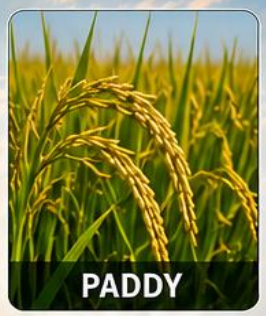
भारतीय कृषि
ICAR
INDIAN COUNCIL OF
AGRICULTURAL RESEARCH

DISTRICT WISE
CONTINGENCY PLAN
TO DEAL WITH
EL NIÑO

PREPAREDNESS | RESPONSE | RESILIENCE

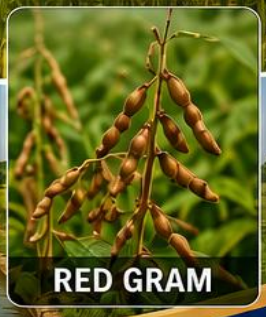
BUILDING A DROUGHT RESILIENT TRIPURA


PADDY


MAIZE


BLACK GRAM


SESAMUM


RED GRAM

EARLY WARNING & MONITORING | WATER MANAGEMENT | SUSTAINABLE AGRICULTURE | COMMUNITY PARTICIPATION

TOGETHER, LET'S BUILD A RESILIENT TRIPURA

PREPARE TODAY • PROTECT TOMORROW • PROSPER TOGETHER

Tripura

Tripura, located in the North-Eastern region of India, is a predominantly agrarian state where agriculture plays a crucial role in the state's economy. The sector provides livelihood to a majority of the rural population and contributes significantly to food security, employment, and socio-economic development. The state is characterized by undulating hills, fertile valleys, abundant rainfall, and diverse agro-climatic conditions that support a wide range of agricultural and horticultural crops. Although **Jhum (shifting cultivation)** continues to be practiced in parts of the hilly regions, settled farming has expanded considerably in the plains and valley areas. Agriculture in Tripura also supports allied sectors such as horticulture, livestock, fisheries, agro-forestry and plantation crops, thereby strengthening rural livelihoods and income generation.

Rice is the principal food crop and occupies the largest share of the cultivated area in the state. Other important Kharif crops include maize, sesame, groundnut, pigeon pea, black gram, green gram, sugarcane, jute and various vegetables. During the Rabi season, farmers cultivate rapeseed-mustard, pulses, potato, vegetables and limited areas of wheat. Tripura is also known for the production of high-value horticultural and plantation crops such as pineapple, jackfruit, banana, orange, litchi, arecanut, coconut, rubber and spices including ginger and turmeric. The state receives an average annual rainfall of approximately 2000–2500 mm**,** with nearly 80–90 per cent of the rainfall occurring during the southwest monsoon season (June to September). Despite receiving abundant rainfall, agricultural production in Tripura largely depends on the timely onset, proper distribution and adequate quantity of monsoon rainfall. Consequently, climatic anomalies associated with **El Niño,** such as delayed monsoon onset, prolonged dry spells and uneven rainfall distribution, can adversely affect crop production, particularly in rainfed and upland farming systems.

Historical Impact of El Niño on Tripura

Tripura is moderately vulnerable to El Niño-induced monsoon variability. During El Niño years, the state may experience delayed onset of the southwest monsoon, prolonged dry spells, uneven rainfall distribution and higher-than-normal temperatures. These conditions reduce soil moisture availability and adversely affect sowing, crop establishment and productivity, especially in rainfed and upland agricultural areas. Moisture stress during critical crop growth stages often leads to reduced yields, affecting farm income and rural livelihoods.

Effects on Major Crops

- **Paddy:** Delayed nursery raising and transplanting, reduced tillering, moisture stress during flowering and lower grain yield.
- **Maize:** Poor germination, reduced cob development and lower grain filling due to moisture stress.
- **Sesame:** Better drought tolerance than rice but reduced seed yield under severe rainfall deficit.
- **Pigeon pea:** Reduced flowering, pod formation and grain yield under prolonged dry spells.
- **Black gram and Green gram:** Flower drop, poor pod setting, and lower productivity.
- **Groundnut:** Poor peg formation and kernel development due to inadequate soil moisture.
- **Sugarcane:** Reduced cane growth and lower biomass production under prolonged moisture stress.
- **Jute:** Reduced fibre yield and poor plant growth due to inadequate rainfall during vegetative growth.
- **Vegetables:** Reduced growth, poor fruit setting and increased incidence of pests and diseases during high temperatures and intermittent dry spells.

Contingency Plans for Major Crops Grown in Tripura

Crop	El Niño Situation	Recommended Contingency Measures
Paddy	Delayed monsoon or transplanting	Use short-duration and drought-tolerant varieties, direct-seeded Rice (DSR), community nurseries
	Mid-season drought	Mulching, rainwater harvesting, alternate wetting and drying, protective irrigation
Maize	Delayed sowing	Adopt short-duration hybrids and drought-tolerant varieties
	Dry spells	Earthing up, mulching, foliar spray of 2% KCl, moisture conservation
Sesame	Delayed sowing or rainfall deficit	Use as a contingency crop in upland areas with drought-tolerant varieties
Pigeon pea	Delayed monsoon	Adopt short-duration cultivars and intercropping systems

	Moisture stress	Mulching and protective irrigation where available
Black gram	Delayed sowing	Shift to short-duration varieties
	Dry spells	Foliar nutrition and moisture conservation practices
Green gram	Late Kharif sowing	Use early maturing varieties
	Drought conditions	Foliar spray of 2% urea and mulching
Groundnut	Delayed onset of monsoon	Use short-duration varieties, ridge-furrow planting and moisture conservation
Sugarcane	Prolonged dry spells	Trash mulching, supplemental irrigation, and moisture conservation practices
Jute	Early-season rainfall deficit	Timely sowing with available moisture and moisture conservation measures
Vegetables	Prolonged dry spells	Promote drip irrigation, mulching, protected cultivation and rainwater harvesting

Agriculture continues to be the backbone of Tripura's rural economy and plays a crucial role in ensuring food security and livelihood security. Although the state receives high annual rainfall, its agriculture remains vulnerable to El Niño-induced climatic variability due to dependence on timely and well-distributed monsoon rainfall. Delayed monsoon onset, prolonged dry spells, erratic rainfall distribution, and rising temperatures can significantly affect the productivity of Paddy, maize, pulses, oilseeds, jute, vegetables and horticultural crops. Strengthening district-level contingency planning, promoting climate-resilient crop varieties, improving rainwater harvesting and water conservation, expanding climate-smart agricultural practices and enhancing weather-based agro-advisory services are essential for minimizing the impacts of El Niño and ensuring sustainable agricultural development in Tripura.

Area under major crops

Crop	Area (Lakh ha)
Paddy	2.25
Maize	0.14
Black gram	0.06
Sesamum	0.05
Red gram	0.04

Districts vulnerable to El Nino

Highly	Medium	Low
Unakoti	North Tripura	Nil

Actionable Comprehensive Plans for Contingency

State	TRIPURA	District	NORTH TRIPURA

Rainfall info (mm)

Month/season	Normal rainfall (mm)	Expected deficiency, %	Expected rainfall (mm)
June-Sep	1413.8	More than 19%	Less than 1145.178
June	426.1		
July	311.3		
August	340.2		
September	336.2		

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

Irrigation info:

Net irrigated area:	6913	Gross irrigated area:	10450
Net Rainfed area	15027	Gross rainfed area	28511

Source wise irrigation area details (ha)

Source of irrigation	Net	Gross
Canals	-	-
Wells	480	788
Tanks	75	135
Other sources	6358	9527

Crop Profile (Kharif)

Cereals

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Rice	15648	1680	13968
2	Jowar	-	-	
3	Maize	2153	120	2033
4	Bajra	-		
5	Ragi	-		

Pulses & Oilseeds

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Arhar/ Redgram	552		552
2	Groundnut	8		8
3	Sesamum	636		636

4	Soyabean	-		
5	Sunflower	-		
6	Castor	-		

Fibre

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Cotton	83		83
2	Jute	57		57
3	Mesta	9		9
4	Sunhemp	-		

Other crops

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Sugarcane	28	28	0
2	Tobacco	-		
3	Guar seed	-		
4	Other Fodder crops	-		

Crop Plan- Beginning of the season

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Change in crop/cropping system[c]**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
Delay by 4 weeks (**July 2nd week**)	a. Upland-rain fed (Red soil with –high rainfall, hills slope situation availability of irrigation facility.	Summer and kharif vegetables like brinjal, Snake gourd, okra, ridge gourd, bottle gourd, Bitter gourd Sweet guard, cucumber, sesame followed by Rabi vegetables, rapeseed, pea potato, French bean.	Late kharif vegetables followed by normal Rabi vegetables, Sowing of tapioca & other tubers in hill slope	i. Weed management, ii. Supply of minimum irrigation, iii. Use suitable short duration rice varieties either for direct sowing/ transplanting. Grow seedlings accordingly. Apply whole of the fertilizers at the time of sowing/ transplanting unlike normal condition. iv. use of organic manures	State Agri. Dept, ICAR, Tripura center

		Pineapple, mandarin, Sweet orange, Sathkara		Normal cultivation practices, use of recommended dose of fertilizer	
		Jhum rice (Var-Goramalati, Betti, Gelong, Maichika)	Mix cropping of Jhum rice with maize	Use of pig manure & other organic inputs	
		Jhum rice+ Sesamum, Cotton	No change	--	--
	b. High rainfall with Medium to low land (Sandy Loam to clay loam)	Jhum rice+ Sesame, Cotton	No change	--	--
		Kharif paddy (Ranjit, Swarnamasuri,Gomati)	Short duration and drought resistant varieties.	SRI with proper crop management practices	
		Summer vegetables, Cucurbits & solanaceous Sugarcane	No change	--	--
		Kharif vegetables mainly solanaceous	No change	--	--
		Rice-Rice Autumn rice + winter rice	Short duration paddy (Sahabhagi, , NRD-97, MTU 1010,CO-51, Dishang) followed by pulse.	Integrated weed & water management	State Agriculture, Horticulture, ICAR and other KVK's
	3 Low land - High rainfall with Red Soil	Kharif paddy (Ranjit, Swarnamasuri,Gomati)	Short duration paddy (Sahabhagi,, NRD-97, MTU 1010,CO-51, Dishang)	Intercultural operation, soil health management, drainage of excess water	State Agriculture, Horticulture, ICAR and other KVK's

Contingency measures- Mid season

Condition			**Suggested Contingency measures**		
Mid-season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management**	**Soil nutrient & moisture conservation measure[s]**	**Remarks on Implementation**

At vegetative stage	1 Upland & hill slopes situation	Summer Vegetables, Black Gram	Strengthen bunds and prevent runoff, Delay top dressing of urea and adopt, Close, observation on disease pest incidence and adopt prompt remedial measures	Solution, weed management, Supply of minimum irrigation,	
	2 Medium lowland situation (Sandy Loam to clay loam)	Kharif paddy (Gomoti, DDR 45, Ranjit, Swarna, MTU-1010), Colocasia	Strengthen bunds and prevent runoff, Delay top dressing of urea and adopt, Close observation on disease pest incidence and adopt prompt remedial measures	Spray 0.5-1.0% MOP solution, Spray 2.0% urea	Can be implemented through State Agriculture, Horticulture, ICAR and KVK
	3 low land	Kharif vegetables like (Ridge gourd, okra, bottle gourd, Ash gourd etc), Rabi vegetables like (Groundnut, Black gram, Moong, Chick pea, Soybean)	Large Scale utilization of organic mulches & FYM. Rain water harvesting. Weeding & breaking of soil mulch by finger weeder. Ridge & furrow cultivation. Apply N as top dress as it rains, P & K also as top dress if not applied as basal in line seeded crop. P should be applied up to 3 weeks after seeding & K upto flowering.	Mulching Field Bunding Off season ploughing, use of organic manures	

Condition			**Suggested Contingency measures**		
Mid-season drought (long dry spell)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Soil nutrient & moisture conservation measues[d]**	**Remarks on Implementation[e]**
At flowering/ fruiting stage	1 Upland & hill slopes situation	Summer and kharif vegetables like brinjal , Snake gourd, okra, ridge gourd, bottle gourd, bitter gourd Sweet guard, cucumber, sesame followed by rabi vegetables, pulses	Crop can be cut and ratooned. Foliar application at 2 % Urea in Pre-Flowering and Flowering Stage.	i.Mulching ii. Off season ploughing to conserve moisture iii. Cover / Crop	

	2 Medium lowland situation (Sandy Loam to clay loam)	Kharif paddy, rainy season vegetables like Yard long bean, ridge & sponge gourd	Strengthen bunds and prevent runoff Close observation on disease pest incidence and adopt prompt remedial measures	Rice- Weed management, Supply of minimum irrigation, Top dressing additional quantities of MOP Spray 2% MOP solution, Delay top dressing of urea up to heading	Can be implemented through State Agriculture, Horticulture, ICAR and KVK
	3 low land	Solanaceous vegetables, Groundnut	Thinning	Application of sufficient amount of organic manures in main fields before transplanting/ sowing, Mulching	

Contingency measures- End of the season

Condition			**Suggested Contingency measures**		
Terminal drought	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Rabi Crop planning[d]**	**Remarks on Implementation[e]**
	1 Upland & hill slopes situation	Vegetables / Arhar / Sesamum	i.Mulching ii.Life saving irrigation	Land preparation for early rabi sowing	-
	2 Medium lowland situation (Sandy Loam to clay loam)	Vegetables / Sesamum	Mulching	Toria / Mustard	May be implemented through KVK and ICAR
		Paddy	If grain filling is severely affected, harvest for fodder	Land preparation for early rabi sowing	
	3. low land	Paddy	If grain filling is severely affected, harvest for fodder	Land preparation for early rabi sowing & ready for pulse crops (black gram)	

Resource management technologies

Resilient practices such as the cultivation of drought-tolerant crop varieties, implementation of intercropping systems, and utilization of improved fodder crop planting materials can be expanded by enhancing community capacities and developing local enabling mechanisms. The creation and nurturing of institutional frameworks at the local level can significantly contribute to the adoption and spread of these practices. It is crucial to establish and support such mechanisms through policies aimed at promoting the dissemination of climate- resilient technologies in Manipur, Nagaland, and Tripura.

Actionable Comprehensive Plans for Contingency

State	TRIPURA	District	UNAKOTI

Rainfall info (mm)

Month/season	Normal rainfall (mm)	Expected deficiency, %	Expected rainfall (mm)
June-Sep	1430.3	More than 19%	Less than 1158.543
June	461.1		
July	330.2		
August	319		
September	320		

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

Irrigation info:

Net irrigated area:	4625	Gross irrigated area:	6592
Net Rainfed area	14037	Gross rainfed area	26627

Source wise irrigation area details (ha)

Source of irrigation	Net	Gross
Canals	-	-
Wells	240	580
Tanks	70	164
Other sources	4315	5848

Crop Profile (Kharif)

Cereals

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Rice	13668	1160	12508
2	Jowar	-	-	
3	Maize	879	255	624
4	Bajra	-		
5	Ragi	-		

Pulses & Oilseeds

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Arhar/ Redgram	319		319

2	Groundnut	98	62	36
3	Sesamum	255	2	253
4	Soyabean	-		
5	Sunflower	-		
6	Castor	-		

Fibre

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Cotton	25		25
2	Jute	27		27
3	Mesta	15		15
4	Sunhemp	-		

Other crops

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Sugarcane	58	42	16
2	Tobacco	-		
3	Guar seed	-		
4	Other Fodder crops	-		

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At vegetative stage	1 Upland & hill slopes situation	Summer Vegetables, Black Gram, Moong, Blackgram	Strengthen bunds and prevent runoff, Delay top dressing of urea. Close observation on disease pest incidence and adopt prompt remedial measures.	Solution, weed management, Supply of minimum irrigation,	

	2 Medium lowland situation (Sandy Loam to clay loam)	Sub mergible paddy (Swarna Sub-1), Kharif paddy (Ranjit, Swarna,Swarna), Colocasia	Strengthen bunds and prevent runoff, Delay top dressing of urea. Close observation on disease pest incidence and adopt prompt remedial measures	Spray 0.5-1.0% MOP solution, Spray 2.0% urea	Can be implemented through State Agriculture, Horticulture, ICAR and KVK
	3 Red Soil	Kharif veg- Rabi veg, Groundnut	Large Scale utilization of organic mulches & FYM. Rain water harvesting. Weeding & breaking of soil mulch by finger weeder. Ridge & furrow cultivation. Apply N as top dress as it rains, P & K also as top dress if not applied as basal in line seeded crop. P should be applied up to 3 weeks after sowing & K up to flowering.	Mulching Field, Bunding, Off season ploughing, use of organic manures	

Crop Plan- Beginning of the season

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Change in crop/cropping system[c]**	**Agronomic measures[d]**	**Remarks on Implementation[e]**

Delay by 4 weeks (**July 2nd week**)	a. Upland-rain fed (Red soil with –high rainfall, hills slope situation availability of irrigation facility. Maize - rice/vegetables/ /mustard	Summer and kharif vegetables like brinjal, Snake gourd, okra, ridge gourd, bottle gourd, Bitter gourd Sweet guard, cucumber, sesame followed by Rabi vegetables, rapeseed, pea potato, French bean.	Late kharif vegetables followed by normal Rabi vegetables, Sowing of tapioca & other tubers in hill slope	i. Weed management, ii. Supply of minimum irrigation, iii. Use suitable short duration rice varieties either for direct sowing/ transplanting. Grow seedlings accordingly. Apply whole of the fertilizers at the time of sowing/ transplanting unlike normal condition. iv. use of organic manures	State Agri. Dept, ICAR, Tripura center
		Pineapple, mandarin, Sweet orange, Sathkara		Normal cultivation practices, use of recommended dose of fertilizer	
		Jhum rice (Var- Goramalati, Betti, Gelong, Maichika)	Mix cropping of Jhum rice with maize	Use of pig manure & other organic inputs	
		Jhum rice+ Sesamum,, Cotton	No change	--	--
	b. High rainfall with Medium to low land (Sandy Loam to clay loam) Paddy –kharif vegetable –potato – mustard	Jhum rice+ Sesame, Cotton	No change	--	--
		Kharif paddy (Ranjit, Swarnamasuri,Gomati)	Short duration and drought resistant varieties.	SRI with proper crop management practices	
		Summer vegetables, Cucurbits & solanaceous Sugarcane	No change	--	--
		Kharif vegetables mainly solanaceous	No change	--	--
		Rice-Rice Autumn rice + winter rice	Short duration paddy (Sahabhagi, , NRD-97, MTU 1010,CO-51, Dishang) followed by pulse.	Integrated weed & water management	State Agriculture, Horticulture, ICAR and other KVK's

	3 Low land -High rainfall with Red Soil kharif paddy – potato – winter vegetables – oilseeds (mustard)	Kharif paddy (Ranjit, Swarnamasuri,Gomati)	Short duration paddy (Sahabhagi, , NRD-97, MTU 1010,CO-51, Dishang)	Intercultural operation, soil health management, drainage of excess water	State Agriculture, Horticulture, ICAR and other KVK's

Contingency measures- Mid season

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Soil nutrient & moisture conservation measues[d]**	**Remarks on Implementation[e]**
At flowering/ fruiting stage	1 Upland & hill slopes situation	Summer and kharif vegetables like brinjal , Snake gourd, okra, ridge gourd, bottle gourd, bitter gourd Sweet guard, cucumber, sesame followed by rabi vegetables, pulses	Crop can be cut and ratooned. Foliar application at 2 % Urea in Pre-Flowering and Flowering Stage.	i. Mulching ii. Off season ploughing to conserve moisture iii. Cover / Crop	
	2 Medium lowland situation (Sandy Loam to clay loam)	Kharif paddy, rainy season vegetables like Yard long bean, ridge & sponge gourd	Strengthen bunds and prevent runoff Close observation on disease pest incidence and adopt prompt remedial measures	Rice- Weed management, Supply of minimum irrigation, Top dressing additional quantities of MOP Spray 2% MOP solution, Delay top dressing of urea up to heading	Can be implemented through State Agriculture, Horticulture, ICAR and KVK
	3 Red Soil	Solanaceous vegetables, Groundnut	Thinning	Application of sufficient amount of organic manures in main fields before transplanting/ sowing, Mulching	

Contingency measures- End of the season

Condition			**Suggested Contingency measures**		
Terminal drought	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Rabi Crop planning[d]**	**Remarks on Implementation[e]**
	1 Upland & hill slopes situation	Vegetables / Arhar / Sesamum	i.Mulching ii.Life saving irrigation	-	-
	2 Medium lowland situation (Sandy Loam to clay loam)	Vegetables / Sesamum	Mulching	Toria / Mustard	May be implemented through KVK and ICAR

Irrigated situation- not applicable

Resource management technologies

Resilient practices such as the cultivation of drought-tolerant crop varieties, implementation of intercropping systems, and utilization of improved fodder crop planting materials can be expanded by enhancing community capacities and developing local enabling mechanisms. The creation and nurturing of institutional frameworks at the local level can significantly contribute to the adoption and spread of these practices. It is crucial to establish and support such mechanisms through policies aimed at promoting the dissemination of climate- resilient technologies in Manipur, Nagaland, and Tripura.