SMW sown crop begins from 30 SMW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SMW no.</td>
<td>WAT (23&quot;)</td>
<td>WAT (26&quot;)</td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>32</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anticipated weather likely to be observed</th>
<th>Crop Stage</th>
<th>Recommendations based on likely effects of anticipated weather changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal weather condition</td>
<td>Stem elongation and flag leaf stage (23 SMW sown crop)</td>
<td>• Drain out excess water from field</td>
</tr>
<tr>
<td>Rainfall received &gt;15 mm in one or two consecutive days</td>
<td></td>
<td>• Monitor the crop for incidence of Yellow Stem Borer, Brown Plant Hoppers, Leaf Folder, Blast, Bacterial Blight and Udbatta</td>
</tr>
<tr>
<td>Rainfall received &gt;30 mm in one or two consecutive days</td>
<td></td>
<td>• Hand weeding should be done to keep weed free plot</td>
</tr>
<tr>
<td>Sufficient rainfall followed by clear sky and high RH (&gt;75%)</td>
<td></td>
<td>• Monitor pests and diseases as indicated above</td>
</tr>
<tr>
<td>Light rainfall, intermediate cloudy sky/ moderate humidity</td>
<td></td>
<td>• Pull out and destroy the affected tillers of stem borer</td>
</tr>
<tr>
<td>No rains, cloudy sky, low RH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No rains, cloudy sky, high RH (&gt;75%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No rainfall, hot and dry winds during day time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal weather condition</td>
<td>*Secondary tiller development (26 SMW sown crop)</td>
<td>• Recommendations same as 23 SMW sown crop except fertilizer application</td>
</tr>
<tr>
<td>Rainfall received &gt;15 mm in one or two consecutive days</td>
<td></td>
<td>• Apply top dressing of half dose of N (50 kg/ha) at dry period early in the morning or late in the evening to avoid volatilization losses</td>
</tr>
<tr>
<td>Rainfall received &gt;30 mm in one or two consecutive days</td>
<td></td>
<td>• Recommendations same as 26 SMW sown crop</td>
</tr>
<tr>
<td>Sufficient rainfall followed by clear sky and high RH (&gt;75%)</td>
<td></td>
<td>• Top dressing of half dose of N (50 kg/ha), if sufficient moisture is available</td>
</tr>
<tr>
<td>Light rainfall, intermediate cloudy sky/ moderate humidity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No rains, cloudy sky, low RH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No rains, cloudy sky, high RH (&gt;75%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No rainfall, hot and dry winds during day time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Secondary tiller development stage of (26 SMW sown crop) continues up to 33 SMW</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Standard Meteorological Week Number: 33 and 34 (13 August to 26 August)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAT (23°)</th>
<th>WAT (26°)</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>7</td>
<td>4</td>
<td>13 Aug to 19 Aug</td>
<td>28.5</td>
<td>23.9</td>
<td>97</td>
<td>93</td>
<td>0.4</td>
<td>8.3</td>
<td>44.6</td>
</tr>
<tr>
<td>34</td>
<td>8</td>
<td>5</td>
<td>20 Aug to 26 Aug</td>
<td>28.9</td>
<td>24.1</td>
<td>96</td>
<td>90</td>
<td>0.6</td>
<td>6.6</td>
<td>44.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anticipated weather likely to be observed</th>
<th>Crop Stage</th>
<th>Recommendations based on likely effects of anticipated weather changes</th>
</tr>
</thead>
</table>
| Normal weather condition                | Booting/ Panicle initiation/ Heading  (23 SMW sown crop) | • Drain out excess water from field  
• Apply *Jeevanmit* @ 200 lit/acre to increase soil microbial activities and fertility of soil  
• Monitor the crop for incidence of *Yellow Stem Borer, Brown Plant Hoppers, Leaf Folder, Blast, Bacterial Blight and Udbatta* |
| Rainfall received >15 mm in one or two consecutive days |  | • *Spray Amritpani* @ 150 ml/15 lit of water to increase growth and pest control  
• Monitor pest and diseases as indicated above |
| Rainfall received >30 mm in one or two consecutive days |  | • Monitor pest and diseases as indicated above |
| Sufficient rainfall followed by clear sky and high RH (>75%) |  |  |
| Light rainfall, intermediate cloudy sky/ moderate humidity |  |  |
| No rains, cloudy sky, low RH |  |  |
| No rains, cloudy sky, high RH (>75%) |  |  |
| No rainfall, hot and dry winds during day time |  |  |
| Normal weather condition | *Active vegetative stage*  (26 SMW sown crop) | • Recommendations same as 23 SMW sown crop |
| Rainfall received >15 mm in one or two consecutive days |  |  |
| Rainfall received >30 mm in one or two consecutive days |  |  |
| Sufficient rainfall followed by clear sky and high RH (>75%) |  |  |
| Light rainfall, intermediate cloudy sky/ moderate humidity |  |  |
| No rains, cloudy sky, low RH |  |  |
| No rains, cloudy sky, high RH (>75%) |  |  |
| No rainfall, hot and dry winds during day time |  |  |

*Secondary tiller development stage of (26 SMW sown crop) continues up to 33 SMW*
### Standard Meteorological Week Number: 35 (27 August to 2 September)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAT (23°)</th>
<th>WAT (26°)</th>
<th>Period</th>
<th>T max (°c)</th>
<th>T max (°c)</th>
<th>T min (°c)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>9</td>
<td>6</td>
<td>27 Aug to 2 Sep</td>
<td>29.0</td>
<td>29.0</td>
<td>26.9</td>
<td>96</td>
<td>91</td>
<td>0.9</td>
<td>6.6</td>
<td>24.9</td>
</tr>
</tbody>
</table>

### Anticipated weather likely to be observed

<table>
<thead>
<tr>
<th>Condition</th>
<th>Flowering (23 SMW sown crop)</th>
<th>Recommendations based on likely effects of anticipated weather changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal weather condition</td>
<td>• Top dressing of 20 kg N/ha (43 kg urea) at vapsa condition, early in the morning or late in the evening to reduce volatilization losses, if urea DAP briquette not used</td>
<td></td>
</tr>
<tr>
<td>Rainfall received &gt;15 mm in one or two consecutive days</td>
<td>• Monitor the crop for incidence of Yellow Stem Borer, Brown Plant Hoppers, Gundhi bug and Udabatta</td>
<td></td>
</tr>
<tr>
<td>Rainfall received &gt;30 mm in one or two consecutive days</td>
<td>• If sufficient soil moisture is available, then apply 20 kg N/ha (43 kg urea), if urea DAP briquette not used</td>
<td></td>
</tr>
<tr>
<td>Sufficient rainfall followed by clear sky and high RH (&gt;75%)</td>
<td>• Monitor pests and diseases as indicated above</td>
<td></td>
</tr>
<tr>
<td>Light rainfall, intermediate cloudy sky/ moderate humidity</td>
<td>• If irrigation facility is available, then give protective irrigation so as to save the crop</td>
<td></td>
</tr>
<tr>
<td>No rains, cloudy sky, low RH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No rains, cloudy sky, high RH (&gt;75%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No rainfall, hot and dry winds during day time</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Crop Stage

#### Flowering (23 SMW sown crop)

- Top dressing of 20 kg N/ha (43 kg urea) at vapsa condition, early in the morning or late in the evening to reduce volatilization losses, if urea DAP briquette not used
- Monitor the crop for incidence of Yellow Stem Borer, Brown Plant Hoppers, Gundhi bug and Udabatta

#### Stem elongation and flag leaf stage (26 SMW sown crop)

- Drain out excess water from field
- Monitor pest and diseases as indicated above
- Hand weeding should be done to keep weed free plot
- Monitor pests and diseases as indicated above
- Pull out and destroy the affected tillers of stem borer
### Standard Meteorological Week Number: 36 (3 September to 9 September)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAT (23°)</th>
<th>WAT (26°)</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>10</td>
<td>7</td>
<td>3 Sep to 9 Sep</td>
<td>29.5</td>
<td>22.5</td>
<td>95</td>
<td>90</td>
<td>1.3</td>
<td>5.8</td>
<td>27.8</td>
</tr>
</tbody>
</table>

### Anticipated weather likely to be observed

| Normal weather condition | Rainfall received >15 mm in one or two consecutive days | Rainfall received >30 mm in one or two consecutive days | Sufficient rainfall followed by clear sky and high RH (>75%) | Light rainfall, intermediate cloudy sky/ moderate humidity | No rains, cloudy sky, low RH | No rains, cloudy sky, high RH (>75%) | No rainfall, hot and dry winds during day time |

### Crop Stage

| Flowering | (23 SMW sown crop) | Booting/ Panicle initiation/ Heading | (26 SMW sown crop) |

#### Recommendations based on likely effects of anticipated weather changes

- **Flowering (23 SMW sown crop)**
  - Monitor the crop for incidence of Yellow Stem Borer, Brown Plant Hoppers, Gundhi Bug, Blast, Bacterial Blight and Udbatta
  - Apply *Jeevamrit* at 200 lit/acre to increase soil microbial activities and improve soil fertility

- **Bootiong/ Panicle initiation/ Heading (26 SMW sown crop)**
  - Recommendations same as 23 SMW sown crop
  - Recommendations same as 23 SMW sown crop
  - Recommendations same as 23 SMW sown crop

*Bootiong/ Panicle initiation/Heading stage of 26 SMW sown crop is up to 37 SMW
# Standard Meteorological Week Number: 37 and 38 (10 September to 23 September)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAT (23°)</th>
<th>WAT (26°)</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>11</td>
<td>8</td>
<td>10 Sep to 16 Sep</td>
<td>30.1</td>
<td>22.7</td>
<td>94</td>
<td>86</td>
<td>2.1</td>
<td>5.8</td>
<td>42.4</td>
</tr>
<tr>
<td>38</td>
<td>12</td>
<td>9</td>
<td>17 Sep to 23 Sep</td>
<td>30.5</td>
<td>22.4</td>
<td>94</td>
<td>83</td>
<td>2.6</td>
<td>4.7</td>
<td>42.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anticipated weather likely to be observed</th>
<th>Crop Stage</th>
<th>Recommendations based on likely effects of anticipated weather changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal weather condition</td>
<td>Milk grain stage/ Dough Grain Stage (23 SMW sown crop)</td>
<td>• Monitor the crop for incidence of Gundhi Bug, Rats, Birds and False Smut</td>
</tr>
<tr>
<td>Rainfall received &gt;15 mm in one or two consecutive days</td>
<td>(23 SMW sown crop)</td>
<td>• If irrigation facility is available, then give protective irrigation to save the crop</td>
</tr>
<tr>
<td>Rainfall received &gt;30 mm in one or two consecutive days</td>
<td>(23 SMW sown crop)</td>
<td>• Recommendations same as 23 SMW sown crop</td>
</tr>
<tr>
<td>Sufficient rainfall followed by clear sky and high RH (&gt;75%)</td>
<td>(23 SMW sown crop)</td>
<td>• Recommendations same as 23 SMW sown crop</td>
</tr>
<tr>
<td>Light rainfall, intermediate cloudy sky/ moderate humidity</td>
<td>(23 SMW sown crop)</td>
<td>• Recommendations same as 23 SMW sown crop</td>
</tr>
<tr>
<td>No rains, cloudy sky, low RH</td>
<td>*Flowering (26 SMW sown crop)</td>
<td>• Recommendations same as 26 SMW sown crop</td>
</tr>
<tr>
<td>No rains, cloudy sky, high RH (&gt;75%)</td>
<td>*Flowering (26 SMW sown crop)</td>
<td>• Recommendations same as 26 SMW sown crop</td>
</tr>
<tr>
<td>No rainfall, hot and dry winds during day time</td>
<td>*Flowering (26 SMW sown crop)</td>
<td>• Recommendations same as 26 SMW sown crop</td>
</tr>
</tbody>
</table>

*Flowering stage of 26 SMW sown crop is started from 38 SMW
### Standard Meteorological Week Number: 39 (24 September to 30 September)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAT (23°)</th>
<th>WAT (26°)</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>39</td>
<td>13</td>
<td>10</td>
<td>24 Sep to 30 Sep</td>
<td>30.8</td>
<td>22.9</td>
<td>90</td>
<td>78</td>
<td>4.8</td>
<td>3.8</td>
<td>51.7</td>
</tr>
</tbody>
</table>

#### Anticipated weather likely to be observed

<table>
<thead>
<tr>
<th>Condition</th>
<th>Crop Stage</th>
<th>Recommendations based on likely effects of anticipated weather changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal weather condition</td>
<td>Milk grain stage/</td>
<td>• Monitor the crop for incidence of Gundhi Bug, Rats, Birds and False Smut</td>
</tr>
<tr>
<td>Rainfall received &gt;15 mm in one or two consecutive days</td>
<td>Dough Grain Stage</td>
<td></td>
</tr>
<tr>
<td>Rainfall received &gt;30 mm in one or two consecutive days</td>
<td>(23 SMW sown crop)</td>
<td></td>
</tr>
<tr>
<td>Sufficient rainfall followed by clear sky and high RH (&gt;75%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light rainfall, intermediate cloudy sky/ moderate humidity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No rains, cloudy sky, low RH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No rains, cloudy sky, high RH (&gt;75%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No rainfall, hot and dry winds during day time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal weather condition</td>
<td>Flowering</td>
<td>• If irrigation facility is available, then give protective irrigation to save the crop</td>
</tr>
<tr>
<td>Rainfall received &gt;15 mm in one or two consecutive days</td>
<td></td>
<td>• Monitor pest and diseases as indicated above</td>
</tr>
<tr>
<td>Rainfall received &gt;30 mm in one or two consecutive days</td>
<td>(26 SMW sown crop)</td>
<td></td>
</tr>
<tr>
<td>Sufficient rainfall followed by clear sky and high RH (&gt;75%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light rainfall, intermediate cloudy sky/ moderate humidity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No rains, cloudy sky, low RH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No rains, cloudy sky, high RH (&gt;75%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No rainfall, hot and dry winds during day time</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

22
### Standard Meteorological Week Number: 40 (1 October to 7 October)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAT ($23^{rd}$)</th>
<th>WAT (26th)</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>14</td>
<td>11</td>
<td>1 Oct to 7 Oct</td>
<td>31.7</td>
<td>22.3</td>
<td>88</td>
<td>76</td>
<td>5.1</td>
<td>3.5</td>
<td>34.3</td>
</tr>
</tbody>
</table>

### Anticipated weather likely to be observed

<table>
<thead>
<tr>
<th>Condition</th>
<th>Crop Stage</th>
<th>Recommendations based on likely effects of anticipated weather changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal weather condition</td>
<td>Mature Grain Stage</td>
<td>• Drain the field 7 to 10 days before the expected harvest date OR&lt;br&gt; When the upper grains in most of the tillers are in the hard dough stage</td>
</tr>
<tr>
<td>Rainfall received &gt;15 mm in one or two consecutive days</td>
<td>(23 SMW sown crop)</td>
<td>• Turning of green to yellowish color of panicle</td>
</tr>
<tr>
<td>Rainfall received &gt;30 mm in one or two consecutive days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sufficient rainfall followed by clear sky and high RH (&gt;75%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light rainfall, intermediate cloudy sky/ moderate humidity</td>
<td>Milk grain stage/Dough Grain Stage</td>
<td>• Recommendations same as 23 SMW sown crop</td>
</tr>
<tr>
<td>No rains, cloudy sky, low RH</td>
<td>(26 SMW sown crop)</td>
<td>• Spray Amritpani @ 150 ml/15 llt of water to increase growth and pest control&lt;br&gt; Monitor the crop for incidence of Gundhi Bug, Rats, Birds and False Smut</td>
</tr>
<tr>
<td>No rains, cloudy sky, high RH (&gt;75%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No rainfall, hot and dry winds during day time</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

23
# Standard Meteorological Week Number: 41 (8 October to 14 October)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAT (23°)</th>
<th>WAT (26°)</th>
<th>Period</th>
<th>T max °C</th>
<th>T min °C</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>15</td>
<td>12</td>
<td>8 Oct to 14 Oct</td>
<td>32.6</td>
<td>21.8</td>
<td>82</td>
<td>68</td>
<td>6.2</td>
<td>3.9</td>
<td>20.1</td>
</tr>
</tbody>
</table>

## Anticipated weather likely to be observed

<table>
<thead>
<tr>
<th>Normal weather condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainfall received &gt;15 mm in one or two consecutive days</td>
</tr>
<tr>
<td>Rainfall received &gt;30 mm in one or two consecutive days</td>
</tr>
<tr>
<td>Sufficient rainfall followed by clear sky and high RH (&gt;75%)</td>
</tr>
<tr>
<td>Light rainfall, intermediate cloudy sky/ moderate humidity</td>
</tr>
<tr>
<td>No rains, cloudy sky, low RH</td>
</tr>
<tr>
<td>No rains, cloudy sky, high RH (&gt;75%)</td>
</tr>
<tr>
<td>No rainfall, hot and dry winds during day time</td>
</tr>
</tbody>
</table>

## Crop Stage

- **Harvesting**
  - (23 SMW sown crop)
  - **Recommendations based on likely effects of anticipated weather changes**
    1. Monitor the field for maturity symptoms for harvesting of crop:
       1. De-hull a few grains from the upper portion of the matured panicles and observe their translucence and firmness
       2. Grains, when ready for harvest, are clear and firm
       3. Moisture content of grains is less than 20%
       4. About 80% panicles are straw colored and grains in lower portion of panicle are in hard dough stage
      5. At least five hills are to be studied at maturity
    - Separate out Smut-affected panicles to avoid contamination
    - Harvest close to ground level to destroy insect pest present in the internodes/stubbles. This will also expose the insects to birds, thus helping in natural bio-control of insect pests
    - Harvesting should be done at clear weather conditions
    - Protect the harvested produce from rains and keep it in a safe and dry place

- **Milk grain stage/Dough Grain Stage**
  - (26 SMW sown crop)
  - **Recommendations same as 23 SMW sown crop**
  - **Recommendations same as 23 SMW sown crop**
### Standard Meteorological Week Number: 42 (15 October to 21 October)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAT (°C)</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>42</td>
<td>13</td>
<td>15 Oct to 21 Oct</td>
<td>33.0</td>
<td>20.7</td>
<td>77</td>
<td>60</td>
<td>7.2</td>
<td>4.0</td>
<td>13.8</td>
</tr>
</tbody>
</table>

#### Anticipated weather likely to be observed
- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH (>75%)
- Light rainfall, intermediate cloudy sky/ moderate humidity
- No rains, cloudy sky, low RH
- No rains, cloudy sky, high RH (>75%)
- No rainfall, hot and dry winds during day time

#### Crop Stage
- Mature Grain Stage (26 SMW sown crop)

#### Recommendations based on likely effects of anticipated weather changes
- Recommendations same as 23 SMW sown crop

### Standard Meteorological Week Number: 43 (22 October to 28 October)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAT (°C)</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>14</td>
<td>22 Oct to 28 Oct</td>
<td>33.1</td>
<td>19.6</td>
<td>75</td>
<td>53</td>
<td>8.4</td>
<td>4.3</td>
<td>8.8</td>
</tr>
</tbody>
</table>

#### Anticipated weather likely to be observed
- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH (>75%)
- Light rainfall, intermediate cloudy sky/ moderate humidity
- No rains, cloudy sky, low RH
- No rains, cloudy sky, high RH (>75%)
- No rainfall, hot and dry winds during day time

#### Crop Stage
- Harvesting (26 SMW sown crop)

#### Recommendations based on likely effects of anticipated weather changes
- Recommendations same as 23 SMW sown crop
## Annexure I – Pests

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Pest</th>
<th>Crop stage</th>
<th>Actions to be Undertaken</th>
</tr>
</thead>
</table>
| 1      | Yellow Stem Borer - *Scirpophaga incertulas* | Seedlings, Primary tiller development, Secondary tiller development, Active vegetative stage, Stem elongation and flag leaf stage, Booting/panicle emergence, Heading, Flowering | • Destruction of stubble after harvest to reduce the carry-over to next crop  
• Harvesting the plant close to the ground  
• Clipping off tip of seedling before transplanting reduces carry-over of eggs from nursery to main field as the eggs of stem borers are laid near the tip of the leaf  
• Avoid continuous water stagnation in the field  
• Pull out and destroy affected seedlings  
• Set up light traps @ 2 to 3/ha to attract and kill the moths  
• Release the egg parasitoid, *Trichogramma japonicum* two times at 15 days interval @ 50,000-1,00,000 adult/ha  
• Apply Fipronil 0.3 G @ 25 kg/ha OR Phorate 10 G @ 10 kg/ha  
ETL for Stem Borer: two egg mass/m² |
| 2      | Gall Midge Fly - *Orseolia oryzae* | Seedlings, Primary tiller development, Secondary tiller development, Active vegetative stage | • Use recommended dose of potash fertilizer  
• Setup light trap @ 2 to 3/ha  
• Spray NSKE 5% @ 200ml/15 lit of water  
• Apply Fipronil 0.3 G @ 25 kg/ha OR Quinoxphos 5 G @ 15 kg/ha OR Phorate 10 G @ 10 kg/ha  
ETL for Gall midge fly: 1 gall fly/m² or 10% Silver shoot |
| 3      | Mealy Bug - *Pseudococcus saccharicola* | Seedlings, Primary tiller development | • Remove grass weeds from the field; these are alternate host for pest  
• Spray NSKE 5% @ 200 ml/15 lit of water  
• Spray Diethoate 30 EC @ 15 ml/15 lit of water OR Methyl demeton 25 EC@ 20 ml/15 lit of water |
<table>
<thead>
<tr>
<th>No.</th>
<th>Pest</th>
<th>Description</th>
<th>Control Measures</th>
</tr>
</thead>
</table>
| 4   | Brown Plant Hoppers - *Laodelphax striatellus* | Primary tiller development, secondary tiller development, active vegetative stage, stem elongation and flag leaf stage, booting/panicle emergence/heading, flowering | - Avoid excess use of nitrogenous fertilizers  
- Apply nitrogenous fertilizer in split doses  
- Drain out water in case of heavy infestation  
- Set up of light traps @ 5/ha to attract and kill hoppers  
- Spray NSKE 5% @ 200ml/15 lit of water  
- Spray Phosalone 35 EC @ 20 ml/15 lit of water OR Imidacloprid 70% WG @ 15 g mixed in 150 lit of water  
ETL for Brown Plant Hoppers 10-15 Hoppers/Plant |
| 5   | Case Worm - *Nymphula depunctalis* | Primary tiller development, secondary tiller development, active vegetative stage | - Do not allow standing water in the field  
- Use of bamboo perches facilitates predation by birds  
- Mechanical killing of the larvae of case worm by straining running water from the field  
- Spray Dashparni ark @ 150 ml/15 lit of water  
- Spray Chlorpyrifos 20 EC @ 25 ml/15 lit of water  
ETL for Case Worm: 2 fully damaged leaves/hill |
| 6   | Swarming Caterpillar - *Spodoptera mauritia* and Cut Worm - *Spodoptera litura* | Primary tiller development, secondary tiller development, active vegetative stage | - Avoid close planting and excess use of nitrogenous fertilizers  
- Weed out the graminaceous weed hosts from the field  
- Spray NSKE 5% @ 200ml/15 lit of water OR Spray Dashparni ark @ 150 ml/15 lit of water  
- Spray Chlorpyrifos 20 EC @ 25 ml/15 lit of water  
ETL for Swarming Caterpillar: 1 damaged tiller/hill or 2 larvae/m² |
| 7   | Leaf Folder - *Cnaphalocrocis medinalis* | Primary tiller development, active vegetative stage, stem elongation and flag leaf stage, booting/panicle emergence | - Avoid excess use of nitrogenous fertilizers  
- Release the egg parasitoid, *Trichogramma chilonis* two times at 15 days interval @ 50,000-1,00,000 adults/ha  
- Spray NSKE 5% @ 200ml/15 lit of water OR Spray Dashparni ark @ 150 ml/15 lit of water  
- Spray Chlorpyrifos 20 EC @ 25 ml/15 lit of water OR Phosalone 35 EC @ 20-25ml/15 lit of water  
ETL for Leaf Folder: 2 fully damaged leaves/hill |
<table>
<thead>
<tr>
<th>No.</th>
<th>Pest</th>
<th>Stage</th>
<th>Control Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Green Leaf Hopper- <em>Nephotettix virescens</em></td>
<td>Secondary tiller development&lt;br&gt;Active vegetative stage</td>
<td>• Avoid excess use of nitrogenous fertilizers&lt;br&gt;• Weed out the graminaceous weed hosts from the field&lt;br&gt;• Set up light traps @ 5/ha to attract and kill the moths&lt;br&gt;• Set up bird perches @ 40 to 50/ha at vegetative phase of crop&lt;br&gt;• Set up traps of yellow sticky traps @ 25/ha to attract and kill hoppers&lt;br&gt;• Spray NSKE 5% @ 200 ml/15 lit of water&lt;br&gt;• Spray Acephate 75% SP @ 20-25 ml/15 lit of water OR&lt;br&gt; 17.8 SL @ 3 ml/15 lit of water OR&lt;br&gt; 20 EC @ 30 ml/15 lit of water&lt;br&gt;ETL for Green Leaf Hoppers: 10-20 Hoppers/Plant</td>
</tr>
<tr>
<td>9</td>
<td>Gundhi Bug- <em>Leptocorisa oratorius</em></td>
<td>Flowering, Milk grain stage, Dough grain stage</td>
<td>• Spray NSKE 5% @ 200 ml/15 lit of water&lt;br&gt;• Spray Acephate 75% SP @ 20-25 ml/15 lit of water&lt;br&gt;ETL for Gundhi Bug: 1 to 2 Bugs/Plant</td>
</tr>
<tr>
<td>10</td>
<td>Rats- <em>Rattus rattus</em>, <em>Bandicota bengalensis</em> etc.</td>
<td>Milk grain stage, Dough Grain Stage</td>
<td>• Wildcats, snakes, and birds are predators of rice field rats; protect them&lt;br&gt;• Prepare poison bait - 3 g zinc phosphide + wheat flour 100 g + jaggery 5 g + edible oil 5 g. The pellets should be prepared by mixing water in wheat flour + zinc phosphide followed by coating of oil and jaggary. These baits are placed in burrows and then covered</td>
</tr>
<tr>
<td>11</td>
<td>Birds</td>
<td>Milk grain stage, Dough grain Stage</td>
<td>• Scaring devices and chemical repellents can also be used in the field</td>
</tr>
</tbody>
</table>
# Annexure II - Diseases

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Disease</th>
<th>Existing crop stage</th>
<th>Remedial Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blast - <em>Pyricularia oryzae</em>&lt;br&gt;<strong>Bacterial Blight - Xanthomonas oryzae</strong></td>
<td>Seedlings, Primary tiller development, Secondary tiller development, Active vegetative stage, Stem elongation and flag leaf stage, Booting/panicle emergence, flowering</td>
<td>- Use healthy and disease resistant varieties like Indrayani, Panvel-1 for blast an Karjat-1, Radhanagri-185 for blight &lt;br&gt;- Early planting to reduce disease intensity &lt;br&gt;- Control grasses and other weeds as these are alternate host for the pathogens &lt;br&gt;- Burn and destroy diseased plant debris and stubble &lt;br&gt;- Avoid excessive depth application of irrigation water &lt;br&gt;- Spray Carprofamid 30 SC @ 15 ml/15 lit of water OR Isoprothiolane 40 EC @ 37 ml/15 lit of water OR Iprobenphos 48 EC @ 30 ml/15 lit of water OR Propiconazole 25 EC @ 15 ml/15 lit of water OR Carbendazim 50 WP @ 15 g/15 lit of water &lt;br&gt;ETL for Blast: 3-5 lesions/leaf &lt;br&gt;ETL for Bacterial blight is 2-3 infected leaves/m²</td>
</tr>
<tr>
<td>2</td>
<td>Sheath Rot - <em>Sarocladium oryzae</em> and Sheath Blight - <em>Rhizoctonia solani</em></td>
<td>Primary tiller development</td>
<td>- Foliar spray of Pseudomonas fluorescens talc formulation @ 30 g/15 lit of water &lt;br&gt;- Spray Mancozeb 75 WP @ 35 g/15 lit of water OR Propiconazole 25 EC @ 15 ml/15 lit of water OR Hexaconazole 5 EC @ 30 ml/15 lit of water OR Thiophanate methyl 70 WP @ 15 g/15 lit of water &lt;br&gt;ETL for Sheath Blight: Lesions of 5-6 mm in length &amp; 2-3 infected plants/m² &lt;br&gt;ETL for Sheath Rot: Lesions of 2-3 mm on sheath &amp; 3-5 infected plants/m²</td>
</tr>
<tr>
<td>3</td>
<td>Stem Rot - <em>Sclerotium oryzae</em></td>
<td>Active vegetative stage</td>
<td>- Drain out the excess water from field &lt;br&gt;- Spray Validamycin @ 30 ml/15 lit of water OR Hexaconazole @ 30 ml/15 lit of water OR propiconazole @ 15 ml/15 lit of water OR Benomyi 15 g/15 lit of water OR Carbendazim 50 WP @ 15 g/15 lit of water</td>
</tr>
<tr>
<td>#</td>
<td>Disease</td>
<td>Stage</td>
<td>Control Measures</td>
</tr>
<tr>
<td>---</td>
<td>---------</td>
<td>-------</td>
<td>------------------</td>
</tr>
<tr>
<td>4</td>
<td>Udbatta Disease - <em>Balansia oryzae</em></td>
<td>Stem elongation and flag leaf stage, Booting/panicle emergence, Heading, Flowering</td>
<td>• Treat seeds with Benlate @ 2.5 g/kg of seed <strong>OR</strong> Vitavax power @ 2 g/kg of seed • Remove and destroy the diseased panicles • Spray Copper hydroxide @ 30 g/15 l of water</td>
</tr>
<tr>
<td>5</td>
<td>False Smut - <em>Ustilaginoidea virens</em></td>
<td>Milk grain stage, Dough grain stage</td>
<td>• Remove and destroy the diseased panicles • Spray Propiconazole 25 EC @ 15 ml/15 l of water <strong>OR</strong> Chlorothalonil 75 WP @ 30 ml/15 l of water</td>
</tr>
</tbody>
</table>

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Weather-Based Management of Finger Millet (*Eleusine coracana* L.) Cultivation

1. Introduction

Finger millet is also known as Ragi, Nachani and Nagali in the local language. In the tropics, finger millet is predominantly a staple food grain. The major producer countries are Uganda, India, Nepal, and China. Finger millet contains 9.2% proteins, 1.29% fat, 76.32% carbohydrates, 2.24% minerals, 3.90% ash and 0.33% calcium. Besides Vitamin A and B, phosphorus is also present in smaller quantities.

Finger millet is a crop of tropical and sub-tropical climate and can be grown successfully from sea level to an altitude of 2100 meters on hilly slopes as well as in plains. It is a very hardy crop. It is grown in areas having annual average rainfall between 500-1000 mm. The optimum temperature for the growth of finger millet is 26-29°C. It prefers porous and well-drained soil. It can be grown well in soils with pH 4.5-7.5.

Finger millet is a crop with varied uses. Germinating grains are malted and fed to infants also. It is also good for pregnant women. It is a nutritive food for adults of different ages, especially those suffering from diabetes. In the northern hills of India, grains are eaten mostly in the form of 'chapatis' and in south India, grains are used in many preparations like porridge, cakes, puddings, sweets, etc. The green straw is suitable for making silage, which is sweet smelling and consumed by cattle without any wastage. The finger millet contributes about 50% area and 65% production under small millets.

2. Sowing Period

The normal sowing period of finger millet in Akole Taluka is from 14th May to 10th June (20th to 23rd SMW). Recommendations are provided for finger millet grown during this period. Table 1 below indicates the various varieties that are suitable for the Akole Block, together with growth period and expected yield.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Variety</th>
<th>Days to maturity</th>
<th>Yield (q/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VR-708</td>
<td>90-100</td>
<td>12-15</td>
</tr>
<tr>
<td>2</td>
<td>PES-400</td>
<td>90-100</td>
<td>12-15</td>
</tr>
<tr>
<td>3</td>
<td>RAU-308</td>
<td>100-110</td>
<td>25-30</td>
</tr>
<tr>
<td>4</td>
<td>HR-374</td>
<td>100-110</td>
<td>10-12</td>
</tr>
<tr>
<td>5</td>
<td>Dapoli-1</td>
<td>100-110</td>
<td>15-20</td>
</tr>
<tr>
<td>6</td>
<td>Phule Nachani-1 (KOPN-235)</td>
<td>115-120</td>
<td>20-25</td>
</tr>
<tr>
<td>7</td>
<td>PES-110</td>
<td>115-125</td>
<td>25-27</td>
</tr>
<tr>
<td>8</td>
<td>INDAF-8</td>
<td>115-125</td>
<td>20-25</td>
</tr>
<tr>
<td>9</td>
<td>PR-202</td>
<td>120-130</td>
<td>25-30</td>
</tr>
</tbody>
</table>

---

3 Pest and Disease Management

Details about control measures at various stages of crop growth are furnished in Annexure I (Pests) and Annexure II (Diseases). Remedial actions may be initiated accordingly.

4 General Points to be kept in mind

- One ploughing is recommended in summer season to expose the egg mass of hibernating pests & diseases.
- Incorporate FYM/compost @ 5 t/ha.
- If irrigation facilities are available, grow green manuring crops like Dhaincha, Sun hemp on the same fields and bury in the fields before flowering (at 45 DAS) which helps to improve soil fertility.
- Incorporate Glyclicdia green leaf @ 2.0 t/ha at the time of puddling to improve soil fertility.
- Apply recommended dose of fertilizer 60:30:00 NPK kg/ha.
- Use “Blast tolerant” varieties- Phule Nachani-1 (KDPN-235).
- Follow crop rotation with legumes like green / black gram / field gram / soybean / horse gram and groundnut.
- Intercropping of finger millet with pigeon pea at 4:1 ratio is recommended.
## Weather-Specific Crop Advisories for Finger Millet

### Standard Meteorological Week Numbers: 20 / 21 / 22 and 23 (14 May to 10 June)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAS</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20/21/22</td>
<td>0</td>
<td>14 May to 3 June</td>
<td>36.0</td>
<td>24.8</td>
<td>75.6</td>
<td>49.1</td>
<td>7.7</td>
<td>8.2</td>
<td>4.8</td>
</tr>
<tr>
<td>23</td>
<td>0</td>
<td>4 June to 10 June</td>
<td>34.4</td>
<td>24.8</td>
<td>80</td>
<td>60</td>
<td>5.6</td>
<td>7.0</td>
<td>34.4</td>
</tr>
</tbody>
</table>

**Anticipated weather likely to be observed**

- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH
- Light rainfall, intermediate cloudy sky / moderate humidity
- No rains, cloudy sky, low RH
- No rains, cloudy sky, high RH
- No rainfall, hot and dry winds during day time

**Crop stage**

- Land Preparation

**Recommendations based on likely effects of anticipated weather changes**

- One ploughing of soil to expose hibernating pests & diseases to sun and birds
- Two harrotings should be done, once in each week, for improving physical condition of soil
- Incorporate FYM/Compost @ 5t/ha OR Vermicompost @ 2t/ha before the last harrowing

### Standard Meteorological Week Number: 24 (11 June to 17 June)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAS</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>0</td>
<td>11 June to 17 June</td>
<td>32.8</td>
<td>24.3</td>
<td>86</td>
<td>71</td>
<td>4.4</td>
<td>8.6</td>
<td>37.9</td>
</tr>
</tbody>
</table>

**Anticipated weather likely to be observed**

- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH
- Light rainfall, intermediate cloudy sky / moderate humidity
- No rains, cloudy sky, low RH
- No rains, cloudy sky, high RH
- No rainfall, hot and dry winds during day time

**Crop stage**

- Nursery / Sowing

**Recommendations based on likely effects of anticipated weather changes**

- Prepare raised bed for nursery
- 5 R area of nursery seedlings is sufficient for 1 ha area of transplanting
- Apply FYM/Compost @ 100 kg/R of Nursery bed
- Seed treatment with cow urine at 1:10 concentration for good germination and seedling vigour
- Seed treatment with Thiram 4g/kg or Captan 4g/kg or Carbendazim @2g/kg of seeds
- Seed treatment with Azospirillum @ 25g/kg of seed + Phosphobacteria @ 50g/kg of seed
- Sow the seeds on raised bed
- Prepare raised bed for nursery
- 5 R area of nursery seedlings is sufficient for 1 ha area of transplanting
- Apply FYM/Compost @ 100 kg/R of Nursery bed
- Avoid the sowing of seed in nursery
## Standard meteorological week number: 25 (18 June to 24 June)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAS</th>
<th>Period</th>
<th>T max ('C)</th>
<th>T min ('C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>1</td>
<td>18 June to 24 June</td>
<td>31.2</td>
<td>24.1</td>
<td>92</td>
<td>84</td>
<td>2.3</td>
<td>10.8</td>
<td>34.9</td>
</tr>
</tbody>
</table>

### Anticipated weather likely to be observed
- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH
- Light rainfall, intermediate cloudy sky/moderate humidity
- No rains, cloudy sky, low RH
- No rains, cloudy sky, high RH
- No rainfall, hot and dry winds during day time

### Crop stage
- Germination

#### Recommendations based on likely effects of anticipated weather changes
- Observe the optimum germination (90%) of seeds
- Top dressing of 0.5 kg urea/R after 12 DAS
- Keep raised bed at optimum moisture level

## Standard meteorological week number: 26 (25 June to 1 July)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAS</th>
<th>Period</th>
<th>T max ('C)</th>
<th>T min ('C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>2</td>
<td>25 June to 1 July</td>
<td>30.5</td>
<td>23.9</td>
<td>96</td>
<td>90</td>
<td>1.2</td>
<td>10.9</td>
<td>57.6</td>
</tr>
</tbody>
</table>

### Anticipated weather likely to be observed
- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH
- Light rainfall, intermediate cloudy sky/moderate humidity
- No rains, cloudy sky, low RH
- No rains, cloudy sky, high RH
- No rainfall, hot and dry winds during day time

### Crop stage
- Seedling

#### Recommendations based on likely effects of anticipated weather changes
- Monitor crop for incidence of Blast and Seedling Blight

Details about control measures at various stages of crop growth are furnished in Annexure I (Pest) and Annexure II (Diseases). Control measures may be initiated accordingly

- Sprinkle the water on nursery bed with the help of water can
- Keep nursery bed at optimum moisture level
### Standard meteorological week number: 27 (2 July to 8 July)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAT</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>0</td>
<td>2 July To 8 July</td>
<td>29.8</td>
<td>23.7</td>
<td>96</td>
<td>91</td>
<td>0.6</td>
<td>10.6</td>
<td>70.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anticipated weather likely to be observed</th>
<th>Crop stage</th>
<th>Recommendations based on likely effects of anticipated weather changes</th>
</tr>
</thead>
</table>
| Normal weather condition                | Transplanting of seedlings | • Prepare slurry of 2 kg Azophos in 40 liters of water and dip the root portion of the seedlings for 15-30 minutes  
• Transplant the seedlings at 22.5 X 10 cm  
• Plant 2 seedlings per hill  
• Apply half dose of Nitrogen 30 kg/ha and full dose of Phosphorus 30 kg/ha at the time of transplanting OR  
• Apply 75% Nitrogen and Phosphorus dose i.e.(45 kg N + 22.5 kg P2O5/ha) in the form of briquettes  
• Use healthy seedlings for transplanting |
| Rainfall received >15 mm in one or two consecutive days |                        |                                                      |
| Rainfall received >30 mm in one or two consecutive days |                        |                                                      |
| Sufficient rainfall followed by clear sky and high RH |                        |                                                      |
| Light rainfall, intermediate cloudy sky/ moderate humidity |                        |                                                      |
| No rains, cloudy sky, low RH |                        |                                                      |
| No rains, cloudy sky, high RH |                        |                                                      |
| No rainfall, hot and dry winds during day time |                        |                                                      |

### Standard meteorological week number: 28 and 29 (9 July to 22 July)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAS</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>1</td>
<td>9 July to 15 July</td>
<td>29.6</td>
<td>23.7</td>
<td>97</td>
<td>92</td>
<td>0.4</td>
<td>10.0</td>
<td>48.3</td>
</tr>
<tr>
<td>29</td>
<td>2</td>
<td>16 July to 22 July</td>
<td>29.1</td>
<td>23.5</td>
<td>96</td>
<td>92</td>
<td>0.6</td>
<td>8.8</td>
<td>46.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anticipated weather likely to be observed</th>
<th>Crop stage</th>
<th>Recommendations based on likely effects of anticipated weather changes</th>
</tr>
</thead>
</table>
| Normal weather condition                | Primary tiller or early vegetative growth | • Observe the growth of primary tillers  
• Spray Amritpani @ 150ml/15lit of water for better crop growth and pest control  
• Apply Jeevamrit @ 200lit/acre to improve physical, chemical and biological properties of soil  
• Gap filling and thinning should be done at 21 DAT  
• Monitor the crop for incidence of Pink Borer/ Stem Borer, Seedling Blight and Blast |
| Rainfall received >15 mm in one or two consecutive days |                        |                                                      |
| Rainfall received >30 mm in one or two consecutive days |                        |                                                      |
| Sufficient rainfall followed by clear sky and high RH |                        |                                                      |
| Light rainfall, intermediate cloudy sky/ moderate humidity |                        |                                                      |
| No rains, cloudy sky, low RH |                        |                                                      |
| No rains, cloudy sky, high RH |                        |                                                      |
| No rainfall, hot and dry winds during day time |                        |                                                      |
### Standard meteorological week number: 30 and 31 (23 July to 5 August)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAS</th>
<th>Period</th>
<th>$T_{\text{max}}$ ($^\circ$C)</th>
<th>$T_{\text{min}}$ ($^\circ$C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>3</td>
<td>23 July to 29 July</td>
<td>29.0</td>
<td>23.3</td>
<td>96</td>
<td>93</td>
<td>1.0</td>
<td>9.3</td>
<td>77.9</td>
</tr>
<tr>
<td>31</td>
<td>4</td>
<td>30 July to 5 Aug</td>
<td>28.7</td>
<td>27.4</td>
<td>98</td>
<td>94</td>
<td>0.6</td>
<td>8.7</td>
<td>63.8</td>
</tr>
</tbody>
</table>

#### Anticipated weather likely to be observed
- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH
- Light rainfall, intermediate cloudy sky/ moderate humidity
- No rains, cloudy sky, low RH
- No rains, cloudy sky, high RH
- No rainfall, hot and dry winds during day time

#### Crop stage
- Active vegetative

#### Recommendations based on likely effects of anticipated weather changes
- Avoid continuous water stagnation
- Hand weeding should be done at 30 DAT to reduce crop-weed competition
- Apply half dose of Nitrogen (30kg/ha) early in the morning or late in the evening to avoid volatilization losses
- Monitor for incidence of Blast, Stem Borer, Aphids, Jassids and Bacterial Blight
- Hand weeding should be done at 30 DAT to reduce crop-weed competition
- Apply half dose of Nitrogen (30kg/ha) early in the morning or late in the evening to avoid volatilization losses
- Monitor pest and diseases as indicated above
- Monitor pest and diseases as indicated above
- Hand weeding should be done at 30 DAT
- If irrigation facility is available, give protective irrigation to the crop

### Standard meteorological week number: 32 and 33 (6 August to 19 August)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAS</th>
<th>Period</th>
<th>$T_{\text{max}}$ ($^\circ$C)</th>
<th>$T_{\text{min}}$ ($^\circ$C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>5</td>
<td>6 Aug to 12 Aug</td>
<td>28.3</td>
<td>23.0</td>
<td>97</td>
<td>94</td>
<td>0.4</td>
<td>8.8</td>
<td>51.1</td>
</tr>
<tr>
<td>33</td>
<td>6</td>
<td>13 Aug to 19Aug</td>
<td>28.5</td>
<td>28.9</td>
<td>97</td>
<td>93</td>
<td>0.4</td>
<td>8.3</td>
<td>44.6</td>
</tr>
</tbody>
</table>

#### Anticipated weather likely to be observed
- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH
- Light rainfall, intermediate cloudy sky/ moderate humidity
- No rains, cloudy sky, low RH
- No rains, cloudy sky, high RH
- No rainfall, hot and dry winds during day time

#### Crop stage
- Flag leaf stage & Flowering

#### Recommendations based on likely effects of anticipated weather changes
- Avoid continuous water stagnation
- Apply Jeevanrit @ 200 lit/acre to increase soil microbial activities and improve soil fertility
- Spray multi-micronutrient @ 50g/15 lit of water
- Monitor the crop for incidence of Stem Borer, Bacterial Blight and Blast, Brown Plant Hoppers
- Monitor pest and diseases as indicated above
- If irrigation facility is available, give protective irrigation to the crop
- Spray Amritpani @ 150ml/15lit of water for better crop growth and pest control
### Standard meteorological week number: 34 and 35 (20 August to 2 September)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAS</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>7</td>
<td>20 Aug to 26 Aug</td>
<td>28.9</td>
<td>29.1</td>
<td>96</td>
<td>90</td>
<td>0.6</td>
<td>6.6</td>
<td>44.1</td>
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<tr>
<td>35</td>
<td>8</td>
<td>27 Aug to 2 Sep</td>
<td>29.0</td>
<td>26.9</td>
<td>96</td>
<td>91</td>
<td>0.9</td>
<td>6.6</td>
<td>24.9</td>
</tr>
</tbody>
</table>

**Anticipated weather likely to be observed**

- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH
- Light rainfall, intermediate cloudy sky/ moderate humidity
- No rains, cloudy sky, low RH
- No rains, cloudy sky, high RH
- No rainfall, hot and dry winds during day time

**Crop stage:** Grain filling

**Recommendations based on likely effects of anticipated weather changes**

- Apply Jeevanrit @ 200 lit/acre to increase soil microbial activities and improve soil fertility
- Spray 00:00:50 @ 50 g /15 lit of water
- Spray Amritpani @ 150ml/15lit of water for better crop growth and pest control
- Monitor the field for incidence of Stem Borer, Gall Midge Fly, Brown Plant Hoppers, Bacterial Blight and Blast

### Standard meteorological week number: 36 and 37 (3 September to 16 September)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAT (26°)</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>9</td>
<td>3 Sep to 9 Sep</td>
<td>29.5</td>
<td>22.5</td>
<td>95</td>
<td>90</td>
<td>1.3</td>
<td>5.8</td>
<td>27.8</td>
</tr>
<tr>
<td>37</td>
<td>10</td>
<td>10 Sep to 16 Sep</td>
<td>30.1</td>
<td>22.7</td>
<td>94</td>
<td>86</td>
<td>2.1</td>
<td>5.8</td>
<td>42.4</td>
</tr>
</tbody>
</table>

**Anticipated weather likely to be observed**

- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH (>75%)
- Light rainfall, intermediate cloudy sky/ moderate humidity
- No rains, cloudy sky, low RH
- No rains, cloudy sky, high RH (>75%)
- No rainfall, hot and dry winds during day time

**Crop Stage:** Maturity

**Recommendations based on likely effects of anticipated weather changes**

- Observe the symptoms of maturity:
  (i) Leaves becomes dry and yellow
  (ii) 50% of the ear heads of main shoot turn brown
- Monitor the field for incidence of Rodents and Birds
Standard meteorological week number: 38 and 39 (17 September to 30 September)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAS</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>11</td>
<td>17 Sep to 23 Sep</td>
<td>30.5</td>
<td>22.4</td>
<td>94</td>
<td>83</td>
<td>2.6</td>
<td>4.7</td>
<td>42.4</td>
</tr>
<tr>
<td>39</td>
<td>12</td>
<td>23 Sep to 30 Sep</td>
<td>30.8</td>
<td>22.9</td>
<td>90</td>
<td>78</td>
<td>4.8</td>
<td>3.8</td>
<td>51.7</td>
</tr>
</tbody>
</table>

Anticipated weather likely to be observed  
Crop stage  
Recommendations based on likely effects of anticipated weather changes

| Normal weather condition  | Harvesting |  
| Rainfall received >15 mm in one or two consecutive days |  
| Rainfall received >30 mm in one or two consecutive days |  
| Sufficient rainfall followed by clear sky and high RH |  
| Light rainfall, intermediate cloudy sky/ moderate humidity |  
| No rains, cloudy sky, low RH |  
| No rains, cloudy sky, high RH |  
| No rainfall, hot and dry winds during day time |  

Harvesting should be done at clear weather conditions
- 80% of the ears that have become brown in color should be harvested
- Grains are separated by threshing after sun drying
- Grains can be stored in sacks or gunny bags at room temperature for about one year without losing viability
- Protect the harvested produce from rain and keep it in a safe and dry place

Annexure I – Pests

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Pest</th>
<th>Crop stage</th>
<th>Remedial Measures</th>
</tr>
</thead>
</table>
| 1      | Pink Borer/Stem Borer-    | Primary tiller or early vegetative growth, Active vegetative, Flag leaf    | • Avoid continuous water stagnation  
|        | Sesamia inferens          | stage and Flowering, Grain filling                                        | • Pull out and destroy the affected seedlings  
|        |                           |                                                                            | • Set up light traps @ 2 to 3/ha to attract and kill the moths  
|        |                           |                                                                            | • Release the egg parasitoid, *Trichogramma japonicum* two times at 15 days interval  
|        |                           |                                                                            | @ 50,000 egg masses/ha  
|        |                           |                                                                            | • Spray NSKE 5%@ 200ml/15 lit of water  
|        |                           |                                                                            | • Spray Dashparni ark @ 150 ml/15 lit of water  
|        |                           |                                                                            | • Apply Phorate 10 G @ 10 kg/ha  
|        |                           |                                                                            | **ETL for Stem Borer: One egg mass/m²**  

---
<table>
<thead>
<tr>
<th>Page</th>
<th>Insect/Agricultural害虫</th>
<th>Stage/Phase</th>
<th>Control Measures</th>
</tr>
</thead>
</table>
| 2    | Aphids-Rhopalosiphum maidis and Jassids- | Active vegetative | - Avoid excess use of nitrogenous fertilizers  
- Set up of yellow sticky card @ 25/ha  
- Spray NSKE 5% @ 200 ml/15 lit of water  
- Spray Dashparni ark @ 150 ml/15 lit of water  
Spray Dimethoate 30 EC 20-25/15 lit of water OR  
Spray Methyl Demeton 25 EC 20-25 ml/15 lit of water  
ETL for Aphids/Jassids: 5-10 Adults/Plant |
| 3    | Brown Plant Hoppers- Nilapavarta lugens | Flag leaf stage and Flowering, Grain filling | - Early sowing reduces the infestation  
- Crop rotation with pulse crop  
- Summer fallowing  
- Avoid excess use of nitrogenous fertilizers  
- Spray Dashparni ark @ 150 ml/15 lit of water  
- Spray NSKE 5% @ 200 ml/15 lit of water  
- Set up of yellow sticky card @ 25/ha to attract and kill hoppers  
- Spray Phosalone 35 EC @ 20-25 ml/15 lit of water  
ETL for Brown Plant Hoppers: 5-10 Hoppers/Plant |
| 4    | Gall Midge Fly- Geromyia penniseti | Grain filling | - Crop rotation with legume crops  
- Optimum use of potash fertilizer  
- Setup light trap @ 5/ha and monitor adult flies  
- Spray Dashparni ark @ 150 ml/15 lit of water  
- Spray Malathion 50 EC @ 30 ml/15 lit of water OR  
- Apply Phorate 10 G @ 10 kg/ha OR  
- Apply Fipronil 0.3 G @ 25 kg/ha OR  
Quinolphos 5G @ 15 kg/ha  
ETL for Gall Midge Fly: 1 Silvery shoot/m² |
| 5    | Rats- Rattus rattus, Bandicota bengalensis etc. | Maturity | - Wildcats, snakes, and birds are also predators of rats  
- Prepare poison bait- 3 g zinc phosphide + wheat flour 100 g + jaggery 5 g + edible oil 5 g. The pellets should be prepared by mixing water in wheat flour + zinc phosphide followed by coating of oil and jaggery. These baits are placed in burrows and then covered |
| 6    | Birds | Maturity | - Scaring devices and chemical repellents can be used in the field |
# Annexure II - Diseases

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Disease</th>
<th>Existing Crop Stage</th>
<th>Actions to be Undertaken</th>
</tr>
</thead>
</table>
| 1       | Blast-<br>`Pyricularia grisea` | Seedling, Transplanting of seedlings, Primary tiller or early vegetative growth, Active vegetative Flag leaf stage and Flowering, Grain filling | • Use disease free seeds and resistant var. Phule Nachani-1 (KOPN-235)  
• Early sowing reduces blast severity  
• Uproot and destroy the diseased plants  
• Spray *Pseudomonas fluorescens* talc formulation @ 30 g/15 llt of water  
• Spray Mancozeb 75 WP @ 30 g/15 llt of water OR  
• Spray Carbendazim @ 20 g/15 llt of water |
| 2       | Seedling Blight-<br>`Helminthosporium nodulosum` | Seedling, Transplanting of seedlings, Primary tiller or early vegetative growth | • Uproot and destroy the diseased plant soon after detecting in the field  
• Spray Mancozeb 75 WP @ 35 g/15 llt of water OR  
Propiconazole 25 EC @ 15 ml/15 llt of water |
| 3       | Bacterial Blight-<br>`Pseudomonas pisi` | Active vegetative, Flag leaf stage and Flowering, Grain filling | • Avoid continuous water stagnation  
• Pull out and destroy the affected seedlings  
• Spray *Pseudomonas fluorescens* talc formulation @ 30 g/15 llt of water  
• Spray NSKE 5%@ 200 ml/15 ltt of water  
• Spray Mancozeb 75 WP@ 40 g/15 llt of water OR  
Spray Carbendazim + Mancozeb 75 WP @ 30 g/15 llt of water |

**References:**

Dr. B. Gangaliah, Agronomy of Kharif Crops, IARI, New Delhi – 110 012  
mpkv.mah.nic.in/MPKV_News_Apr_to_Jun_2011.pdf  
http://tnau.ac.in/eagri/eagri50/ENT0331/lecture03/finger_millet/007.html  
Weather-Based Management of Summer Groundnut (Arachis hypogaea L.) Cultivation

1 Introduction

In India, Groundnut has pride of place among all the oilseed crops accounting more than 40% acreages and 60% production in the country. Groundnut seed contains 47-53% oil and 25-36% protein. Groundnut kernel, as a whole, is highly digestible. Groundnut is a good source of all B vitamins except B12. The oil cake obtained after the extraction of the oil is valuable as organic manure and animal feed. It contains 7-8% nitrogen, 1.5% phosphorus and 1.5% potash.

Groundnut is a tropical crop plant. It requires a long and warm growing season with well distributed rainfall of at least 50 cm during growing season, abundance of sunshine and a mean temperature ranging from 21-26.5°C. Groundnut thrives best in well drained sandy to sandy loam soils, as a light soil helps in easy preparation of pegs, their development and also harvesting.

2 Phenological Growth Stages of Groundnut

Since crop management recommendations depend crucially upon the phenological growth stage of a crop, we give below an overview of the different growth stages.

Stage 1: Germination and emergence

A groundnut seed has two cotyledons, or seed leaves, and an embryo. After emergence, the cotyledons unfold above the ground. The embryo is not totally protected by the cotyledons and can easily be physically damaged during the harvesting, storage, shelling and planting operations. A damaged embryo will not develop properly, and although it may germinate and establish, yields will be much lower than those of plants from undamaged seed. Plants growing from damaged seed often have a curled or J-shaped root system. This defect can also be a symptom of pre-emergence herbicide damage. Groundnut seed germinates best at soil temperatures of 20-35°C. The radicle, or root, takes one to two days to emerge from the seed. After five days the taproot is 10-15 cm long. Lateral roots then start to develop and secondary roots grow from the laterals. After five to ten days, the root begins supplying minerals from the soil to the plant. Effective rooting depth of the groundnut plant is around 100-120 cm. Where there are no soil restrictions, the groundnut plant has a long, spike-shaped root up to 150 cm long, with the primary root system branching to a depth of 60-80 cm. Emergence through the soil, known as 'cracking', begins six to fourteen days after planting. Dry or cool soils can delay emergence for up to three weeks, often resulting in poor establishment due to soil-borne disease. Emerging groundnut seedlings can push through quite hard and crusted soil, hence the term 'cracking', but very crusted soil will restrict emergence.

6 - This section has been taken and adapted from: http://www.pca.com.au/bmp/pdfs/2a_peanut_plant.pdf
Stage 2: Vegetative growth
After 20 days there may be eight to ten fully-expanded leaves. Unlike most legumes, groundnuts have four leaflets per leaf, which partially fold up at night. Groundnut foliage can grow at a rate of 150 to 200 kg per hectare per day once full canopy cover is reached. Groundnuts are indeterminate in vegetative and reproductive development. This means the plant does not stop growing in order to flower and produce a crop. They continue to grow leaves and stems while also flowering and setting pods. The pods must, therefore, compete with the shoots for carbohydrate and nutrients. There are differences between varieties. The Virginia types are more determinate than Spanish types. Newer varieties achieve higher pod yields compared to older varieties, because a larger portion of the newer varieties' growth goes into pods rather than vegetation.

Stage 3: Flowering
Flowering starts at about 28 to 40 days after emergence and continues for 25 to 30 days thereafter. Flowers can appear throughout the season. The yellow flowers open at night, self-pollinate in the early morning and wither by evening of the same day. Flowers grow along the branches and each node can produce several flowers. Generally only about 15 to 20% of flowers successfully produce a pod. It is possible for a plant to have 200 pods. Drought and temperatures over 35°C will reduce the number of flowers produced. If water stress reduces flower numbers, the plant can recover by producing a flush of flowers when adequate water is received.

Stage 4: Pegging
After the ovary is fertilized, it begins to elongate and bend towards the soil. The 'peg', or 'strings', can be seen about a week after fertilization. The pegs hang down from the stems and continue to grow until they have penetrated the soil. Since one node can produce several flowers, several pegs can develop from a single node. Pegs may be from 2-15 cm long. However, those longer than about seven centimeters often do not reach the ground or penetrate the soil adequately. If these long pegs develop a pod, it is more likely to be immature and lost at harvest. Pegs enter the soil 8-12 days after pollination. The tip of the peg is sharp, allowing it to penetrate the soil to a depth of 1-7 cm under cool, moist conditions. Most of the pegs that only penetrate 1 to 1.5 cm develop a pod, but the rate of development is slower. As soils become harder it is more difficult for the pegs to penetrate. The pegs are more sensitive to soil compaction than are the roots, so soil moisture, which 'softens' hard soils, can be critical at this stage. The fertilized embryo is in the tip of the peg and begins to develop and enlarge soon after entering the soil. After the tip of the peg enlarges underground it is called a pod.

Stage 5: Pod development
The period between the peg entering the soil and the shell reaching full size is called pod development. Pod development lasts about 30 days and relies on the soil surface being kept moist. This is a critical time for irrigation.
Stage 6: Pod filling
From about 60 days onwards, pods are formed and filled. Pods are full sized about three to four weeks after peg burial, even though seed growth inside the pod has barely begun. The shell reaches maximum dry weight well before the kernels. Groundnut pod numbers can increase at a rate of 100,000 to 500,000 pods per hectare per day over a 15-25 day period and pod weight can increase at a rate of up to 100 kg per hectare per day for the 75-110 days period after emergence. Some nutrients, particularly calcium and boron, are absorbed through minute hairs on the peg and shell. This method of nutrient uptake is relatively inefficient, so groundnuts have a much higher soil calcium requirement in the top 5 to 10 cm of soil than other plants. When soil calcium levels are very low, the developing kernels abort and the empty shell is called a ‘pop’.

Stage 7: Maturity
Crops may take 100-120 days to reach harvest maturity, depending on variety, planting time, seasonal conditions and location. Temperature largely controls the time to harvest. As groundnuts mature, the inside layer of the shell changes color from white, through yellow, orange, brown to black. This gives an indication of harvest maturity. Yield loss starts to occur if groundnuts are not harvested within 7-10 days of peak maturity because the pegs weaken and the pods fall off the plant. Groundnuts often produce a very uneven crop, with a range of mature and immature kernels present at harvest time. The relative proportion of mature and immature kernels is assessed and has an impact on the quality grading of the crop.

3 Summer Groundnut Cultivation in Akole Block
In Akole block, summer is an important cropping season where Pearl Millet and Groundnut are major crops. Groundnut in this region is predominantly grown in shallow to medium type of soil during the summer season. Land preparation for summer groundnut is initiated with shallow ploughing after harvest of *rabi* season crop. Crop is sown at 30 cm between the rows and 10 cm distance between plants; organic manures are hardly used and neither is seed treatment undertaken. Most of the farmers do not apply chemical fertilizers to this crop.

4 Sowing Period
The normal sowing period of summer groundnut in Akole Taluka is from 8th to 21st January (2nd and 3rd SMW). Recommendations are provided for Groundnut grown during this period. Table 1 below indicates the various varieties that are suitable for the Akole Block, together with growth period and expected yield.
Table 1: Summer Groundnut varieties suitable for irrigated conditions in Akole block

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Varieties</th>
<th>Type</th>
<th>Days to maturity</th>
<th>Pod yield (q/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SB-11</td>
<td>Erect/ Bunch</td>
<td>105-110</td>
<td>15-20</td>
</tr>
<tr>
<td>2</td>
<td>TAG-24</td>
<td></td>
<td>100-115</td>
<td>25-30</td>
</tr>
<tr>
<td>3</td>
<td>JL-286</td>
<td></td>
<td>110-115</td>
<td>20-25</td>
</tr>
<tr>
<td>4</td>
<td>TPG-41</td>
<td></td>
<td>125-130</td>
<td>25-30</td>
</tr>
<tr>
<td>5</td>
<td>TG-26</td>
<td></td>
<td>110-115</td>
<td>25-30</td>
</tr>
<tr>
<td>6</td>
<td>Phule Unnati</td>
<td></td>
<td>120-125</td>
<td>30-35</td>
</tr>
<tr>
<td>7</td>
<td>Phule RHRG-6021</td>
<td>Semi spreading</td>
<td>120-125</td>
<td>30-35</td>
</tr>
</tbody>
</table>

5 Pest and Disease Management
Details about control measures at various stages of crop growth are furnished in Annexure I (Pests) and Annexure II (Diseases). Remedial actions may be initiated accordingly.

6 General points to be kept in mind
- One shallow ploughing followed by two harrowings and by one clod crushing to obtain good surface tilth up to 12-18 cm depth should be done.
- Incorporation of FYM/compost @ 10 t/ha or Vermicompost @ 5 t/ha before the last harrowing to improving soil fertility and productivity is necessary.
- Use of high yielding varieties like TAG-24, SB-11, JL-286, TPG-41 and TG-26 is recommended.
- Application of fertilizer dose (25:50 kg NP/ha) and 125 kg gypsum/ha at the time of sowing and 125 kg gypsum/ha at the time of pegging is recommended.
- For bunch type of variety, use 100 kg of seeds/ha and for spreading type of variety use 125 kg of seeds/ha.
- For maintaining the optimum plant population, planting should be done at 30 cm x 10 cm.
- Crop rotation with Sorghum/Pearl Millet or Maize in kharif helps to minimize the attack of white grubs.
# Weather-Specific Crop Advisories for Summer Groundnut (Irrigated)

## Standard Meteorological Week Number: 2 and 3 (8 January to 21 January)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAS</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>0</td>
<td>8 Jan to 14 Jan</td>
<td>29.8</td>
<td>14.6</td>
<td>69.1</td>
<td>42.9</td>
<td>9.0</td>
<td>4.4</td>
<td>0.6</td>
</tr>
<tr>
<td>03</td>
<td>0</td>
<td>15 Jan to 21 Jan</td>
<td>30.2</td>
<td>14.6</td>
<td>71.3</td>
<td>46.2</td>
<td>8.6</td>
<td>4.1</td>
<td>1.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anticipated weather likely to be observed</th>
<th>Crop stage</th>
<th>Recommendations based on likely effects of anticipated weather changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal weather condition</td>
<td>Land Prep.</td>
<td>• One shallow ploughing followed by two harrowings to obtain good physical condition of soil is necessary</td>
</tr>
<tr>
<td>Rainfall received &gt;15 mm in one or two consecutive days</td>
<td>Land Prep.</td>
<td>• Incorporate FYM/Compost @ 10 tons/ ha OR Vermicompost @ 5 t/ha</td>
</tr>
<tr>
<td>Rainfall received &gt;30 mm in one or two consecutive days</td>
<td>Land Prep.</td>
<td></td>
</tr>
<tr>
<td>Sufficient rainfall followed by clear sky and high RH</td>
<td>Land Prep.</td>
<td></td>
</tr>
<tr>
<td>Light rainfall, intermediate cloudy sky/ moderate humidity</td>
<td>Land Prep.</td>
<td></td>
</tr>
</tbody>
</table>

## Standard Meteorological Week Number: 4 and 5 (22 January to 4 February)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAS</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>0</td>
<td>22 Jan to 28 Jan</td>
<td>30.4</td>
<td>14.6</td>
<td>72.8</td>
<td>42.8</td>
<td>8.6</td>
<td>4.5</td>
<td>0.9</td>
</tr>
<tr>
<td>05</td>
<td>0</td>
<td>29 Jan to 4 Feb</td>
<td>30.6</td>
<td>14.7</td>
<td>66.0</td>
<td>42.0</td>
<td>8.3</td>
<td>4.8</td>
<td>0.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anticipated weather likely to be observed</th>
<th>Crop stage</th>
<th>Recommendations based on likely effects of anticipated weather changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal weather condition</td>
<td>Sowing</td>
<td>• Give pre sowing irrigation for better germination</td>
</tr>
<tr>
<td>Rainfall received &gt;15 mm in one or two consecutive days</td>
<td>Sowing</td>
<td>• Seed rate for bunch varieties is 100 kg/ha and spreading type of varieties, 125 kg/ha</td>
</tr>
<tr>
<td>Rainfall received &gt;30 mm in one or two consecutive days</td>
<td>Sowing</td>
<td>• Sowing should be done at 30 x 10 cm by seed drill or by dibbling</td>
</tr>
<tr>
<td>Sufficient rainfall followed by clear sky and high RH</td>
<td>Sowing</td>
<td>• Dibbling method of sowing requires less seeds as compared to seed drill</td>
</tr>
<tr>
<td>Light rainfall, intermediate cloudy sky/ moderate humidity</td>
<td>Sowing</td>
<td>• Apply RDF i.e. 25:50 kg NP/ha at the time of sowing OR 125 kg DAP/ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Apply gypsum @ 125 kg/ha at the time of sowing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Seed treatment with Thiram @ 5 g/kg of seed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Seed treatment with Trichoderma @ 5 g/kg of seed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Seed treatment with Rhizobium @ 25 g/kg of seed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Give light irrigation immediate after sowing for good germination</td>
</tr>
</tbody>
</table>
### Standard meteorological week number: 6 (5 February to 11 February)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAS</th>
<th>Period</th>
<th>$T_{\text{max}}$ ($^\circ$C)</th>
<th>$T_{\text{min}}$ ($^\circ$C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
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<tr>
<td>06</td>
<td>1</td>
<td>5 Feb to 11 Feb</td>
<td>30.9</td>
<td>14.7</td>
<td>62</td>
<td>36</td>
<td>7.8</td>
<td>4.4</td>
<td>0.5</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Anticipated weather likely to be observed</th>
<th>Crop stage</th>
<th>Recommendations based on likely effects of anticipated weather changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal weather condition</td>
<td>Germination/Vegetative growth</td>
<td>• Observe field for 90% germination of seeds</td>
</tr>
<tr>
<td>Rainfall received &gt;15 mm in one or two consecutive days</td>
<td></td>
<td>• Gap filling should be done at 10 DAS to maintain optimum plant population</td>
</tr>
<tr>
<td>Rainfall received &gt;30 mm in one or two consecutive days</td>
<td></td>
<td>• Gap filling should be done at optimum moisture condition</td>
</tr>
<tr>
<td>Sufficient rainfall followed by clear sky and high RH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light rainfall, intermediate cloudy sky/ moderate humidity</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Standard meteorological week number: 7 and 8 (12 February to 25 February)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAS</th>
<th>Period</th>
<th>$T_{\text{max}}$ ($^\circ$C)</th>
<th>$T_{\text{min}}$ ($^\circ$C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
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<tr>
<td>08</td>
<td>3</td>
<td>19 Feb to 25 Feb</td>
<td>32.1</td>
<td>16.4</td>
<td>65</td>
<td>38</td>
<td>8.5</td>
<td>4.4</td>
<td>0.1</td>
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</table>

<table>
<thead>
<tr>
<th>Anticipated weather likely to be observed</th>
<th>Crop stage</th>
<th>Recommendations based on likely effects of anticipated weather changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal weather condition</td>
<td>Branching</td>
<td>• One hoeing should be done at 21 DAS</td>
</tr>
<tr>
<td>Rainfall received &gt;15 mm in one or two consecutive days</td>
<td></td>
<td>• One hand weeding should be done after hoeing</td>
</tr>
<tr>
<td>Rainfall received &gt;30 mm in one or two consecutive days</td>
<td></td>
<td>• Spray Amritpani @ 150 ml/15 lit of water for better crop growth and pest control</td>
</tr>
<tr>
<td>Sufficient rainfall followed by clear sky and high RH</td>
<td></td>
<td>• Apply Jeevamrit @ 200 lit/acre along with irrigation so as to improve soil health</td>
</tr>
<tr>
<td>Light rainfall, intermediate cloudy sky/ moderate humidity</td>
<td></td>
<td>• Monitor the crop for incidence of Aphid and Jassid</td>
</tr>
</tbody>
</table>

Details about control measures at various stages of crop growth are furnished in Annexure I (Pest) and Annexure II (Diseases). Control measures may be initiated accordingly.
### Standard meteorological week number: 9 and 10 (26 February to 11 March)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAS</th>
<th>Period</th>
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<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
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<tr>
<td>09</td>
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<td>26 Feb to 4 Mar</td>
<td>32.2</td>
<td>17.2</td>
<td>61</td>
<td>33</td>
<td>9</td>
<td>6.3</td>
<td>0.2</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
<td>5 Mar to 11 Mar</td>
<td>33.4</td>
<td>17.8</td>
<td>61</td>
<td>34</td>
<td>8.8</td>
<td>4.7</td>
<td>0.0</td>
</tr>
</tbody>
</table>

#### Anticipated weather likely to be observed

- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH
- Light rainfall, intermediate cloudy sky/ moderate humidity

#### Crop stage
Flowering

#### Recommendations based on likely effects of anticipated weather changes
- Spray 00:52:34 @ 50 g + multi-micronutrient @ 50 g + nitrobenzene 30 ml/15 litres of water to induce flowering and pod formation
- Apply Jeevamrit @ 200 lit/acre along with irrigation to increase soil microbial activities and fertility of soil
- Monitor the crop for incidence of Early Leaf Spot (Tikka) and Leaf Eating Caterpillar

### Standard meteorological week number: 11 (12 March to 18 March)

<table>
<thead>
<tr>
<th>SMW no.</th>
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<th>Period</th>
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<th>T min (°c)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
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</thead>
<tbody>
<tr>
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<td>6</td>
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<td>18.8</td>
<td>62</td>
<td>36</td>
<td>8.6</td>
<td>5.4</td>
<td>0.5</td>
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</tbody>
</table>

#### Anticipated weather likely to be observed

- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH
- Light rainfall, intermediate cloudy sky/ moderate humidity

#### Crop stage
Flowering/ Pegging

#### Recommendations based on likely effects of anticipated weather changes
- Spray 00:52:34 @ 50 g + micronutrient @ 50 g + nitrobenzene 30 ml/15 lit of water
- Apply gypsum @ 125 kg/ha mixed with 500 kg FYM + 5 kg Sulphur and then give irrigation to the crop
- Monitor the crop for incidence of Jassids, Aphids, Early Leaf Spot (Tikka) and Alternaria Leaf Spot
### Standard meteorological week number: 12, 13 and 14 (19 March to 8 April)

<table>
<thead>
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<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
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<tbody>
<tr>
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<td>07</td>
<td>19 Mar to 25 Mar</td>
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<td>19.4</td>
<td>57</td>
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<tr>
<td>13</td>
<td>08</td>
<td>26 Mar to 1 April</td>
<td>35.2</td>
<td>20.2</td>
<td>55</td>
<td>36</td>
<td>8.8</td>
<td>5</td>
<td>0.3</td>
</tr>
<tr>
<td>14</td>
<td>09</td>
<td>2 April to 8 April</td>
<td>35.6</td>
<td>21.0</td>
<td>62</td>
<td>37</td>
<td>8.5</td>
<td>3.5</td>
<td>1.7</td>
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</tbody>
</table>

#### Anticipated weather likely to be observed

- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH
- Light rainfall, intermediate cloudy sky/ moderate humidity

#### Crop stage
- Pegging

#### Recommendations based on likely effects of anticipated weather changes

- Apply *Jeevamrit* @ 200 lit/acre along with irrigation to increase soil microbial activities and fertility of soil
- Roll a 200 liters plastic empty drum over the vegetative growth of the crop in order to accelerate penetration of pegging in the soil.
- Monitor the crop for incidence of *Early Leaf Spot (Tikka Leaf Eating Caterpillar and Alternaria Leaf Spot*"

### Standard meteorological week number: 15, 16 and 17 (9 April to 29 April)

<table>
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<tr>
<th>SMW no.</th>
<th>WAS</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
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<tr>
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<td>62</td>
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<td>8.8</td>
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<td>0.3</td>
</tr>
<tr>
<td>16</td>
<td>11</td>
<td>16 April to 22 April</td>
<td>36.1</td>
<td>22.3</td>
<td>63</td>
<td>37</td>
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</tr>
<tr>
<td>17</td>
<td>12</td>
<td>23 April to 29 April</td>
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<td>22.9</td>
<td>66</td>
<td>40</td>
<td>9.8</td>
<td>5.1</td>
<td>0.6</td>
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</tbody>
</table>

#### Anticipated weather likely to be observed

- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH
- Light rainfall, intermediate cloudy sky/ moderate humidity

#### Crop stage
- Pod Development

#### Recommendations based on likely effects of anticipated weather changes

- Spray 00:00:50 @ 50 g /15 lit of water
- Apply *Jeevamrit* @ 200 lit/acre along with irrigation to increase soil microbial activities and fertility of soil
- Monitor the crop for incidence of *Late Leaf Spot and Rats*"
### Standard meteorological week number: 18, 19 and 20 (30 April to 20 May)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAS</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
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<tr>
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<td>30 April to 6 May</td>
<td>36.6</td>
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<td>5.6</td>
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<td>19</td>
<td>14</td>
<td>7 May to 13 May</td>
<td>36.5</td>
<td>23.9</td>
<td>73</td>
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<td>1.6</td>
</tr>
<tr>
<td>20</td>
<td>15</td>
<td>14 May to 20 May</td>
<td>36.3</td>
<td>24.7</td>
<td>74</td>
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<td>3.8</td>
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</tbody>
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#### Anticipated weather likely to be observed
- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH
- Light rainfall, intermediate cloudy sky/ moderate humidity

#### Crop stage
- Pod Development

#### Recommendations based on likely effects of anticipated weather changes
- Monitor the crop for incidence of Rats

### Standard meteorological week number: 21 (21 May to 27 May)

<table>
<thead>
<tr>
<th>SMW no.</th>
<th>WAS</th>
<th>Period</th>
<th>T max (°C)</th>
<th>T min (°C)</th>
<th>RH I (%)</th>
<th>RH II (%)</th>
<th>BSS (Hrs)</th>
<th>Wind Speed (Km/hr)</th>
<th>Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>16</td>
<td>21 May to 27 May</td>
<td>36</td>
<td>24.8</td>
<td>75</td>
<td>48</td>
<td>8.1</td>
<td>8.9</td>
<td>3.4</td>
</tr>
</tbody>
</table>

#### Anticipated weather likely to be observed
- Normal weather condition
- Rainfall received >15 mm in one or two consecutive days
- Rainfall received >30 mm in one or two consecutive days
- Sufficient rainfall followed by clear sky and high RH
- Light rainfall, intermediate cloudy sky/ moderate humidity

#### Crop stage
- Harvesting and Pod storage

#### Maturity signs:
- Yellowing of leaves
- The mature pods become hard and tough
- The inside shell surface becomes rough with visible net venation with a dark brown color
- About 75-80% pods of the plants are matured
- Internal surface of the pod becomes brown in colour

#### Harvesting:
- Give light irrigation 2 days before harvesting
- Uproot the groundnut plant and place in sun for drying for 3-4 days
- After that pluck the pods

#### Storage:
- Dry the groundnut pods in sunshine to below 7% moisture content
- Store the dry groundnut in gunny bags
## Annexure I – Pests

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Pest</th>
<th>Existing Crop Stage</th>
<th>Remedial Measures</th>
</tr>
</thead>
</table>
| 1      | **Jassids - Empoasca kerri** | Branching and Flowering/pegging     | • Timely sowing of the crop and field sanitation is necessary  
• Crop rotation with non-host cereal crops  
• Intercropping with pearl millet (7:1)  
• Place Yellow sticky card @ 10/ha  
• Spray Dashparni ark @ 150 ml/15 lit of water  
• Spray 5% NSKE @ 150 ml/15 lit of water  
• Spray Dimethoate 30EC @ 15 ml/15 lit water |
| 2      | **Aphids - Aphis craccivora** | Branching and Flowering/pegging     | • Place Yellow sticky trap @ 10/ha  
• Spray 5% NSKE @ 150 ml/15 lit of water  
• Spray Dashparni ark @ 150 ml/15 lit of water  
• Spray Dimethoate 30 EC @ 15 ml/15 lit of water **OR**  
• Spray Dimethoate 30 EC 25-30 ml/15 lit of water **OR**  
• Spray Methyl/demeton 25 EC 20-25 ml/15 lit of water |
| 3      | **Leaf Eating Caterpillar - Spodoptera litura** | Flowering Pegging,                 | • Plant castor or sunflower plant as a trap crop  
• Early sowing to escape insect pest damage  
• Use of pheromone traps @ 5/ha to monitoring the moth population  
• Install bird perches @ 10-12/ha  
• Collection and destruction of egg masses/ early instars larvae from trap crop  
• Release Trichogramma chilonis @ 50000/ha two times at 7-10 days interval  
• Spray Dashparni ark @ 200 ml/15 lit of water  
• Spray Quinolphos 25 EC @ 45 ml/15 lit of water |
| 4      | **Rats - Rattus rattus, Bandicota bengalensis etc.** | Pod development                    | • Field sanitation should be done  
• Remove grasses from field bunds  
• Prepare poison bait - 3 g zinc phosphide + wheat flour 100 g + jaggery 5 g + edible oil 5 g  
The pellets should be prepared by mixing water in wheat flour + zinc phosphide followed by coating of oil and jaggery. These baits are placed in burrows and then covered |
## Annexure II - Diseases

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Disease</th>
<th>Existing crop stage</th>
<th>Remedial Measures</th>
</tr>
</thead>
</table>
| 1     | Early Leaf Spot - *Cercospora arachidicola* | Flowering, Flowering/Pegging, Pegging | - Removal of volunteer groundnut plants are important measures in reducing the primary source of infection  
- Crop rotation with cereal crops  
- Spray Mancozeb 75 WP @ 30 g/15 l lit of water OR  
  Spray Carbendazim 50 WP @ 15 g/15 l lit of water |
| 2     | Alternaria Leaf Spot - *Alternaria arachidis* and *Alternaria tenuissima* | Flowering/Pegging, Pegging            | - Removal of volunteer groundnut plants are important measures in reducing the primary source of infection  
- Affected plant residues should be removed from the field  
- Spray Mancozeb 75 @ 40 g/15 l lit water OR  
  Spray Copper Oxchloride @ 45 g/15 l lit water OR  
  Spray Carbendazim 50 WP @ 15 g/15 l lit water |
| 3     | Late Leaf Spot - *Phaeoisariopsis personatum* | Pod Development                       | - Crop rotation with cereal crops  
- Removal of volunteer groundnut plants are important measures in reducing the primary source of infection  
- Spray Carbendazim 50 WP @ 15 g/15 l lit of water OR  
  Spray Mancozeb 75 WP @ 15 g/15 l lit of water OR  
  Spray Chlorothalonil @ 30 g/15 l lit of water |

### References:

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- http://agritech.tnau.ac.in/crop_protection/crop_prot_crop%20diseases_oilseed_groundnut.html
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- http://www.pdkv.in/OilseedUnit.php
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APPENDIX

Preparation of organic and plant based formulations from locally available material
for enhancing plant growth, soil health and controlling pests and diseases

1. AMRITPANI
   a) Material Required
      i. Fresh cow dung - 1 kg
      ii. Cow urine - 1 lit
      iii. Green neem leaves - 1 kg
      iv. Chickpea floor - 1 kg
      v. Jaggary - 100 g
      vi. Water - 10 lit
   b) Method of Preparation
      Take a 15 litre capacity plastic bucket. Then mix all the above material into the bucket then stir it vigorously with a wooden stick; cover with lid when well mixed and store in shade for 10 days. The mixture should be stirred with a wooden stick clockwise and anti-clockwise for 5-10 minutes every day, in the morning and evening. After 10 days, the mixture should be filtered with a cotton cloth. It is then ready for spraying.
   c) Dose of Application
      Mix 100 ml of Amritpani in 10 litres of water and spray it on all crops at vegetative stage with spray pump.
   d) Advantages
      i. It is use full for all crops at vegetative growth stage.
      ii. It is beneficial for pest control.
      iii. It gives lustre to the crop/grains and increases yield.

2. DASHPARNI ARK
   a) Material Required
      i. Leaves of neem - 5 kg
      ii. Leaves of ghaneri - 2 kg
      iii. Leaves of karanj - 2 kg
      iv. Leaves of kanheri - 2 kg
      v. Leaves of jatropha or castor - 2 kg
      vi. Leaves of guavla - 2 kg
      vii. Leaves of custered apple - 3 kg
      viii. Leaves of rui - 2 kg
      ix. Leaves of papaya - 2 kg
      x. Leaves of nirgudi - 2 kg
      xi. Cow urine/ Gomutra - 5 lit
      xii. Cow dung (Deshi) - 2 kg
      xiii. Water 170 lit
   b) Method of Preparation
      Mix all above content in a plastic container or barrel. The mixture should be stirred with a wooden stick clockwise and anti-clockwise for 5-10 minutes every day, in the morning and evening. Keep it for 30 days in shade. After one month, separate the ark through a sieve the ark is ready for spraying as a bio-pesticide.
   c) Dose of Application
      Recommended dose for spraying is 125 ml of Dashparni ark per 10 lit of water.
   d) Advantages
      i. It is a natural organic pesticide.
      ii. It controls all sucking insect pest on all crops.
      iii. It is a low cost pesticide as compared to chemical pesticides.
      iv. It does not cause harmful effects to crops, pollinators and natural predators, the environment and humans being.

3. NEEM ARK (NSKE)
   a) Material Required
      i. Dried neem seeds 5 kg
      ii. 200 g soap powder
      iii. Water 10 lit
      iv. Plastic bucket
   b) Method of Preparation
      Take 5 kg of dried neem seeds, grind them into powder, mix in 10 litres of water with 200 gms soap powder for 24 hrs. Then separate out the resultant Neem Ark by filtering through cotton cloth. The Neem Ark is now ready for spraying.
   c) Dose of Application
      Recommended spraying rate is 15 ml of Neem Ark per lit of water.
   d) Advantages
      i. It controls Aphid, Jassid, Leaf eating Caterpillar, Thrips in all crops.
      ii. It also controls white grub and nematodes in all crops.
      iii. It’s a low cost natural pesticide and does not cause harmful effects to crops, pollinators and natural predators, the environment and humans being.

4. JEEVAMRIT
   a) Material Required
      i. Fresh cow dung - 10 kg
      ii. Cow urine - 10 lit
      iii. Gram flour - 2 kg
      iv. Jaggery - 1 kg
      v. 200 lit plastic barrel
      vi. Water - 180 lit
   b) Method of Preparation
      Take 200 litres capacity plastic barrel; then mix all above material into the barrel and add 180 litres of water in it. Then stir with a wooden stick clockwise and anti-clockwise in the morning and evening for 5 to 10 minutes for 6 days. It should be kept in the shade. After 6 days, Jeevamrit is ready for application to the soil.
   e) Dose of Application
      Apply 200 litres of Jeevamrit slurry for 1 acre area as a soil application at the time of irrigation.
   f) Advantages
      i. It is low cost and useful for all crops.
      ii. It increases the vegetative growth of the plant.
      iii. Microbial activity is increased in the soil which helps to maintain and improve soil health.
      iv. It also helps to maintain C:N ratio of the soil.
WOTR has prepared short video presentation on the above topics which can be viewed at:

https://youtu.be/Zb3sNOjY5w - Amritpani
http://youtu.be/So3Ta5IF_r8 - JeevanMrit
https://youtu.be/BmzADjXt1Z4 - Dashparl ark
http://youtu.be/dMR2ow1l3DE - Adaptive Sustainable Agriculture
http://youtu.be/AIbIEcRArL - System of Crop Intensification
http://youtu.be/pwVD_p8tIPG - Weathering Climate Change
About Watershed Organisation Trust (WOTR)

Established in 1993, WOTR is a non-profit that engages at the intersection of practice, knowledge and policy across scales and in collaboration with stakeholders from across sectors. Headquartered in Pune, WOTR has supported and carried out developmental work in over 3500 villages across 7 states of India.

WOTR assists rural communities to assess their vulnerabilities to climate and non-climatic risks. It organizes them in a socially and gender inclusive manner to help themselves out of poverty by regenerating their ecosystems in a holistic and integrated manner, conserving and optimising resource use, especially water, and undertaking climate smart sustainable livelihoods.

Being a Learning Organisation, WOTR undertakes applied research and closely engages with institutions and governance actors so that insights and good practices derived from ground experience contribute to shaping enabling policies and effective programs. With a view to up-scale successful interventions, WOTR develops pedagogies for implementation and organises a variety of knowledge sharing and capacity building events for stakeholders across the civil society, developmental and governance spaces, from India and other countries.

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