



भारतीय कृषि
ICAR

INDIAN COUNCIL OF
AGRICULTURAL RESEARCH

DISTRICT WISE CONTINGENCY PLAN TO DEAL WITH **EL NIÑO**

PREPAREDNESS | RESPONSE | RESILIENCE



BUILDING A
DROUGHT RESILIENT
ANDHRA PRADESH



RICE



PIGEONPEA
(TUR)



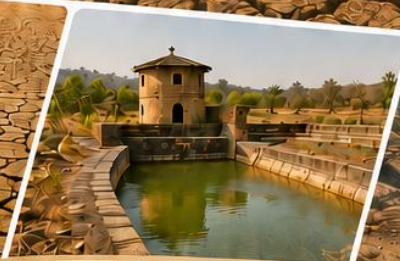
BLACKGRAM
(URAD)



MAIZE



COTTON



EARLY WARNING
& MONITORING



WATER
MANAGEMENT



SUSTAINABLE
AGRICULTURE



COMMUNITY
PARTICIPATION

TOGETHER, LET'S BUILD A RESILIENT ANDHRA PRADESH

PREPARE TODAY • PROTECT TOMORROW • PROSPER TOGETHER

Andhra Pradesh

Andhra Pradesh is one of India's leading agricultural states, with agriculture serving as the backbone of its economy and a major source of livelihood for a large proportion of the rural population. The state's diverse agro-climatic conditions, fertile river deltas, extensive irrigation infrastructure, and progressive farming community make it one of the country's most productive agricultural regions. Located along the southeastern coast of India, Andhra Pradesh covers a geographical area of about 16.2 million hectares and experiences a tropical climate characterized by hot summers, moderate winters, and rainfall primarily from both the Southwest and Northeast monsoons. The average annual rainfall ranges between 700 and 1,200 mm, although significant spatial variability exists across districts. The fertile alluvial soils of the coastal plains, black cotton soils in the Rayalaseema region, and red loamy soils spread across much of the state support a wide range of cropping systems.

Agriculture contributes significantly to the state's Gross State Value Added (GSVA) and plays a vital role in ensuring food security, employment generation, and rural development. More than half of the state's population is directly or indirectly dependent on agriculture and allied sectors, including horticulture, livestock, fisheries, and forestry. Andhra Pradesh has consistently been among the leading producers of rice, maize, groundnut, chillies, tobacco, oil palm, mango, banana, citrus, papaya, coconut, and several pulses. The state has also emerged as a national leader in aquaculture and inland fisheries, contributing substantially to India's seafood exports.

Rice is the principal food crop and occupies the largest share of cultivated area. The fertile deltas of the Krishna and Godavari rivers have earned the state the reputation of being one of India's "Rice Bowls." Major rice-growing districts include East Godavari, West Godavari, Krishna, Guntur, Nellore, and Konaseema. Besides rice, maize has become an important cereal crop due to increasing demand from the poultry and feed industries. Groundnut remains the dominant oilseed crop, particularly in the drought-prone Rayalaseema districts such as Anantapur, while sunflower, sesame, and castor are also cultivated on a smaller scale. Pulses including red gram (pigeonpea), black gram, green gram, Bengal gram, and horse gram are grown under rainfed conditions as well as in rice fallows, contributing to nutritional security and soil fertility.

Andhra Pradesh is internationally recognized for its commercial and horticultural agriculture. The state ranks among the top producers of fruits and vegetables in India, benefiting from favorable climatic conditions and growing market demand. Mango,

banana, citrus, guava, papaya, sapota, and grapes are cultivated extensively, while tomato, onion, brinjal, chilli, okra, and leafy vegetables form important vegetable crops. Andhra Pradesh is India's leading producer of chillies, with Guntur serving as one of the world's largest chilli trading hubs. The state is also the largest producer of oil palm, supported by suitable climatic conditions and government initiatives promoting edible oil self-sufficiency. Coconut cultivation is concentrated in the coastal districts, while floriculture involving jasmine, marigold, chrysanthemum, and rose has gained importance due to expanding domestic and export markets.

Irrigation is one of the key strengths of Andhra Pradesh agriculture. The state possesses an extensive irrigation network supported by major river systems, reservoirs, canals, tanks, groundwater resources, and lift irrigation projects. Large irrigation projects on the Krishna and Godavari rivers, including the Polavaram Project, have significantly enhanced irrigation potential and agricultural productivity. Micro-irrigation technologies such as drip and sprinkler systems are increasingly being adopted, particularly for horticultural crops, enabling efficient water use and improving crop yields. Despite these advancements, certain regions, particularly Rayalaseema, continue to face recurring droughts, groundwater depletion, and rainfall variability, necessitating climate-resilient agricultural practices.

Livestock and allied sectors contribute substantially to agricultural income and nutritional security in Andhra Pradesh. Dairy farming, poultry production, sheep and goat rearing, and piggery provide supplementary income to farming households. The state has one of the largest poultry industries in India, supplying eggs and broilers to domestic and export markets. Fisheries and aquaculture have experienced remarkable growth, with Andhra Pradesh consistently ranking first in inland fish and shrimp production. Extensive freshwater aquaculture in the Godavari and Krishna delta regions has transformed rural livelihoods and positioned the state as a major exporter of shrimp to international markets.

Mechanization and technological interventions have significantly modernized agriculture in Andhra Pradesh. Farmers increasingly use tractors, combine harvesters, laser land levellers, drones for crop monitoring and pesticide application, precision farming techniques, and digital advisory services. The state government has promoted farmer producer organizations (FPOs), custom hiring centres, soil health management, quality seed distribution, integrated nutrient management, integrated pest management, and natural farming practices. Andhra Pradesh has received national recognition for

promoting Community Managed Natural Farming (APCNF), which emphasizes reduced chemical inputs, improved soil health, biodiversity conservation, and climate resilience.

The state has also invested considerably in agricultural research, education, and extension services. Agricultural universities, research stations, and institutions work closely with farmers to develop and disseminate improved crop varieties, climate-smart technologies, integrated farming systems, and sustainable resource management practices. The adoption of high-yielding varieties, hybrid seeds, balanced fertilizer use, mechanization, and scientific crop management has contributed to steady improvements in productivity. Digital agriculture initiatives, remote sensing, weather-based advisories, mobile applications, and e-marketing platforms are increasingly helping farmers make informed decisions regarding crop planning, input use, and marketing.

Despite its strengths, Andhra Pradesh agriculture faces several challenges. Climate change has increased the frequency of droughts, cyclones, floods, heat waves, and pest outbreaks, adversely affecting crop production and farm incomes. Fragmented landholdings, declining soil fertility, groundwater depletion, labour shortages, rising input costs, market price fluctuations, and post-harvest losses continue to constrain agricultural growth. Coastal agriculture is particularly vulnerable to cyclones, saline water intrusion, and sea-level rise. Strengthening climate-resilient agriculture through improved water management, stress-tolerant crop varieties, diversified farming systems, efficient irrigation, digital weather services, crop insurance, and value chain development will be essential for ensuring long-term sustainability.

Area under major crops

Crop	Area (Lakh ha)
Paddy	20.77
Cotton	4.04
Groundnut	3.28
Tobacco	1.39

Districts vulnerable to El Nino

High	Medium	Low
Kurnool	Anantapuramu, Sri Satya Sai	Nil

Actionable Comprehensive Plans for Contingency

State	ANDHRA PRADESH	District	ANANTAPURAMU
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Rainfall info (mm)

Month/season	Normal rainfall (mm)	Expected deficiency, %	Expected rainfall (mm)
June-Sep	338.2	More than 19%	Less than 273.942
June	62.8		
July	63.1		
August	67.5		
September	144.8		

Forecast probability for the season (as per IMD): Normal

Irrigation info:

Net irrigated area:	187712	Gross irrigated area:	203233
Net Rainfed area	286453	Gross rainfed area	288521

Source wise irrigation area details (ha)

Source of irrigation	Net	Gross
Canals	19712	19712
Wells	167131	182652
Tanks	788	788
Other sources	81	81

Crop Profile (Kharif)

Cereals

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Rice	21875	21875	0
2	Jowar	2760	132	2628
3	Maize	27318	24190	3128
4	Bajra	2552	135	2417
5	Ragi	80	48	32

Pulses & Oilseeds

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Arhar/ Redgram	57079	218	56861
2	Groundnut	110824	14371	96453
3	Sesamum	157	43	114
4	SOyabean	372	129	243
5	Sunflower	902	115	787
6	Castor	30941		

Fibre

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Cotton	32656	3899	28757
2	Jute	-		
3	Mesta	1		1
4	Sunhemp	-		

Other crops

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Sugarcane	70	70	0
2	Tobacco	42	10	32
3	Guar seed	-		192
4	Other Fodder crops	255	63	192

Crop Plan- Beginning of the season

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 4 weeks (Specify month) August 1 st FN	Shallow red soils	Groundnut + Redgram (15:1) inter cropping	Redgram	LRG-52, PRG 176	-

Contingency measures- Mid season

Condition			Suggested Contingency measures		
Mid season drought (long dry spell, > 2 consecutive weeks rainless (>2.5 mm) period)	Major Farming situation	Crop/cropping system	Crop management	Soil management	Remarks on Implementation
At vegetative stage	Shallow red soils	Groundnut + Redgram	Protect the crop from Thrips which act as vectors for PBND and PSND, Chloropyriphos @ 2ml/L at 7-10 days interval	✓ Formation of conservation furrows @ 3.6 m interval at 21 DAS ✓ Intercultivation for weed control and moisture conservation ✓ Mulching with groundnut shells	

Mid season drought (long dry spell)	Major Farming situation	Crop/cropping system	Crop management	Soil management	Remarks on Implementation
At reproductive stage	Shallow red soils	Groundnut + Redgram	✓ Supplemental irrigation with harvested rain water in ponds (20 mm depth.) by using micro-irrigation (Sprinklers) ✓ Foliar spray with 2% KNO₃	--	Digging of farm ponds may be encouraged under NREC

Contingency measures- End of the season

Condition			Suggested Contingency measures		
Terminal drought	Major Farming situation	Crop/cropping system	Crop management	Rabi Crop planning	Remarks on Implementation
	shallow red soils	Groundnut + Redgram	Supplemental irrigation with harvested rain water in ponds (20 mm depth) by using micro-irrigation.	--	Digging of farm ponds may be encouraged under NREC

Irrigated situation

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed/ limited release of water in canals due to low rainfall	1. Red soils 2. Black soils 3. Tankfed areas	Paddy	ID crops like Groundnut (NOV 15 th – Dec 31 st) and Castor (Oct)		

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment	Tail end areas	Groundnut and sunflower	Jowar / Greengram / Horsegram are recommended during September as rainfed crops.	---	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Tankfed red soils Tankfed black soils	Paddy	Jowar	---	

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Bore well irrigated red soils and black soils	Groundnut	No change	1. Timely sowing is advised 2. Irrigation at critical stages through Micro irrigation systems 3. Limited number of irrigations are suggested	
		Sunflower			
Any other condition (specify)					

Resource management technologies

1. Rain water harvesting through construction or renovation (desilting) of farm ponds, check dams, community ponds.
2. Recharge of open and tubewells with silt trap for providing supplemental irrigation to the kharif crops and pre sowing irrigation to rabi crops.
3. Sub-soiling with chisel plough to break hard pans
4. Conservation furrows or dead furrows in groundnut and redgram for in situ moisture conservation after first intercultivation practices
5. In-situ water harvesting practices like trench cum bunding and conservation furrow to increase moisture usage for longer period
6. Polythene mulching in Tomato for moisture conservation and weed control
7. Sunhemp green manuring in mango for yield improvement

Actionable Comprehensive Plans for Contingency

State	ANDHRA PRADESH	District	KURNOOL
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Rainfall info (mm)

Month/season	Normal rainfall (mm)	Expected deficiency, %	Expected rainfall (mm)
June-Sep	431.8	More than 19%	Less than 349.758
June	85.3		
July	94		
August	102.8		
September	149.7		

Forecast probability for the season (as per IMD): Normal

Irrigation info:

Net irrigated area:	93898	Gross irrigated area:	106121
Net Rainfed area	394187	Gross rainfed area	399696

Source wise irrigation area details (ha)

Source of irrigation	Net	Gross
Canals	23122	24272
Wells	58460	68347
Tanks	1053	1114
Other sources	11263	12388

Crop Profile (Kharif)

Cereals

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Rice	12642	12642	0
2	Jowar	680	20	660
3	Maize	10934	6069	4865
4	Bajra	7040	656	6384
5	Ragi	1	1	0

Pulses & Oilseeds

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Arhar/ Redgram	36266	283	35983
2	Groundnut	39869	10114	29755
3	Sesamum	10	4	6
4	SOyabean	276	21	255
5	Sunflower	1344	47	1297
6	Castor	20565		

Fibre

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Cotton	203058	7829	195229
2	Jute	-		
3	Mesta	23		23
4	Sunhemp	192		192

Other crops

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Sugarcane	107	107	0
2	Tobacco	3802	18	3784
3	Guar seed	-		237
4	Other Fodder crops	252	15	237

Crop Plan- Beginning of the season

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation ^a	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 4 weeks (July 1 st week)	Rainfed – Red soils	Groundnut / Groundnut + Redgram intercropping	No change	-do-	-
		Redgram	-do-	-do-	-
		Castor (or) Castor + Redgram (7:1)	-do-	-do-	-
		Jowar	-do-	-do-	-
		Bajra (or) Bajra + Groundnut (1:5)	-do-	-do-	-
		Foxtail millet	-do-	-do-	

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation ^a	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
	Rainfed – black soils	Groundnut (or) Groundnut + Redgram(5:1)	-do-	-do-	-
		Sunflower	-do-	-do-	
		Cotton	-do-	-do-	-
		Redgram	-do-	-do-	
		Castor (or) Castor + Redgram (7:1)	-do-	-do-	-
		Jowar (or) Jowar +Groundnut(1:5)	-do-	-do-	-
		Foxtail millet	-do-	-do-	
		Maize	-do-	-do-	

Contingency measures- Mid season

Condition			Suggested Contingency measures		
Mid season drought (long dry spell, > 2 consecutive weeks rainless (>2.5 mm) period)	Major Farming situation	Crop/cropping system	Crop management	Soil management	Remarks on Implementation
At vegetative stage	Rainfed – Red soils	Groundnut / Groundnut + Redgram intercropping	Protect the crop from thrips to avoid PBNB and PSND Spraying of 2 % urea	1. Mulching with groundnut shells 2. Frequent intercultivation to conserve soil moisture 3. Formation of dead furrows at 3.6 mt	Link with MGNREGS
		Sunflower	Spray urea or DAP @ 2 %, Resowing of short duration varieties(Morden,DRSF -1)/ hybrids(NDSH-1)	Formation of dead furrows at 3.6 m.	
		Redgram	Spray urea or DAP @ 2 %,	-do-	
		Castor / Castor + Redgram	Do (or) Resowing of short duration varieties	-do-	
		Jowar	--	-do-	
		Bajra / Bajra + Groundnut	--	-do-	
	Rainfed – Black soils	Groundnut / Groundnut + Redgram	Protect the crop from thrips to avoid PBNB and PSND Spraying of 2 % urea	1. Mulching with groundnut shells 2.Frequent Intercultivation to conserve soil moisture 3. Formation of dead furrows at 3.6 m.	

Condition			Suggested Contingency measures		
Mid season drought (long dry spell, > 2 consecutive weeks rainless (>2.5 mm) period)	Major Farming situation	Crop/cropping system	Crop management	Soil management	Remarks on Implementation
		Sunflower	Spray urea or DAP @2 %, Resowing of short duration varieties(Morden, DRSF -1)/ hybrids(NDSH-1)	-do-	
		Cotton	Spray urea or DAP @2 %,	-do-	
		Redgram	Do (or) Resowing of short duration varieties	-do-	
		Castor / Castor + Redgram	--	-do-	
		Jowar / Jowar +Groundnut	--	-do-	
At reproductive stage	Rainfed – Red soils	Groundnut / Groundnut + Redgram intercropping	Supplemental irrigation with harvested rain water in farm ponds (10 mm depth.) 2.2% Urea spray	Top dressing of urea with receipt of rains after dry spell Mulching	Link with MGNREGS for digging farm ponds
		Sunflower	Supplemental irrigation with harvested rain water in ponds (10 mm depth.) Boran application @0.2% 2 % Urea spray		
		Redgram	2 % Urea spray		
		Castor / Castor + Redgram	2 % Urea spray		
		Jowar	--		
		Bajra / Bajra + Groundnut	--		
	Rainfed – Black soils	Groundnut / Groundnut + Redgram	Supplemental irrigation with harvested rain water in farm ponds (10 mm depth.) 2% Urea spray	Top dressing of urea with receipt of rains after dry spell Mulching	
		Sunflower	Supplemental irrigation with harvested rain water in ponds (10 mm depth.) Boron application @0.2% 2 % Urea spray		
		Cotton	2% Urea spray		
		Redgram	2% Urea spray		
		Castor / Castor + Redgram	--		
		Jowar / Jowar +Groundnut	--		

Contingency measures- End of the season

Condition	Suggested Contingency measures				
	Major Farming situation	Crop/cropping system	Crop management	Soil management	Remarks on Implementation
Terminal drought	Rainfed – Red soils	Groundnut / Groundnut + Redgram intercropping	Protective irrigation through farm ponds		Link with MGNREGS for digging farm crops
		Sunflower			
		Redgram			
		Castor / Castor + Redgram			
		Jowar			
		Bajra / Bajra + Groundnut			
	Rainfed – Black soils	Groundnut / Groundnut + Redgram	Protective irrigation through farm ponds		
		Sunflower			
		Cotton			
		Redgram			
		Castor / Castor + Redgram			
		Jowar / Jowar +Groundnut			

Irrigated situation

Condition	Suggested Contingency measures				
	Major Farming situation ^f	Crop/cropping system ^g	Change in crop/cropping system ^h	Agronomic measures ⁱ	Remarks on Implementation ^j
Delayed/ limited release of water in canals due to low rainfall	Canal irrigated red soil.	Paddy	No change	Planting of aged seedlings of paddy Close planting, 4 – 5 seedlings / hill, 20 % additional fertilizer for Paddy	
	Canal irrigated black soils				
	Tankfed areas	Direct sown paddy	No change	Converted in to wet paddy after release of water. Correction of iron deficiency	

Condition	Suggested Contingency measures				
	Major Farming situation ^f	Crop/cropping system ^g	Change in crop/cropping system ^h	Agronomic measures ⁱ	Remarks on Implementation ^j
Non release of water in canals under delayed onset of monsoon in catchment	Red and black soils under canals	Foxtailmillet, Cowpea, Greengram, Horsegram, Bajra, Fodder jowar, Maize	No change	Recommended practices of respective crops will be followed.	
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Tank fed red soils	Sunflower, Maghi jowar	No change	---	
	Tank fed black soils	Sunflower, jowar and Bengal gram are recommended.	No change		

Condition	Suggested Contingency measures				
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Bore wells in irrigated red soils	Groundnut Sunflower Castor	Blackgram, Greengram, Maize, Foxtailmillet, Bajra, Horsegram, cowpea	1. Timely sowing is advised 2. Irrigation at critical stages through Micro irrigation systems 3. Limited irrigation may be followed instead of intensive irrigations	
	Bore wells in irrigated black soils	Paddy	Sunflower, Blackgram, Maize, Greengram, Foxtail millet, Bajra, Horsegram, cowpea		
Any other condition	-	-	-	-	

Resource management technologies

1. Water harvesting through construction or renovation of farm ponds, community ponds , check dams.
2. Desilting of drainage channel for quick disposal of runoff water
3. Tank silt application in cotton
4. Field level drainage, cleaning of farm canal and removal of aquatic weeds in irrigation channels
5. Recharging of tube wells with silt trap to create sufficient water storage potential in the village and increase crop intensification
6. Raised bed method of cotton cultivation
7. Formation of dead furrows in red gram, castor
8. Zero tillage maize cultivation in rabi in rice fallow system