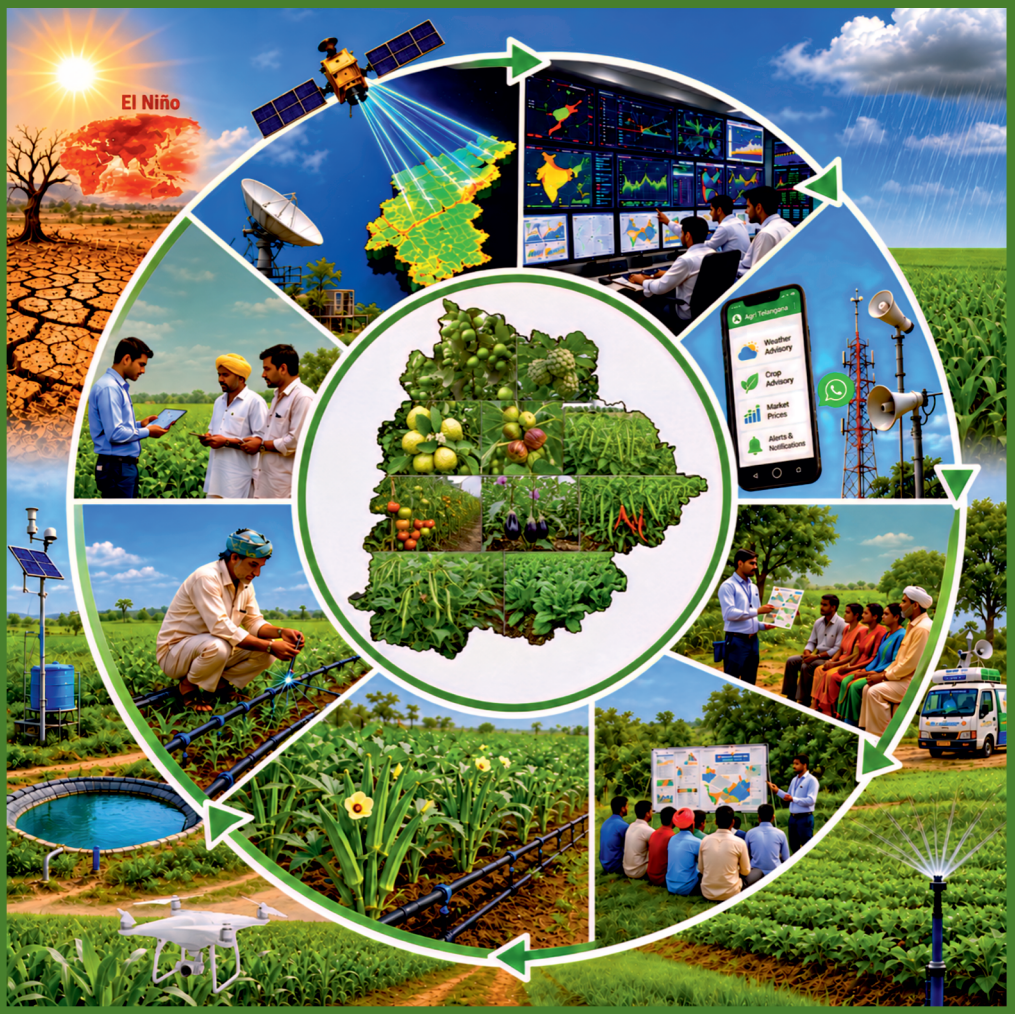
CONTINGENCY CROP MANAGEMENT STRATEGIES FOR HORTICULTURAL CROPS IN TELANGANA 2026-27



SRI KONDA LAXMAN TELANGANA HORTICULTURAL UNIVERSITY

Mulugu (V & M), Siddipet District - 502279
Telangana, India

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SRI KONDA LAXMAN TELANGANA HORTICULTURAL UNIVERSITY
Mulugu (V&M), Siddipet (District) - 502279, Telangana

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Contingency Crop Management Strategies for Horticultural Crops in Telangana 2026-27

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FORE WORD

Monsoon plays a pivotal role in the success of Telangana agriculture and horticulture. Timely onset and uniform distribution of rainfall plays a critical role in realising high yields particularly in *kharif* season. Adequate rainfall in South West Monsoon supports the production of both field and horticultural crops. Delayed onset of monsoon and breaks in the monsoon results in difficulty in planting and sustenance of crop growth. In view of El Nino phenomenon in 2026, IMD forecasts indicate that the seasonal rainfall over the country as a whole is likely to be 90% of Long Period Average (LPA). Telangana state is not expected to experience a uniform rainfall pattern. Central districts show normal to above-normal rainfall probabilities, whereas northern and southern districts exhibit below-normal tendencies. Considering the above forecast, it is important to be well equipped with scientific knowledge to prepare for reducing the impact of weather aberrations.

There is a need to get ready with the contingency plans for horticultural crops, monitoring the seasonal conditions and timely dissemination of agro - advisories, farmers awareness about the situation to minimise the losses and realise higher returns. As a part of this, the university has prepared Contingency crop management strategies for horticultural crops in Telangana for ready use. I complement all the scientists of SKLTGHU who contributed in their subject area in this important endeavour for bringing out this useful publication.

I am sure that this publication will be helpful to all the stakeholders at the state and district level as a guide in the preparedness of facing El Nino and reduce its impact on horticultural crops.

04/02/26

(D. RAJI REDDY)

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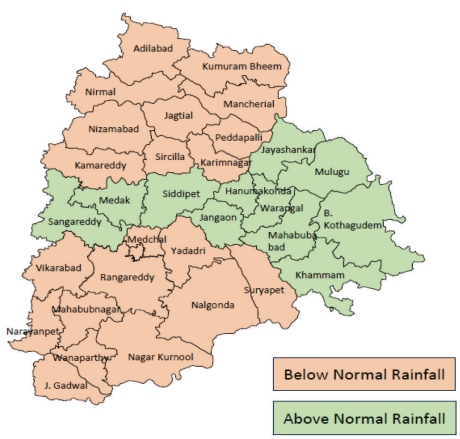
INTRODUCTION

Agriculture and allied activities play a vital role in the economic development of Telangana. The crops sector contributes Rs. 1,06,708 crores in 2024-25(AE) to Telangana's Gross State Value Added (GSVA) at Current Prices. Telangana's horticulture sector is a vital contributor to the state's Gross State Domestic Product (GSDP), contributing 25% of Agriculture Gross Value Output (GVO) (GVO–Agriculture – Rs. 119939 Cr & Horticulture GVO - Rs. 30,346 Cr during 2023-24). Any setback to the agricultural development will have an adverse impact on all the sectors of the state. The state is still dependent on monsoons for the successful harvest of the crops, and deviations and aberrations in weather conditions not only affect the agriculture sector but also influence the overall economic status of the state.

SEASONAL OUTLOOK 2026

The seasonal rainfall probability map indicates that Telangana is not expected to experience a uniform rainfall pattern. In comparison with Long Period Average (LPA), central districts show normal to above-normal rainfall probabilities, whereas northern and southern districts exhibit below-normal tendencies. In Telangana state, Normal to Near Normal rainfall may prevail in the Monsoon Season. As per IMD forecast, though a normal onset of monsoon is expected in June, the expected uncertainty in rainfall distribution during July and August may affect crop growth and moisture availability. The possibility of intense rainfall interspersed with prolonged dry spells may lead to periods of water stress, particularly in rainfed areas. Rainfall may occur in the form of intense downpours and short-duration heavy rainfall events, leading to increased surface runoff rather than effective storage and groundwater recharge. In addition, below-normal rainfall over the Core Monsoon Zone and upper catchments of the Krishna and Godavari basins could influence reservoir inflows and irrigation water availability during the season.



Zone	Districts	Rainfall pattern
Northern Telangana Zone (NTZ)-10 districts	Adilabad, Komaram Bheem Asifabad, Nirmal, Mancherial, Nizamabad, Jagtial, Peddapalli, Kamareddy, Rajanna Sircilla, Karimnagar	Below-Normal
Central Telangana Zone (CTZ)- 11 districts	Sangareddy, Medak, Siddipet, Jangaon, Hanamkonda, Warangal, Mahabubabad, Jayashankar Bhupalpally, Mulugu, BhadradriKothagudem, Khammam	Above Normal
Southern Telangana Zone (STZ)- 11 districts	Hyderabad, Medchal-Malkajgiri, Rangareddy, Vikarabad, YadadriBhuvanagiri, Nalgonda, Suryapet, Mahabubnagar, Wanaparthy, Nagarkurnool, Jogulamba Gadwal	Below-Normal

Impact of El – Nino

El Niño is a climate phenomenon characterized by abnormal warming of sea surface temperatures in the central and eastern Pacific Ocean. It often affects the Indian monsoon, leading to:

- Delayed onset of monsoon
- Deficit rainfall
- Long dry spells
- Increased temperatures and heat waves
- Moisture stress in crops
- Reduced water availability in reservoirs and borewells

In Telangana, the above conditions generally increase the risk of below-normal rainfall, affecting horticultural crops. such as mango, citrus, sweet orange, guava, vegetables, turmeric, chilli, oil palm, flowers, and plantation crops.

In view of the above, the university has prepared the contingency plans and crop management practices for the following situations

- Delayed onset of monsoon
- Initial drought (Normal onset of monsoon followed by dry spell)
- Mid season drought
- Terminal Drought
- Extended Monsoon
- Higher Temperatures

Continuous monitoring of seasonal conditions, the extent of area under different crops, monitoring of water levels in reservoirs, ground water, stocking and positioning of inputs particularly seed of recommended crops/varieties are essential for implementation of contingency plans and management practices for reducing the crop losses and realising higher returns. Weather and crop advisories and farmer awareness programs need to be conducted. Coordination among horticulture, Irrigation, and Disaster Management departments is required.

The Management practices prepared by the university are enumerated in the following pages. These can be put in operation depending on the prevailing weather conditions. Based on past experience and wisdom of farmers and scientific faculty these plans necessarily undergo appropriate changes. The following Impact points need to be stressed across all the horticultural crops.

Impact Points

- ✓ Sowing of rainfed crops to be taken up after receiving 60-75 mm of cumulative rainfall after the onset of the monsoons.
- ✓ Water conservation and growing less water requiring crops.

- ✓ Provide irritation during critical stages of crop growth.
- ✓ Apply the recommended dose of fertilizers and adopt integrated nutrient management practices.
- ✓ Avoid indiscriminate use of pesticides and adopt eco-friendly integrated pest management practices.
- ✓ Encourage natural farming wherever possible.

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CONTINGENCIES AND THEIR MANAGEMENT: FRUIT CROPS

GENERAL RECOMMENDATIONS

1. Delayed onset of monsoon

Fruit varieties suitable for growing under such conditions

Crops	Suitable Varieties
Mango	Kesar, Dashehari
Sweet Orange	Satgudi
Guava	Allahabad Safeda, Lucknow-49
Seethaphaal	Balanagar
Sapota	Kalipathi
Drumstick	PKM-1 and 2
Jamun	Konkan Bahadoli,
Ber	Gola
Pomegranate	Bhagwa
Fig	Pune variety
Papaya	Red Lady
Sweet Orange	Satgudi

Production strategies

- Adopt raised-bed planting systems to improve water-use efficiency, drainage and root development.
- Adopt drip irrigation system with 2 liter per hour drippers and increase the frequency of irrigation for improving water use efficiency.
- Adopt inline drip irrigation system in high density raised bed cultivation of fruits for increasing water use efficiency.

- Use organic mulching in the basin in young orchards or on the raised bed to prevent evapo transpiration and improve water use efficiency.
- Apply organic manures like farm yard manure, vermicompost and neem cake at drip zone in older fruit orchards for increasing water holding capacity.
- Postpone the inorganic fertilizer application until adequate soil moisture is available.
- Harvest and store rainwater in farm ponds for supplemental irrigation.

2. Initial drought (Normal onset of Monsoon followed by dry spell)
Production strategies

- Adopt raised-bed planting systems to improve water-use efficiency, drainage and root development.
- Adopt drip irrigation system with 2 liter per hour dippers and increase the frequency of irrigation for improving water use efficiency.
- Adopt inline drip irrigation system in high density raised bed cultivation of fruits for increasing water use efficiency.
- Use organic mulching in the basin or on the raised bed to prevent evapo transpiration and improve water use efficiency.
- Apply organic manures like farm yard manure, vermicompost and neem cake at drip zone/ point for improving drainage of soil structure.

Plant protection strategies

- Follow the recommended Integrated Pest Management (IPM) practices, including timely monitoring and appropriate plant protection measures, to effectively manage pests and diseases and minimize crop losses.

3. Mid Season Drought

Production strategies

- Use organic or plastic mulching in the raised beds or basins of the tree for preventing evapo transpiration, weeds and conserving soil moisture.
- Adopt drip irrigation system with 2 liter per hour dippers and increase the frequency of irrigation for improving water use efficiency.
- Adopt inline drip irrigation system in high density raised bed cultivation of fruits for increasing water use efficiency.
- Provide life-saving irrigation during critical crop growth stages, particularly during flowering, and fruit development, whenever moisture stress occurs.
- Spray Potassium nitrate (KNO_3) @ 10 g per liter of water 2 to 3 times during the fruit development phase in all fruit crops.
- Apply organic manures like Farm yard manure, Vermicompost and Neem cake in place of chemical fertilizers.
- Keep basins weed-free during the early stages of crop growth to reduce competition for moisture, nutrients, and sunlight.

4. Higher temperatures

Crop and nutrient management

- Paint the main tree trunks up to a height of 1 meter from the ground using Bordeaux mixture. This prevents the bark from cracking and splitting under intense heat.
- Provide shade for young plantations with locally available material/shadenet.

- Run drip irrigation systems strictly during early mornings and late evenings.
- If the orchard is equipped with micro-sprinklers, run them for 10–15 minutes during afternoons to rapidly increase humidity and lower the orchard's ambient micro-climate temperature.
- Maintain a 15–20 cm thick layer of organic mulch (paddy straw, sugarcane trash, or coir pith) in the tree basins to keep soil temperatures low and preserve root-zone moisture.
- Spray 1.5% Potassium Nitrate or 1% Monopotassium Phosphate (0:52:34).
- Apply a foliar spray of 0.2% (Boron) to strengthen the fruit pedicel and prevent heat-induced dropping.
- Spray 3- 5% Kaolin for preventing sunscald in fruit crops like Dragon fruit and other young orchards.

CROP - SPECIFIC RECOMMENDATIONS

Mango

- The pruning in mango should be done when the temperature are around 300 C to 34 OC which will corresponds by June last week.
- The dripper should be at 1.5 m away from trunk with 4 to 6 drippers per plant for 10 years and above age plants.
- Apply 4-5 kg vermicompost or 50-100 kg FYM per tree beneath the dripper.
- Cover the dripper with organic straw mulch which increases water use efficiency.

- Apply 500 g each of N, P and K immediately after receiving the rain during July-October for 10 years and above orchards.
- Spray 19: 19: 19 (Polyfeed) @ 5 g per plant along with micro nutrient twice during the month of August and September.
- Spray KNO3 @ 10 g per liter and Boron @ 1.25 g per liter of water during November, February and March.

Guava

- The pruning of guava should be done the month of May, for getting good winter crop.
- Drip irrigation with 4 dripper per plant for one hour at 2 times in a day (preferably morning and evening) should be given during the months of July-November for increasing water use efficiency.
- Apply 50 kg of Farm Yard Manure or 2-5 kg of Vermicompost per plant beneath the dripper during the month of June-July.
- Apply 250 gm each N, P and K inorganic fertilizers immediately after receiving the rain during July-October.
- Spray KNO_3 @ 10 gm per liter and 1.25 g Boron (20 %) twice during the month of August and September for increasing the size of the fruit and quality.

Seethaphal

- The pruning of Seethaphal has to be done during the month of April to get good crop during September-October.
- Drip irrigation with 4 dripper per plant for one hour at 2 times in a day (preferably morning and evening) should be given during the months of July-August for increasing water use efficiency.

- Apply 30 kg of Farm Yard Manure or 2 kg of Vermicompost per plant beneath the dripper during the month of June-July.
- Apply 250 g each N, P and K inorganic fertilizers immediately after receiving the rain during June-August.
- Spray KNO3 @ 10 gm per liter and 1.25 g Boron (20 %) twice during the month of July and August for increasing the size of the fruit and quality.

Pest and Disease management in mango, guava and seethaphal

- Gummosis and Phytophthora Rot: Saturated soils cause rapid root decay and bark splitting.Drench the soil basin and scrape/paint the trunk with Metalaxyl + Mancozeb at 2.5 g/L or apply bio-mix of Trichoderma viride mixed with well-rotted farmyard manure.
- Bacterial leaf spot and canker: Spray COC @ 3g/l along with Streptomycin @ 0.2g/l
- Anthracnose Fruit Rot (Mango & Guava): Persistent dampness causes black spotting on leaves and rotting of developing fruits. Spray Copper Oxychloride (3 g/l) or Carbendazim (1 g/l) as a protective spray during dry breaks in the rain.
- Sucking Pests & Fruit Flies: High temperature may lead to sudden spike in whiteflies, thrips and high humidity lead to fruit flies on maturing fruits. Install Methyl Eugenol pheromone traps (4–5 traps/acre) to trap fruit flies.

Citrus Crops

Sweet Orange and Acid Lime

- Prune dead and dried twigs frequently in acid lime.
- The dripper should be at 1.0 m away from trunk with 4 per plant for 10 years and above age plants.
- Apply 4-5 kg vermicompost or 50 kg FYM beneath the dripper.
- Cover the dripper with organic straw mulch which increases water use efficiency.
- Apply 250 g each N, P and K inorganic fertilizers immediately after receiving the rain during July-October for 10 years and above orchards.
- Do thinning of excess fruit during fruit development and growth period to
- Spray KNO_3 @ 10 g per liter and micro nutreint mix during 3 to 4 time during the fruit development phase.
- Harvest mature fruits immediately.

Likely Pest and Disease Incidence

Pest and Disease incidence	Management
Citrus Psylla	Yellow sticky traps
Leaf Miner	Neem Oil 3 %
Aphids	Recommended insecticides only when ETL is reached
Gummosis	Proper drainage and Spray COC @ 3 g per liter.

Grapes

- Avoid severe pruning during extreme heat periods.
- Avoid excessive canopy growth by regulated irrigation and nutrient management.
- Increase frequency (2-3 per day) of irrigation with reduced quantity of water.
- Cover the dripper with organic straw mulch which increases water use efficiency.
- Apply recommended fertilizers through fertigation for efficient nutrient utilization.
- Use shade nets for young vineyards wherever feasible.
- Harvest fruits at optimum maturity to minimize losses.
- Regulate crop load by thinning clusters and shoots.

Pests and Diseases

Pest	Management practices
Thrips	Imidacloprid 30.5 % SC 0.3 ml/L Spinosad 45 % SC 0.3 ml/L Fipronil 5 % SC @ 2ml/L of water.
Mealy bug	Thiomethaxam 25 WP @0.4 grams or Imidacloprid 70 WG @0.08 -0.12 grams per liter of water
Disease	**Management practices**
Anthracnose	Copper sulphate 4.62 % @ 0.8 ml/L Copper hydroxide 72 % WP @ 2 grams Dimethomorph 75 % WP @1.5-1.75 grams
Powdery mildew	Dimethomorph 75 WP @ 1 gram + Mancozeb 75 WP @2 grams
Downy mildew	Hexaconazole 5 SC @ 1 ml+ potassium bicarbonate 5 grams or Tebuconazole 250 EC @0.75 ml /L of water

Foliar Nutrition

Condition	Foliar Spray Recommendation
Drought stress	1% Potassium nitrate (KNO_3)
Heat stress	0.5% Potassium sulphate (K_2SO_4)
Moisture stress	1% Urea + 0.5% KNO_3
Micronutrient deficiency	Multi-micronutrient mixture @ 0.5%
Berry development	1% SOP (Sulphate of Potash)
Recovery after stress	19:19:19 water-soluble fertilizer @ 1%
Sunburn prevention	Kaolin spray 3–5%

CONTINGENCIES AND THEIR MANAGEMENT: PLANTATION CROPS

Oil palm

Oil palm is to be planted in the areas where assured irrigation water sources are available throughout the year.

1. Drought

- Increased incidence of Rhinoceros Beetle, Red Palm Weevil and leaf spot diseases may occur therefore, Integrated Pest Management practices should be followed.
- Apply recommended NPK fertilizers in split doses only
- Apply 25–50 kg FYM or organic manure per palm to enhance soil moisture conservation.
- Mulch basins with oil palm fronds, dry leaves, cocoa husk or other organic materials.
- Harvest and utilize rainwater through farm ponds and water-storage structures.
- Adopt drip irrigation and fertigation to ensure continuous moisture supply.
- Construct contour bunds, conservation trenches and other moisture-conservation structures in sloping areas.
- Utilize harvested water judiciously for supplemental irrigation during prolonged dry spells.
- Establish moisture-conservation trenches between rows wherever feasible.

- Avoid pruning of healthy green leaves to maintain photosynthetic efficiency and reduce stress.
- Apply micronutrient mixtures as foliar sprays based on deficiency symptoms and soil/leaf analysis.
- Ablation should be done invariably

2. Extended Monsoon

- Increased incidence of Bud Rot, Basal Stem Rot diseases may occur under prolonged wet conditions.
- Rhinoceros Beetle breeding may increase in decomposing organic matter and unmanaged debris.
- Avoid fertilizer application during waterlogged conditions.
- Resume fertilizer application only after proper drainage and soil aeration are restored.
- Provide effective drainage channels to prevent water stagnation.
- Maintain proper drainage around palm basins and field channels.
- Apply prophylactic fungicidal treatments as per recommended guidelines.
- Maintain strict field sanitation by removing diseased and decaying plant materials.
- Ablation should be done invariably

3. Higher Temperatures

- Increased incidence of Red Palm Weevil and heat stress-related yield reduction may occur.
- Provide frequent irrigation through drip irrigation systems to maintain adequate soil moisture.

- Apply thick organic mulch around palm basins to reduce soil temperature and moisture loss.
- Maintain soil moisture near field capacity through efficient irrigation scheduling.
- Apply foliar micronutrient mixtures wherever deficiency symptoms are observed.
- Maintain an optimum canopy by retaining the maximum number of healthy green leaves.
- Promote cocoa and other compatible intercrops to improve microclimatic conditions and reduce heat stress.
- Ablation should be done invariably

Banana

1. Drought

- Increased incidence of Sigatoka leaf spot, Fusarium wilt and pseudostem weevil may occur, recommended plant protection measures should be adopted.
- Apply recommended NPK fertilizers
- Apply FYM, compost and organic mulches around plants to conserve soil moisture.
- Apply micronutrient mixture sprays based on deficiency symptoms.
- Adopt drip irrigation and fertigation.
- Remove diseased and dried leaves regularly.
- Use disease-free planting material and ensure proper field sanitation.
- Avoid moisture stress during bunch initiation and bunch development stages.

- Maintain weed-free basins to reduce competition for water.
- Support plants properly to avoid lodging under stress conditions.
- Remove severely affected wilt-infected plants.

2. Extended Monsoon

- Increased incidence of Sigatoka leaf spot, Fusarium wilt and rhizome rot may occur.
- Provide effective drainage channels to avoid waterlogging.
- Remove and destroy diseased plants.
- Avoid fertilizer application under waterlogged conditions.
- Fertilizer application after drainage improves.

3. Higher Temperatures

- Frequent irrigation through drip system.
- Mulching to reduce soil temperature.
- Protect bunches from sun scorch using dry leaves.
- Maintain optimum plant population and canopy cover.
- Apply micronutrient sprays whenever deficiency symptoms appear.

Cocoa

1. Drought

- Increased incidence of stem canker and dieback may occur.
- Apply fertilizers after receipt of effective rainfall.
- Apply FYM and cocoa pod husk compost.
- Mulch basins with cocoa husk and dry leaves.
- Supplemental irrigation should be provided.
- Apply fertilizers through fertigation wherever possible.
- Maintain adequate shade through coconut/oil palm canopy.

- Apply organic mulches around plants.
- Avoid heavy pruning during drought periods.
- Remove diseased and dried branches.

2. Extended Monsoon

- Increased incidence of Black Pod Rot (*Phytophthora* spp.), stem canker and cherelle wilt may occur.
- Remove infected pods and diseased plant parts.
- Ensure proper drainage.
- Maintain field sanitation.
- Prophylactic fungicidal sprays may be taken up as recommended before and during monsoon.

3. Higher Temperatures

- Maintain adequate shade regulation.
- Provide frequent irrigation.
- Mulch basins heavily.
- Retain sufficient canopy cover.

Coconut

1. Drought

- Increased incidence of Rhinoceros Beetle, Red Palm Weevil and eriophyid mite may occur.
- Adopt integrated pest management practices.
- Apply fertilizers after receipt of effective rainfall.
- Mulch basins with coconut leaves and husks.
- Harvest and store rainwater.

- Apply fertilizers through fertigation.
- Recycle coconut residues as mulch.
- Apply micronutrients based on deficiency symptoms.
- Apply organic manures and mulches.
- Basin management and moisture conservation measures should be adopted.
- Avoid excessive leaf removal.

2. Extended Monsoon

- Increased incidence of Bud Rot, Stem Bleeding diseases may occur.
- Improve drainage and avoid water stagnation.
- Follow integrated disease management practices.
- Remove diseased plant parts and maintain field sanitation.

3. Higher Temperatures

- Frequent irrigation through drip system.
- Mulching with coconut husk and leaves.
- Maintain soil moisture near field capacity.
- Retain maximum number of healthy leaves.

CONTINGENCIES AND THEIR MANAGEMENT: VEGETABLE CROPS

1. Delayed onset of monsoon

Go for short duration, drought tolerant crops.

Varieties suitable for growing under such condition

Crops	Suitable Varieties
Tomato	Arka Vikas, Arka Rakshak, Arka Samrat, Sahoo (Syngenta), Bahoo (Syngenta), VNR 3348, VNR 3348, Adiya (East & West seeds), Arya F1 (Nunhems)
Brinjal	Shyamala, Bhagyamati, PusaKranti, Arka Neelkanth, Manjari (Syngenta), Utkarsha (Ankura Seeds), Vinayak (Ankura Seeds)
Chilli	Teja, LCA-334 Arka Lohit, IIHR -Sel. 132, VNR 978, Ujala F1 (Nunhems)
Okra	Arkanikhita, arkaanamika, Varsha Uphar, Hisar Unnat, Khasi Lalima, Vivan (Syngenta), VBH–11 (VNR), Brigadier (East & West seeds), Gauri (Ankura Seeds)
Drumstick	PKM-1, PKM-2, Kokan Ruchira
Dolichus bean	RND-01, arka jay
Cluster Bean	Pusa Navbahar
Cowpea	Arka Garima, Pusa, Komal
Cucurbits	Bottle Gourd (Arka Bahar), Bitter Gourd (Arka Harit), Ridge Gourd (Arka Sujat), Cucumber, Cooking melon
Palak	All Green, Arka Anupama

- Cultivate short-duration varieties and hybrids as recommended for the region and season to minimize the impact of moisture stress.
- Promotion of grafted vegetable seedlings in tomato and brinjal for improving drought tolerance and crop survival under moisture stress conditions.
- Staggered nursery raising

2. Initial drought (Normal onset of monsoon followed by dry spell)
Production strategies

- Apply organic mulches such as paddy straw, dry grass, or crop residues @ 7–10 t/ha to conserve soil moisture, suppress weeds and moderate soil temperature.
- Incorporate organic manures such as Farmyard Manure (FYM) @ 15 t/ha or vermicompost @ 10 t/ha to improve soil structure and enhance water-holding capacity
- Adopt ridge-and-furrow or furrow-irrigated raised-bed planting systems to improve water-use efficiency, drainage and root development.
- Provide life-saving irrigation during critical crop growth stages, particularly during active vegetative growth, flowering and fruit development. Under limited water availability, adopt alternate-furrow irrigation to maximize water-use efficiency.
- Keep the crop field free from weeds, especially during the early growth stages, to reduce competition for moisture and nutrients.
- Restrict tillage operations to the upper 5 cm soil layer to minimize soil moisture loss and avoid disturbance of deeper soil moisture reserves

- Apply two foliar sprays of water-soluble fertilizer (19:19:19 NPK) at 5–7 g per litre of water, starting 30 days after crop establishment, to promote early growth and maintain plant vigour under stress conditions.

Plant protection strategies

Under drought conditions, sucking pests such as jassids, whiteflies, aphids, thrips and mites often become major constraints in vegetable production. The incidence of most fungal and bacterial diseases is generally lower during dry weather, although viral diseases may still occur due to increased vector activity. Follow the recommended integrated pest and disease management (IPM) practices, including timely monitoring and appropriate plant protection measures, to effectively manage pests and diseases and minimize crop losses.

Seed Treatment	Treat seeds with Imidaclopridor Thiamethoxam @ 3–5 g/kg of seed to provide early protection against sucking pests.
Management of Sucking Pests	Imidacloprid 17.8 SL @ 0.5 ml/L of water Thiamethoxam 25 WG @ 0.35 g/L of water Thiacloprid 21.7 SC @ 0.65 ml/L of water
Management of Mites	Abamectin1.9% EC @ 0.5 ml/L Spiromesifen @ 1.0 ml/L Chlorfenapyr @ 1.0 ml/L Propargite @ 2–3 ml/L Fenazaquin1.9% EC @ 2.5 ml/L
Botanical and Biological Control	Neem-based insecticides @ 5 ml/L of water *Verticilliumlecanii* @ 5 g/L of wateras a biological control agent against sucking pests

Management of Mealy Bugs	Spirotetramat 0.5 ml/L of water**,** or Imidacloprid **@** 0.5 ml/L of water
Management of Lepidopteran Caterpillars	Indoxacarb **@** 0.5 ml/L Emamectin benzoate **@** 0.35 g/L Flubendiamide **@** 0.5 ml/L

3. Mid-season drought

Production strategies

- Adopt ridge–furrow planting (25–30 cm high ridges) or furrow-irrigated raised beds (90 cm wide and 20 cm high) to improve drainage and minimize waterlogging during heavy rainfall.
- Cultivate vegetable crops and varieties that are capable of performing well under both low and excess rainfall conditions, as recommended in the table above.
- Provide life-saving irrigation during critical crop growth stages, particularly during active vegetative growth, flowering, and fruit development, whenever moisture stress occurs.
- Keep fields weed-free during the early stages of crop growth to reduce competition for moisture, nutrients, and sunlight.

Onion

- In onion cultivation, only the Kharif crop accounting for about 20% of the total area, is predominantly grown under rain-fed conditions. The Rabi crop, which occupies approximately 60% of the area and the late Kharif crop (about 20% of the area) are generally cultivated under assured irrigation. Therefore, the impact of drought or rainfall deficit is primarily confined to the Rain-fed Kharif onion crop.

1. Delayed onset of monsoon

This may not have much effect on the Kharif onion as this crop can be transplanted from July to August. The nursery raising will be rather easier, as onion seedlings are difficult to be raised under rains. The following strategies are suggested in this situation.

- Grow onion varieties with wide adaptability that are suitable for both Kharif and late Kharif seasons, such as Bhima Super, Bhima Raj, Bhima Red, Bhima Shubra, Agrifound Dark Red, ArkaKalyan, ArkaPragati, Baswant 780, and Phule Samarth.
- Raise the nursery during the second week of June so that 35–50 day-old seedlings are available for transplanting at the appropriate time.
- Prepare raised nursery beds and use drip or micro-sprinkler irrigation systems for efficient utilization of available water. Where these facilities are not available, irrigation can be provided using watering cans or portable sprinklers.
- Ensure at least three to four irrigations in the nursery to maintain adequate soil moisture for healthy seedling growth.
- Protect seedlings from excessive heat and moisture stress by providing partial shade using shade nets.
- Apply paddy straw or other suitable stubble mulch on nursery beds until seed germination to conserve soil moisture and reduce evaporation losses.
- Incorporate well-decomposed organic manure or farmyard manure (FYM) at 0.5 t per 1000 m^2 of nursery area to improve soil fertility and water-holding capacity.
- In cases of poor seedling growth, apply a foliar spray of water-soluble NPK fertilizer (19:19:19) at 5 g per litre of water to promote rapid recovery and vigorous growth.
- Direct seeding of onion can be adopted as an alternative to transplanting. Sow seeds at a rate of 8–9 kg/ha on raised beds using drip or sprinkler

irrigation systems. This method enables the crop to mature approximately one month earlier than conventionally transplanted onion crops.

- Where available, onion sets (bulblets) may be used for kharif cultivation. Crops established from sets generally mature about 45 days earlier than those raised through seedling transplanting, helping to reduce the crop's exposure to adverse weather conditions.

2. Initial /Mid-season drought

Three to four irrigations are essential during critical growth stages of onion, depending on soil type. The most important stages are crop establishment (10–20 DAT), active vegetative growth (30–40 DAT), and bulb initiation (40–50 DAT). To mitigate the effects of rainfall deficit during these stages, the following measures are recommended:

- Cultivate onion on raised beds with drip irrigation to improve water-use efficiency and maintain optimum soil moisture.
- Harvest and store rainwater in farm ponds or storage structures to provide two to three life-saving irrigations during prolonged dry spells. Irrigation should be scheduled based on soil moisture status and crop water requirements.
- Apply kaolin (kaolinite) spray at 5% concentration as an antitranspirant to reduce water loss through transpiration during moisture stress conditions.
- Mulch the soil surface with organic materials such as paddy straw, wheat straw, or dry fodder to conserve soil moisture and reduce evaporation losses.
- In cases of poor crop growth, spray water-soluble NPK fertilizer (19:19:19) at 5 g per litre of water to promote rapid recovery and improve plant vigour.
- Apply sulphur 85% WP at 1.5–2.0 g per litre of water as a foliar spray during the active vegetative stage to support crop recovery and growth.

- Spray a micronutrient mixture containing Zn, Mn, Fe, Cu, and B at 5 ml per litre of water at 30, 45, and 60 DAT to improve crop stand, growth, and productivity.
- Incorporate well-decomposed organic manure or FYM at 20 t/ha about 15–30 days before transplanting to improve soil fertility and water-holding capacity.

Thrips Management

Thrips populations may increase beyond the economic threshold level (30 thrips per plant). Under such situations, spray any one of the following insecticides for effective control:

- Imidacloprid30.5 % SC 0.5 ml/L
- Spinosad 45 % SC 0.3 ml/L
- Fipronil 5 % SC @ 2ml/L of water.

Terminal drought: One irrigation is sufficient at 85 days after transplanting. That may be provided by drip irrigation using harvested rainwater

CONTINGENCIES AND THEIR MANAGEMENT: FLOWER CROPS

1. Delayed Onset of Monsoon

- **Marigold & Chrysanthemum:** Postpone direct field transplanting. Retain seedlings in the nursery for an extra 10–15 days by shading them and reducing water to harden them off.
- **Jasmine, Rose & Tuberose:** Delay the pruning schedule to push back the peak flowering window until water becomes available. Swap open-field irrigation with strict drip line systems.

Treat roots with liquid *Azospirillum* and *Phosphobacteria* bio-fertilizers during transplanting to boost early root development under low-moisture conditions.

2. Initial drought (Normal onset of monsoon followed by dry spell)

- **Marigold & Chrysanthemum**: High mortality risk for young transplants. Immediately apply paddy straw or coconut coir mulch around the base of the plants to shield the soil from direct sunlight.
- **Jasmine, Tuberose & Rose**: Young buds or emerging sprouts will dry up. Inter-cultivate the land to create a loose dust mulch that breaks soil capillaries and stops moisture evaporation.

Use a protective anti-transpirant spray like Kaolin (4-5%) on the leaves to reflect excess heat and lower water loss.

3. Mid-season drought

- **Marigold & Chrysanthemum**: This triggers premature budding, which results in small, unsellable flowers. Pinch off early, low-quality buds to keep the plant's energy focused on staying alive.
- **Tuberose**: Flower spikes will fail to emerge or will become short and deformed. De-sucker the plants by removing extra side shoots to lower water demand.
- **Jasmine & Rose**: Severe leaf shedding may happen. Prioritize alternate-row irrigation or micro-sprinklers to keep the root zones damp.

Open conservation furrows between every two flower rows to trap any unexpected rainfall.

4. Terminal Drought

- **Marigold & Chrysanthemum**: Flowers open too quickly, leading to poor shelf life and a loss of petals. Harvest the flowers early in the morning when the tissue is coolest, and put them straight into water.
- **Jasmine & Rose**: Petals turn brown and lose their scent. Harvest open blooms daily and use them for loose flower markets or essential oil extraction immediately.
- **Tuberose**: Spikes wilt quickly on the plant. Cut the spikes when the lower 1–2 pairs of florets open and place them in a holding solution (sucrose + citric acid) to prolong shelf life.

Use saved water from farm ponds to give a life-saving irrigation dose right at the bud emergence stage

5. Extended Monsoon

- **Marigold & Chrysanthemum**: High risk of flower bud rot (*Alternaria*), root rot, and damping-off. Build raised beds for planting and dig deep trenches to drain standing water away immediately.
- **Jasmine, Rose & Tuberose**: Causes heavy leaf growth but very few flowers, along with severe root asphyxiation. Shake branches after heavy rains to drop trapped water and prevent fungal diseases like black spot and powdery mildew.

Stop all irrigation and nitrogen feeding. Tie up heavy, bending rose canes or tall chrysanthemum varieties to bamboo supports to stop them from falling into wet mud.

6. Higher Temperatures

- **Marigold & Chrysanthemum**: Flower petals get scorched and colors fade (e.g., bright yellow turns pale). Erect 50% black or green shade nets over high-value varieties.
- **Jasmine**: Higher heat boosts flower yields but causes them to open too fast, reducing fragrance quality. Increase harvest frequency to twice a day (early morning and late evening).
- **Rose & Tuberose**: Blind wood (shoots without flowers) increases, and flower size shrinks drastically. Mulch the soil heavily to keep root temperatures cool.
- Use overhead micro-foggers during peak afternoon hours to lower the temperature around the plants by 3-5 ^{0}

Management Practices by Crop Growth Stage

The table below outlines critical management interventions across the vegetative, flowering, and harvesting stages:

Management Aspect	Vegetative Stage (Nursery to Active Growth)	Flowering & Bud Development Stage	Maturity & Harvesting Stage
A. Pests & Diseases	• Treat Marigold/Chrysanthemum seeds with *Trichodermaviride*. • Spray Neem oil (3,000 ppm) for early Thrips and Mites on Rose/Jasmine. • Drench soil with Copper Oxychloride for Tuberose root rot.	• Spray systemic fungicides (e.g., Carbendazim) for Rose Black Spot and Chrysanthemum Ray Blight. • Monitor Marigold for Bud Borer (*Helicoverpa-armigera*) • Use yellow sticky traps for Whiteflies.	• Spray bio-pesticides with short withholding periods. • Rogue out any virus-infected or heavily rotted flower heads. • Avoid chemical sprays 3 days before picking loose flowers.
B. Fertilizer	• Apply well-rotted Farmyard Manure (FYM) as a base layer. • Apply full Phosphorus and Potassium; delay Nitrogen if it is dry. • Avoid excessive Nitrogen, which causes soft leaves that invite pests.	• Apply split doses of Nitrogen only when soil moisture is good. • Use water-soluble NPK (19:19:19) through drip lines. • Reduce ground fertilization during mid-season droughts.	• Stop all ground Fertilizer applications entirely. • Apply a final dose of Potassium to Tuberose to boost bulb weight for next season. • Incorporate flower crop residues back into the soil.

Management Aspect	Vegetative Stage (Nursery to Active Growth)	Flowering & Bud Development Stage	Maturity & Harvesting Stage
C. Water Conservation	• Use organic mulch (straw or sugarcane trash) right after planting. • Run drip irrigation systems for 30–45 minutes in the early morning. • Keep the soil loose by regular hoeing to form a dust mulch.	• Prioritize watering during the critical bud initiation stage. • Implement alternate-row or skip-row irrigation if water is scarce. • Use low-volume mini-sprinklers for Jasmine fields.	• Keep root zones damp but never waterlogged. • Withhold water 1–2 days before Harvesting Marigold to prevent heavy, wet heads. • Clean out field drainage channels completely.
D. Foliar Nutrition	• Spray 1% water-soluble NPK to boost plant frame growth. • Spray 0.2% Zinc Sulfate + 0.2% Ferrous Sulfate to stop leaf yellowing • Apply foliar feeds only in the late afternoon.	• Spray 2% Potassium Nitrate (\(\text{KNO}_{3}\)) to improve drought tolerance. • Spray 0.1% Boron to boost flower size and prevent Tuberose bud drop. • Use humic acid sprays to help roots absorb nutrients.	• Avoid late foliar nutrient sprays on open flower petals. • A spray of 0.05% Silver Thiosulfate on Rose/ Chrysanthemum stems before cutting can prolong vase life.
E. Other Practices	• Pinch back Marigold and Chrysanthemum	• Stake tall Chrysanthemum varieties and	• Cut long-stem Roses and Tuberoses using

Management Aspect	Vegetative Stage (Nursery to Active Growth)	Flowering & Bud Development Stage	Maturity & Harvesting Stage
	terminal shoots to encourage branching. • Remove weak seedlings. • Prune Rose bushes cleanly at a \(45^{\circ }\) angle.	heavy Tuberose spikes. • Disbud side flower buds on single-stem Roses to get larger blooms. • Keep honeybee boxes nearby to improve pollination.	sharp, clean shears. • Sort flowers by grade and pack loose blooms into ventilated bamboo baskets. • Keep harvested flowers in a shaded, cool packing shed.

Polyhouse grown Gerbera Contingency Plan

1. Delayed Onset of Monsoon

- Actionable Strategy: Counteract intense solar radiation and high salt accumulation in the growing media.
- Polyhouse Implementation: Keep the top shade nets (50%) closed from 10:00 AM to 4:00 PM to prevent sunburn on young Gerbera leaves.
- Drip Technique: Increase your drip irrigation frequency to 3–4 short cycles per day. This keeps the electrical conductivity (EC) low in the root zone and prevents salt injury.

2. Initial drought (Normal onset of monsoon followed by dry spell)

- Actionable Strategy: Prevent sudden drops in indoor Relative Humidity (RH) which causes small flowers and short stems.
- Polyhouse Implementation: Run your overhead fogger or misting system for 2–3 minutes every hour during the day to keep the indoor RH between 60% and 70%.

- Drip Technique: Apply a thick layer of well-decomposed coco-peat mulch directly on top of the Gerbera raised beds to shield the root zone from drying out.

3. Mid-Season Drought (Borewell Yield Drops)

- Actionable Strategy: Conserve every drop of water and prioritize high-yield flower beds.
- Polyhouse Implementation: Close the side ventilation curtains completely during hot winds to block dry air from stripping moisture out of the house.
- Drip Technique: Run the drip lines only during the early morning (5:00 AM to 7:00 AM). Manually prune away all older, lower, or yellowing leaves to reduce the plant's total water demand.

4. Terminal Drought (Severe Borewell Depletion & Salty Water)

- Actionable Strategy: Manage high-salinity water to prevent root burn and crown rot.
- Polyhouse Implementation: Focus your remaining water exclusively on healthy, producing patches. Harvest flowers at a slightly earlier stage (when 2–3 rows of disc florets are perpendicular to the stalk) to ease stress on the mother plant.
- Drip Technique: Clean your inline disc filters twice a day. If your borewell water turns highly saline, flush the beds with clean water (or harvested rainwater) once a week to wash out built-up salts.

5. Extended Monsoon (High Humidity & Low Light)

- Actionable Strategy: Prevent catastrophic fungal attacks like Powdery Mildew and *Botrytis* (Flower Rot).
- Polyhouse Implementation: Roll up the side curtains completely to increase air circulation and reduce stagnant humidity. Keep shade nets completely open to maximize sunlight penetration.

- Drip Technique: Reduce your water application by 50–60%. Never run misting or fogging systems during monsoon days, as high indoor humidity will rot the flower crowns**.**

6. Higher Temperatures

- Actionable Strategy: Lower indoor temperatures to prevent flower color fading and blind buds.
- Polyhouse Implementation: Use a combination of fan-and-pad cooling systems (if available) or white reflective paint on the polyhouse exterior roof to bounce off excess heat.
- Drip Technique: Run the drip system to keep the soil moist, but avoid waterlogging. High heat combined with soggy soil creates a perfect environment for *Pythium* and *Phytophthora* root rot.

Stage-Wise Management Practices for Polyhouse Gerbera

Management Aspect	Vegetative Stage (Planting to 8 Weeks)	Flowering & Bud Development Stage	Peak Harvesting Stage
A. Pests & Diseases	• Drench beds with Metalaxyl to prevent Crown Rot. • Release biocontrol agents or spray for Whiteflies. • Set up yellow and blue sticky traps right above the plant canopy.	• Spray specialized fungicides for Powdery Mildew (*Podosphaera*). • Use targeted miticides on leaf undersides for Red Spider Mites. • Clean up and remove any dead or spotty leaves instantly.	• Spray only bio-pesticides with zero chemical residue. • Watch for Thrips inside open flower heads, which distort

Management Aspect	Vegetative Stage (Planting to 8 Weeks)	Flowering & Bud Development Stage	Peak Harvesting Stage
			petals. • Avoid spraying chemicals on open petals to prevent burning.
B. Fertigation Management	• Target an EC of 1.2 to 1.5 mS/cm. • Inject N:P:K in a 1:1:1 or 2:1:1 ratio. • Include Calcium Nitrate to build strong root and leaf structures.	• Increase your fertilizer EC to 1.5–1.8 mS/cm. • Shift to a 1:1:2 ratio (e.g., using Potassium Nitrate). • Maintain a strict soil pH between 5.5 and 6.5.	• Keep the Potassium level high to ensure long, stiff flower stems. • Feed Magnesium Sulfate weekly to keep leaves deep green. • Flush lines with plain water once a week to clear chemical buildup.

Management Aspect	Vegetative Stage (Planting to 8 Weeks)	Flowering & Bud Development Stage	Peak Harvesting Stage
C. Water Conservation	• Water lightly and frequently to keep the top 10 cm of media moist. • Avoid spraying water directly onto the central growing crown.	• Keep moisture levels steady; dry spells cause short flower stalks. • Use automated soil moisture sensors to avoid over-watering.	• Pull back water by 10% the morning before a major harvest day. • This hardens the stems and prevents them from snapping during transit.
D. Foliar Nutrition	• Spray a 0.1% micronutrient mixture (Fe, Zn, Mn, B). • Apply a humic acid spray to encourage lateral root spread.	• Spray 0.1% Boron to prevent bent necks and hollow flower stems. • Spray 0.2% Calcium Nitrate to strengthen cell walls against pests.	• Never apply foliar nutrient sprays directly onto open flower heads. • Spray only in the early morning so leaves dry off before

Management Aspect	Vegetative Stage (Planting to 8 Weeks)	Flowering & Bud Development Stage	Peak Harvesting Stage
			nightfall.
E. System Maintenance & "Other"	• Planting Depth: Ensure the central crown sits 1 cm above soil level. • Flush lines with acid to clear out hard borewell scaling.	• Perform raking on the bed surfaces to break up hard crusts. • Remove all side suckers to keep a single, strong central crown.	• Harvest flowers by cleanly pulling the stem sideways (do not cut). • Place stems immediately into clean buckets filled with chlorinated water. • Keep the sorting area clean to stop diseases from spreading.

CONTINGENCIES AND THEIR MANAGEMENT: MEDICINAL AND AROMATIC CROPS

1. Aloe vera

Monsoon aberration	Contingency plan / Management measures
Delayed onset of monsoon	Delay planting until adequate soil moisture is available. Use healthy suckers and irrigate immediately after planting.
Initial drought	Life-saving irrigation at 7–10 day intervals; mulching with dry leaves or straw around plants.
Mid-season drought	Moisture conservation by inter cultivation; remove weeds; provide drip irrigation.
Terminal drought	Reduce irrigation interval; harvest mature leaves early to avoid yield loss.
Extended monsoon	Ensure drainage to avoid water logging and root rot; avoid standing water.
Higher temperatures	Light irrigation and mulching to reduce soil temperature; shade for newly planted suckers if required.

Crop stage management

- **Pests/diseases:** Leaf spot, mealy bugs, soft rot; spray need-based fungicide/insecticide.
- **Fertilizer:** FYM + split nitrogen after establishment.
- **Water conservation:** Mulching, basin formation, drip irrigation.
- **Foliar nutrition:** 1% micronutrient spray

2. Ashwagandha

Monsoon aberration	Contingency plan / Management measures
Delayed onset of monsoon	Delay sowing till sufficient rainfall; prefer short-duration varieties.
Initial drought	Gap filling after rainfall; light irrigation if available.
Mid-season drought	Intercultivation to break soil crust; moisture conservation by mulching.
Terminal drought	Early harvesting if roots attain maturity.
Extended monsoon	Provide drainage to prevent root rot and wilt.
Higher temperatures	Light irrigation at critical stage; maintain soil cover.

Crop stage management

- **Pests/diseases:** Leaf spot, wilt, root rot.
- **Fertilizer:** Apply FYM at land preparation; avoid excess nitrogen.
- **Water conservation:** Mulching and shallow inter-cultivation.
- **Foliar nutrition:** 1% urea or 1% KNO_3spray during stress.

3. Lemongrass

Monsoon aberration	Contingency plan / Management measures
Delayed onset of monsoon	Delay planting of slips until arrival of rains or provide irrigation.
Initial drought	Irrigate immediately after planting and maintain moisture.
Mid-season drought	Harvest at proper interval and irrigate after harvest. Mulching between rows.
Terminal drought	One protective irrigation after harvest for ratoon crop.
Extended monsoon	Proper drainage between the rows to avoid root damage.
Higher temperatures	Frequent irrigation and mulching to reduce moisture loss.

Crop stage management

- **Pests/diseases:** Leaf blight, rust, shoot borer.
- **Fertilizer:** Nitrogen in split doses after each cut.
- **Water conservation:** Mulching, furrow irrigation, drip.
- **Foliar nutrition:** 1% urea spray after harvest for quick regeneration.

4. Tulasi

Monsoon aberration	Contingency plan / Management measures
Delayed onset of monsoon	Delay transplanting until adequate rainfall; irrigation after transplanting.
Initial drought	Frequent light irrigation; gap filling of dead or diseased seedlings.
Mid-season drought	Mulching and inter cultivation to conserve moisture.
Terminal drought	Harvest leaves early before severe moisture stress.
Extended monsoon	Provide drainage to avoid root rot and yellowing.
Higher temperatures	Irrigate in shorter intervals; application of mulch around plants.

Crop stage management

- **Pests/diseases:** Leaf spot, powdery mildew, aphids, whiteflies.
- **Fertilizer:** FYM + split N application after each harvest.
- **Water conservation:** Organic mulch, drip irrigation, weeding.
- **Foliar nutrition:** 1% KNO_3/ micronutrient spray after each harvest.

Common Advisory for All Medicinal & Aromatic Crops

A. Likely incidence of pests & diseases

- Leaf spot
- Root rot
- Wilt
- Aphids / whiteflies / mealy bugs
- Regular monitoring and timely plant protection measures are recommended.

B. Fertilizer management

- Apply well-decomposed FYM/compost.
- Split application of nitrogen during active growth.
- Micronutrient spray during stress conditions.

C. Water conservation measures

- Mulching with crop residues
- Drip irrigation
- Basin or furrow irrigation
- Inter-cultivation for moisture conservation
- Proper drainage during heavy rainfall

D. Foliar nutrition

- 1% urea spray
- 1% potassium nitrate (KNO_3)
- Micronutrient mixture spray
- Seaweed extract/biostimulant spray during drought stress

CONTINGENCIES AND THEIR MANAGEMENT: SPICES

Turmeric and Ginger

1. Delayed Onset of Monsoon

- Farmers may be advised to undertake timely land preparation and adopt staggered sowing based on rainfall receipt.
- Use of healthy, disease-free seed rhizomes and suitable short-duration or drought-tolerant varieties may be encouraged.
- Ridge-and-furrow or raised bed planting methods should be followed to conserve soil moisture and facilitate drainage.
- Mulching with green leaves, straw, or crop residues should be adopted immediately after planting to reduce evaporation losses.

2. Mid-Season Drought and Long Dry Spells

- Life-saving irrigation through drip or sprinkler systems should be provided wherever water sources are available.
- Rainwater harvesting structures, farm ponds, and moisture conservation practices should be promoted.
- Intercultural operations such as earthing up and weed control should be carried out to minimize moisture competition.
- Foliar spray of micronutrients may be recommended to reduce drought stress and sustain crop growth.
- Organic matter incorporation and application of farmyard manure may be encouraged to improve soil moisture retention capacity.

3. General Crop Management Measures

- Regular pest and disease surveillance should be ensured through integrated crop management practices.

- Balanced fertilizer application based on soil test recommendations should be followed.

Crop specific preventive measures were advised to farmers

Turmeric

- Prepare raised beds along with drip irrigation for sowing.
- Mulch the beds immediately after sowing with paddy straw or plastic mulch which ever will be available. As the mulch will conserve moisture, reduce soil temperature and also improve sprouting.
- Can recommend short duration varieties like Pragathi and Roma.
- Apply maximum quantity of organic manures like FYM, Vermicompost and Neem cake which will retain moisture content.

Ginger

- Prepare raised beds along with drip irrigation for sowing.
- Mulch the beds immediately after sowing with paddy straw or plastic mulch which ever will be available. As the mulch will conserve moisture, reduce soil temperature and also improve sprouting.
- Can recommend drought tolerant/ short duration varieties Nadia, Rio-de-Janeiro and IISR Varada
- Apply maximum quantity of organic manures like FYM, Vermicompost and Neem cake which will retain moisture content.
- Provide 50% shaded conditions to prevent from excess sunlight.

Betelvine

- Frequent light irrigation should be provided.
- Mulching with organic materials.
- Maintain adequate shade in vine gardens.

- Increased incidence of foot rot and leaf spot diseases may occur.
- Apply organic manures and maintain optimum soil moisture.
- Apply micronutrient sprays based on deficiency symptoms.
- Adopt drip irrigation wherever feasible.
- Life-saving irrigation is essential.
- Maintain high humidity through irrigation and mulching.
- Avoid exposure of vines to direct sunlight under high temperatures

Chillies

Month	Crop Stage	Likely Aberr-ation	Crop & Water Manage ment	Ferti-lizer Manage ment	Foliar Nutrition (Dosage /Litre)	Pests & Diseases	Recomm-ended Plant Protection Measures
June	Nurser y Raisin g	Delayed monsoon, high temperatu res	Raise nursery under 50% shade net, protrays , ensure drainag e, mulch nursery beds	Apply FYM @ 10–12 t/ha; *Trichode rma* enriched FYM @ 2.5 kg/acre	19:19:19 @ 10 g	Damping-off	Seed treatment with *Trichoderma* @ 10 g/kg seed; Nursery drenching with *Trichoderma* @ 5 g/L
July	Nurser y/Tran splanti ng	Delayed onset, initial drought	Transpla nt after effective rainfall, ridge & furrow plantin, mul-ching, life-saving irriga-tion	Basal dose: 60:80:80 kg $N:P_2O_5:K_2O$/ha	KNO_3 @ 10 g + Humic acid @ 2 ml	Thrips	Neem oil @ 5 ml/L; Fipronil 5 SC @ 1.5 ml/L;

August	Vegetative Growth	Initial drought/ dry spell	Gap filling, inter cultivation, weed control, drip irrigation (2–3 L/plant/ day)	2nd split N @ 30 kg/ha through ferti-gation	19:19:19 @ 10 g + Micronutrient mixture @ 5 g	Thrips, Mites	Spiromesifen 22.9 SC @ 1 ml/L Spinetoram 11.7 SC @ 0.5 ml/L;
September	Flowering & Fruit Set	Mid-season drought	Protective irrigation, moi-sture conservation through mulc-hing	3rd split N @ 30 kg/ha and K through fertigation	KNO_3 @ 10 g + SOP @ 10 g + Boron @ 2 g	Thrips, Mites, White flies-Leaf curl virus, Fruit borer, Flower drop	Emamectin benzoate 5 SG @ 0.4 g/L; Chlorantraniliprole 18.5 SC @ 0.3 ml/L Blue & Yellow sticky traps @ 30/acre
October	Fruit Development & Early Har-vest	Mid-season/Terminal drought, heat stress	Frequent harvesting, maintain soil moisture, drip irrigation (3–4 L/plant/ day)	Potassium-rich fertilization, avoid excess nitrogen	SOP @ 10 g + Calcium nitrate @ 5 g	Black Thrips, White flies-Leaf curl virus, Fruit borer, Wilt complex, Mites, Anthra-cnose	Azoxystrobin + Difenoconazole @ 1 ml/L; Spiromesifen @ 1 ml/L ; Blue & Yellow sticky traps @ 30/acre
November	Fruiting & Harvesting	Terminal drought/Extended monsoon	Timely harvest, drainage during excess rainfall, raised beds	Additional N @ 20 kg/ha after heavy rains if require	KNO_3 @ 10 g + Calcium nitrate @ 5 g	Anthracnose, Fruit rot, White flies-Leaf curl virus, Wilt complex, Die-back, *Phytophthora*blight	Metiram + Pyrachlostrobin @ 2g/L, Copper oxychloride @ 3 g/L; Metalaxyl + Mancozeb @ 2.5 g/L; Blue & Yellow sticky traps @ 30/acre

December	Peak Harvesting	Extended monsoon, high humidity	Remove diseased fruits, maintain field sanitation and drainage	No major fertilizer application	Calcium nitrate @ 5 g	Wilt complex, Fruit rot, Anthracnose, Bacterial leaf spot, White flies-Leaf curl virus	Drenching:Tebuconazole @ 1 ml/L + Thiphanate methyl @ 2g/L Foliar : Metiram + Pyrachlostrobin @ 2g/L;Copper hydroxide @ 2.5 g/L; Copper oxychloride @ 3 g ; Thiamethoxam 25 WG @ 0.25 g/L; Blue & Yellow sticky traps @ 30/acre
January	Peak Harvesting	Low temperature, fog, moisture stress	Harvest at 10–15 day intervals, remove infected fruits	Apply fertigation if crop vigour declines	Calcium nitrate @ 5 g + KNO_3 @ 10 g	Wilt complex, Anthracnose, Powdery mildew White flies-Leaf curl virus	Drenching: Fosetyl Al @ 2g/L Foliar:Azoxystrobin + Difenoconazole @ 1 ml/L; Wettable Sulphur @ 3 g/L; Dinetofuran 20 SG @ 0.3g/L @ 0.25 g/L; Blue & Yellow sticky traps @ 30/acre
February	Continued Harvesting	Rising temperature, dry weather	Protective irrigation, sanitation, removal of old branches	Light fertigation based on crop condition	SOP @ 10 g + Micronutrient mixture @ 5 g	Wilt complex, Black Thrips, Mites, Anthracnose, Fruit borer	Spinetoram 11.7 SC @ 0.5 ml/L; Spiromesifen 22.9 SC @ 1 ml/L

March	Final Harvest & Crop Termination	High temperature, terminal drought	Complete harvesting, uproot crop resid-ues, deep summer ploughing	No further fertilizer application	KNO_3 @ 10 g (if harvest continues)	Black Thrips, Mites, White flies-Leaf curl virus, Dry Fruit Rot	Need-based pest management; field sanitation and destruction of crop residues

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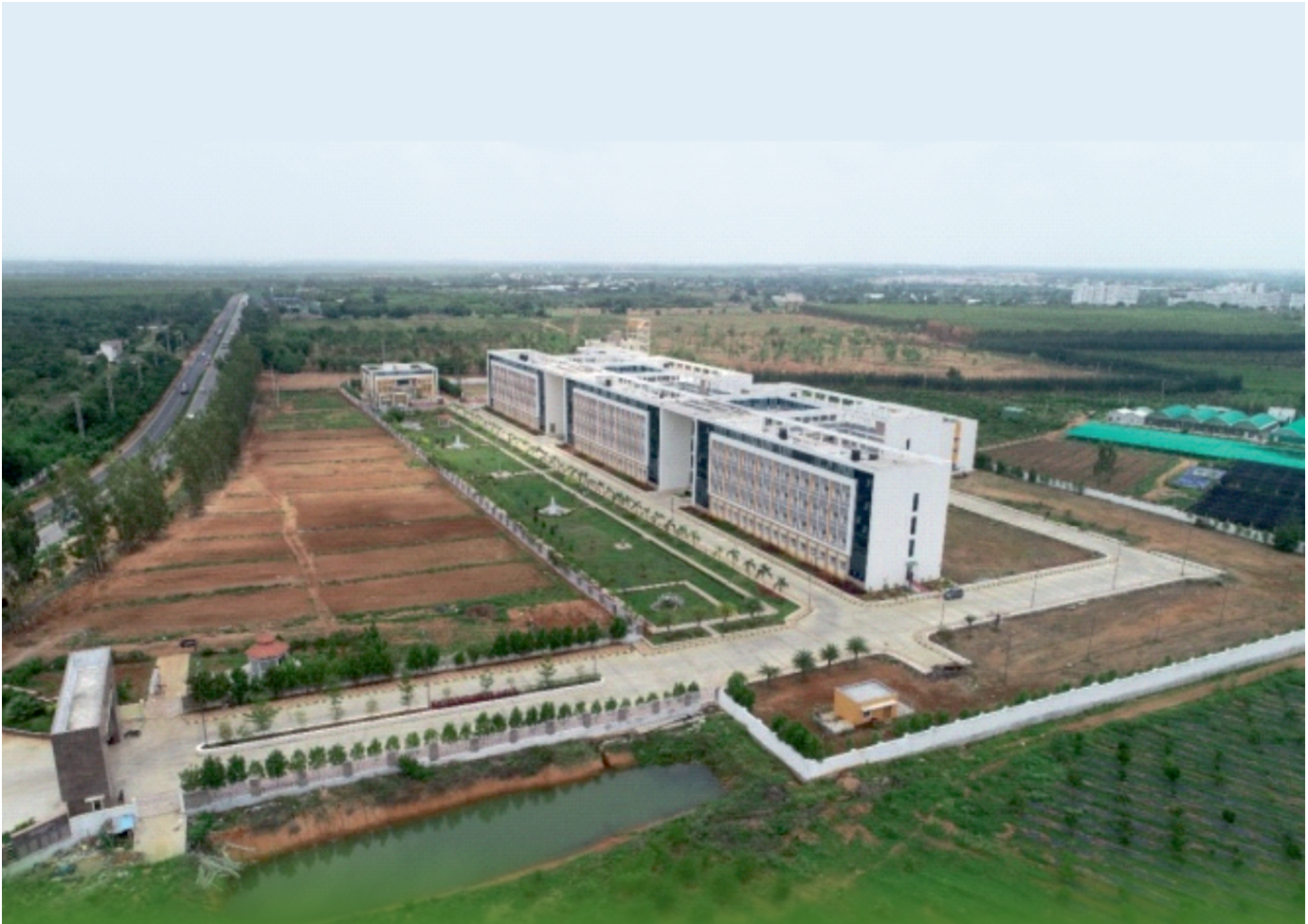

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