



भारतीय कृषि
ICAR

INDIAN COUNCIL OF
AGRICULTURAL RESEARCH

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

PREPAREDNESS | RESPONSE | RESILIENCE



BUILDING A
DROUGHT RESILIENT
WEST BENGAL



PADDY



MAIZE



RAGI



EARLY WARNING
& MONITORING



WATER
MANAGEMENT



SUSTAINABLE
AGRICULTURE



COMMUNITY
PARTICIPATION

TOGETHER, LET'S BUILD A RESILIENT WEST BENGAL
PREPARE TODAY • PROTECT TOMORROW • PROSPER TOGETHER

West Bengal

West Bengal, located in the eastern region of India, is one of the country's leading agricultural states. Agriculture plays a crucial role in the state's economy by providing livelihood to a large proportion of the rural population and contributing significantly to food security, employment, and socio-economic development. The state possesses diverse agro-climatic zones ranging from the Himalayan foothills in the north to the Gangetic plains and coastal regions in the south. Fertile alluvial soils, extensive river systems, and favourable climatic conditions support intensive agricultural production. Agriculture in West Bengal also supports allied sectors such as horticulture, livestock, fisheries, floriculture, and agro-processing industries, contributing substantially to rural income and economic growth.

Rice is the principal food crop and occupies the largest share of the cultivated area in West Bengal. Other important Kharif crops include jute, maize, pulses, sesame, groundnut, sugarcane, and vegetables. During the Rabi season, farmers cultivate wheat, potato, rapeseed-mustard, lentil, chickpea, green gram, black gram, and various vegetables. West Bengal is also one of the leading producers of potato, jute, vegetables, tea, pineapple, mango, litchi, banana, and flowers in India. The state receives an average annual rainfall of approximately 1400–2000 mm, with nearly 75–85 percent of the rainfall occurring during the southwest monsoon season (June to September). Although irrigation facilities are well developed in several regions, a large proportion of Kharif agriculture remains dependent on the timely onset, distribution, and adequacy of monsoon rainfall. Consequently, climatic anomalies associated with El Niño, such as delayed monsoon onset, prolonged dry spells, and below-normal rainfall, can adversely affect agricultural production.

Historical Impact of El Niño on West Bengal

West Bengal is moderately vulnerable to El Niño-induced monsoon variability. During El Niño years, the state may experience delayed monsoon onset, uneven rainfall distribution, prolonged dry spells, and higher-than-normal temperatures, particularly in the western plateau and lateritic regions. These conditions adversely affect the sowing and growth of major Kharif crops, reduce soil moisture availability, and increase irrigation demand. Moisture stress during critical crop growth stages often results in lower yields and reduced farm income.

Effects on Major Crops

- **Paddy:** Delayed nursery raising and transplanting, reduced tillering, moisture stress during flowering, and lower grain yield.
- **Jute:** Reduced plant height, lower fibre yield, and poor fibre quality due to inadequate rainfall.
- **Maize:** Poor germination, reduced cob development, and lower grain filling.
- **Pulses (Green gram, Black gram, Lentil):** Flower drop, poor pod formation, and reduced productivity.
- **Sesame:** Better drought tolerance than rice but reduced seed yield under severe moisture stress.
- **Groundnut:** Poor peg formation, reduced kernel development, and lower oil yield.
- **Sugarcane:** Reduced cane growth and biomass under prolonged dry conditions.
- **Potato:** Reduced tuber development if soil moisture is inadequate during planting and early growth.
- **Vegetables:** Poor growth, reduced fruit setting, and increased pest and disease incidence under high temperatures.

Contingency Plans for Major Crops Grown in West Bengal

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	Alternate wetting and drying, mulching, rainwater harvesting, protective irrigation
Jute	Delayed rainfall	Timely sowing with available soil moisture, moisture conservation, protective irrigation where feasible
Maize	Delayed sowing	Adopt short-duration hybrids and drought-tolerant varieties
	Dry spells	Earthing up, mulching, foliar spray of 2% KCl
Pulses	Delayed sowing	Use short-duration varieties and suitable intercropping systems
	Moisture stress	Foliar nutrition and moisture conservation practices

Sesame	Rainfall deficit	Promote as a contingency crop in upland and drought-prone areas
Groundnut	Delayed onset of monsoon	Use short-duration varieties, ridge-furrow planting, and moisture conservation
Sugarcane	Prolonged dry spells	Trash mulching, supplemental irrigation, and efficient water management
Potato	Moisture stress during planting	Timely irrigation and mulching to conserve soil moisture
Vegetables	Prolonged dry spells	Promote drip irrigation, mulching, protected cultivation, and rainwater harvesting

Agriculture continues to be the backbone of West Bengal's rural economy and plays a vital role in ensuring food security, employment, and economic development. Although the state receives relatively high annual rainfall, agricultural production remains vulnerable to El Niño-induced climatic variability due to dependence on timely and well-distributed monsoon rainfall during the Kharif season. Delayed monsoon onset, prolonged dry spells, erratic rainfall distribution, and rising temperatures can significantly affect the productivity of rice, jute, maize, pulses, oilseeds, sugarcane, vegetables, and other major crops. Strengthening district-level contingency planning, promoting climate-resilient crop varieties, improving water resource management, expanding micro-irrigation, adopting climate-smart agricultural practices, and enhancing weather-based agro-advisory services are essential for minimizing the adverse impacts of El Niño and ensuring sustainable agricultural development in West Bengal.

Area under major crops

Crop	Area (Lakh ha)
Paddy	55.92
Maize	4.05
Ragi	0.06

Districts vulnerable to El Nino

Highly	Medium	Low
Alipurduar, Jalpaiguri, Kalimpong, Kochbihar, Maldah, Puruliya	Nil	Nil

Actionable Comprehensive Plans for Contingency

State	WEST BENGAL	District	ALIPURDUAR
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Rainfall info (mm)

Month/season	Normal rainfall (mm)	Expected deficiency, %	Expected rainfall (mm)
June-Sep	3017.2	More than 19%	Less than 2443.932
June	749.6		
July	980.5		
August	639.9		
September	647.2		

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

Irrigation info:

Net irrigated area:	0	Gross irrigated area:	0
Net Rainfed area		Gross rainfed area	

Source wise irrigation area details (ha)

Source of irrigation	Net	Gross
Canals	-	-
Wells	-	-
Tanks	-	-
Other sources	-	-

Crop Profile (Kharif)

Cereals

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Rice	89802	0	
2	Jowar	-	-	
3	Maize	31690		31690
4	Bajra	-		
5	Ragi	16		16

Pulses & Oilseeds

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Arhar/ Redgram	175		175
2	Groundnut	365		365
3	Sesamum	340		340
4	Soyabean	-		
5	Sunflower	-		
6	Castor	-		

Fibre

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Cotton	-		
2	Jute	7838		7838
3	Mesta	108		108
4	Sunhemp	-		

Other crops

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Sugarcane	62		62
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	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Delay by 4 weeks 1 st week of July	Low Land (Deep to very deep clayey soils)	Jute – Rice	No change	Inter cultivation in between the rows of jute	Link with Govt. farm of department of agriculture, NSC, WBSC, RRS Pundibari farm UBKV for supply of seed
		Rice – Toria	No change	Transplanting with seedlings raised from community nursery/staggered nursery (4-5 seedlings / hill)	
	Medium Land (Deep to very	Jute – Rice	No change	Inter cultivation in between the rows of jute	

	deep clay loamy soils)	Rice – Toria	No change	Prefer SRI system of cultivation	
	Up Land (Shallow to moderately coarse loam soils)	Jute - Rice	No change	Inter cultivation in between the rows of jute	

Contingency measures- Mid season

Condition			Suggested Contingency measures	
	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period) At vegetative stage	Deep to very deep fine loamy to clayey soils	Jute – Rice	- Gap filling with improved variety in the row if population is less than 75% of optimum - Weeding	- Postpone top dressing with N - Apply foliar spray with 2% Urea - Supplemental irrigation
	Deep to very deep sandy loam soils	Rice – Toria	- Gap filling with the seedlings @ 2-3 per hill from community nurseries / split the tillers from surviving hills - Protection against leaf folder with chlorpyrifos 2ml/l	-do-
		Jute – Rice	- Gap filling with improved variety in the row if population is less than 75% of optimum - Weeding	-do-
	Coarse sandy soils in uplands	Rice – Toria	- Gap filling with the seedlings @ 2-3 per hill from community nurseries / split the tillers from surviving hills - Protection against leaf folder with chlorpyrifos 2ml/l	-do-
		Jute - Rice	- Gap filling with improved variety in the row if population is less than 75% of optimum - Weeding	-do-

Condition			Suggested contingency measures	
	Major farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures
Mid-season drought (long dry spell)	Deep to very deep fine loamy to clayey soils	Jute – Rice	- Timely weeding - Plan for rabi rice if damage is very severe	- Supplemental irrigation with farm pond water / other sources - Top dressing of 30-50 kg N/ha after relief

At flowering/ fruiting stage				of dry spell
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	Deep to very deep sandy loam soils	Rice – Toria	-do-	-do-
		Jute – Rice	- Timely weeding - Plan for rabi rice if damage is very severe	-do-
	Coarse sandy soils in uplands	Rice – Toria	-do-	-do-

Contingency measures- End of the season

Condition			Suggested contingency measures	
Terminal drought (Early withdrawal of monsoon)	Major farming situation	Normal Crop/cropping system	Crop management	Rabi crop planning
	Deep to very deep fine loamy to clayey soils	Jute – Rice	Supplemental irrigation with farm pond water / other sources	Land preparation for rabi rice
	Deep to very deep sandy loam soils	Rice – Toria	-do-	Rabi planning for Toria
		Jute – Rice	-do-	Land preparation for rabi rice
	Coarse sandy soils in uplands	Rice – Toria	-do-	Rabi planning for Toria

Drought - Irrigated situation

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop / cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	NA				

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop / cropping system	Change in crop / cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall	NA				

Condition			Suggested Contingency measures		
	Major Farming situation	Normal 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	NA				

Condition			Suggested Contingency measures		
	Major Farming situation	Normal 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	NA				

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Soil nutrient & moisture conservation measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Shallow tube well irrigated Deep to very deep fine loamy to clayey soils	Rice – Rice-Potato/ Mustard/Wheat/Late Vegetable	Rice- Potato-/ Mustard/Late Vegetable	- Adopt SRI method for rice cultivation - Adopt alternate furrow irrigation for potato / mustard / Vegetable - Timely inter culture	Machine for Zero tillage under NFSM
	Shallow tube well irrigated Deep to very deep sandy loam soils	Rice- early potato/ Mustard/ Wheat/Vegetable	Rice- Wheat/Mustard	- Adopt SRI method for rice cultivation - Adopt alternate furrow irrigation for potato / mustard / Vegetable - Timely inter culture - Zero tillage for wheat	
		Rice-early potato/ vegetable- Maize/potato	No Change	- Adopt SRI method for rice cultivation - Adopt alternate furrow irrigation for potato / mustard / Vegetable - Timely interculture	
	Shallow tube well irrigated Coarse sandy soils in uplands	Rice-early potato/ vegetable- Maize/potato	No Change	- Adopt SRI method for rice cultivation - Adopt alternate furrow irrigation for potato / mustard / Vegetable - Timely interculture	
		Pine apple	No Change	- Mulching in between rows - Supplemental irrigation by alternate furrow - Earthing up to provide good anchorage	

Resource management technologies

- Supplementary irrigation through Jalkund
- *In-situ* moisture conservation through organic and poly mulching in vegetable crops
- Poly mulching in Dalley Chilli
- Plastic mulch in bitter gourd production in trellis system during kharif season
- *In-situ* moisture conservation practices through zero tillage technology in Wheat
- Resource Conservation through Zero Tillage in Maize/Wheat
- Harvesting as a sustainable source of potable water for versatile use in rural Sundarbans
- Renovation of existing pond for harvesting, storing and recycling of rain water

Actionable Comprehensive Plans for Contingency

State	WEST BENGAL	District	JALPAIGURI
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Rainfall info (mm)

Month/season	Normal rainfall (mm)	Expected deficiency, %	Expected rainfall (mm)
June-Sep	2886.1	More than 19%	Less than 2337.741
June	729.6		
July	930.4		
August	606.7		
September	619.4		

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

Irrigation info:

Net irrigated area:	0	Gross irrigated area:	0
Net Rainfed area		Gross rainfed area	

Source wise irrigation area details (ha)

Source of irrigation	Net	Gross
Canals	-	-
Wells	-	-
Tanks	-	-
Other sources	-	-

Crop Profile (Kharif)

Cereals

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Rice	111429	0	
2	Jowar	-	-	
3	Maize	16295		16295
4	Bajra	-		
5	Ragi	-		

Pulses & Oilseeds

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Arhar/ Redgram	68		68
2	Groundnut	4738		4738
3	Sesamum	886		886
4	Soyabean	-		
5	Sunflower	5		5
6	Castor	-		

Fibre

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Cotton	-		
2	Jute	23541		23541
3	Mesta	37		37
4	Sunhemp	-		

Other crops

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Sugarcane	111		111
2	Tobacco	55		55
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	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Delay by 4 weeks 1 st week of July	Low Land (Deep to very deep clayey soils)	Jute – Rice	No change	Inter cultivation in between the rows of jute	Link with Govt. farm of department of agriculture, NSC, WBSC, RRS Pundibari farm UBKV for supply of seed
		Rice – Toria	No change	Transplanting with seedlings raised from community nursery/staggered nursery (4-5 seedlings / hill)	
	Medium Land (Deep to very deep clay loamy soils)	Jute – Rice	No change	Inter cultivation in between the rows of jute	
		Rice – Toria	No change	Prefer SRI system of cultivation	

	Up Land (Shallow to moderately coarse loam soils)	Jute - Rice	No change	Inter cultivation in between the rows of jute	
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Contingency measures- Mid season

Condition			Suggested Contingency measures	
	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period) At vegetative stage	Deep to very deep fine loamy to clayey soils	Jute – Rice	- Gap filling with improved variety in the row if population is less than 75% of optimum - Weeding	- Postpone top dressing with N - Apply foliar spray with 2% Urea - Supplemental irrigation
	Deep to very deep sandy loam soils	Rice – Toria	- Gap filling with the seedlings @ 2-3 per hill from community nurseries / split the tillers from surviving hills - Protection against leaf folder with chlorpyrifos 2ml/l	-do-
		Jute – Rice	- Gap filling with improved variety in the row if population is less than 75% of optimum - Weeding	-do-
	Coarse sandy soils in uplands	Rice – Toria	- Gap filling with the seedlings @ 2-3per hill from community nurseries / split the tillers from surviving hills - Protection against leaf folder with chlorpyrifos 2ml/l	-do-
		Jute - Rice	- Gap filling with improved variety in the row if population is less than 75% of optimum - Weeding	-do-

Condition			Suggested contingency measures	
	Major farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures
Mid season drought (long dry spell)	Deep to very deep fine loamy to clayey soils	Jute – Rice	- Timely weeding - Plan for rabi rice if damage is very severe	- Supplemental irrigation with farm pond water / other sources - Top dressing of 30-50 kg N/ha after relief of dry spell
At flowering/ fruiting stage				
	Deep to very deep sandy loam soils	Rice – Toria	-do-	-do-
		Jute – Rice	- Timely weeding - Plan for rabi rice if damage	-do-

			is very severe	
	Coarse sandy soils in uplands	Rice – Toria	-do-	-do-

Contingency measures- End of the season

Condition			Suggested contingency measures	
Terminal drought (Early withdrawal of monsoon)	Major farming situation	Normal Crop/cropping system	Crop management	Rabi crop planning
	Deep to very deep fine loamy to clayey soils	Jute – Rice	Supplemental irrigation with farm pond water / other sources	Land preparation for rabi rice
	Deep to very deep sandy loam soils	Rice – Toria	-do-	Rabi planning for Toria
		Jute – Rice	-do-	Land preparation for rabi rice
	Coarse sandy soils in uplands	Rice – Toria	-do-	Rabi planning for Toria

Drought - Irrigated situation

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	NA				

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall	NA				

Condition			Suggested Contingency measures		
	Major Farming situation	Normal 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	NA				

Condition			Suggested Contingency measures		
	Major Farming situation	Normal 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	NA
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Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Soil nutrient & moisture conservation measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Shallow tube well irrigated Deep to very deep fine loamy to clayey soils	Rice – Rice- Potato/ Mustard/Wheat/Late Vegetable	Rice- Potato-/ Mustard/Late Vegetable	• Adopt SRI method for rice cultivation • Adopt alternate furrow irrigation for potato / mustard / Vegetable • Timely inter culture	Machine for Zero tillage under NFSM
	Shallow tube well irrigated Deep to very deep sandy loam soils	Rice- early potato/ Mustard/ Wheat/Vegetable	Rice-Wheat/Mustard	• Adopt SRI method for rice cultivation • Adopt alternate furrow irrigation for potato / mustard / Vegetable • Timely inter culture • Zero tillage for wheat	
		Rice-early potato/ vegetable- Maize/potato	No Change	• Adopt SRI method for rice cultivation • Adopt alternate furrow irrigation for potato / mustard / Vegetable • Timely interculture	
	Shallow tube well irrigated Coarse sandy soils in uplands	Rice-early potato/ vegetable- Maize/potato	No Change	• Adopt SRI method for rice cultivation • Adopt alternate furrow irrigation for potato / mustard / Vegetable • Timely interculture	
		Pine apple	No Change	• Mulching in between rows • Supplemental irrigation by alternate furrow • Earthing up to provide good anchorage	

Resource management technologies

- Supplementary irrigation through Jalkund
- *In-situ* moisture conservation through organic and poly mulching in vegetable crops
- Poly mulching in Dalley Chilli
- Plastic mulch in bitter gourd production in trellis system during kharif season
- *In-situ* moisture conservation practices through zero tillage technology in Wheat
- Resource Conservation through Zero Tillage in Maize/Wheat

- Harvesting as a sustainable source of potable water for versatile use in rural Sundarbans
- Renovation of existing pond for harvesting, storing and recycling of rain water

Actionable Comprehensive Plans for Contingency

State	WEST BENGAL	District	KALIMPONG
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Rainfall info (mm)

Month/season	Normal rainfall (mm)	Expected deficiency, %	Expected rainfall (mm)
June-Sep	2398	More than 19%	Less than 1942.38
June	544.7		
July	781.3		
August	553.2		
September	518.8		

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

Irrigation info:

Net irrigated area:	0	Gross irrigated area:	0
Net Rainfed area		Gross rainfed area	

Source wise irrigation area details (ha)

Source of irrigation	Net	Gross
Canals	-	-
Wells	-	-
Tanks	-	-
Other sources	-	-

Crop Profile (Kharif)

Cereals

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Rice	3965	0	
2	Jowar	-	-	
3	Maize	15825		15825
4	Bajra	-		
5	Ragi	1940		1940

Pulses & Oilseeds

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Arhar/ Redgram	-		
2	Groundnut	-		
3	Sesamum	-		
4	Soyabean	-		
5	Sunflower	-		
6	Castor	-		

Fibre

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

Other crops

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Sugarcane	37		37
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	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Delay by 4 weeks	Medium deep to very deep fine loamy soils (hill-	Maize -Wheat /Mustard / Vegetable (cole	No change	Normal package of practices given by UBKV	Linkage with seed farms, Department of agriculture, WBSC, NSC,

2 nd week of July	brown forest soils)	crop)			UBKV for supply of seed
		Aman rice transplanted – Vegetable (cole crops) / Mustard	No change. Prefer short duration varieties like Annada or Satabdi	Transplanting with 2-3 seedlings / hill	
		Kodo millet	No change	-	
	Sandy loam soils (Medium lands & terai land)	Maize (pre-kharif) - Mustard	No change	Normal package of practices given by UBKV	
		Aman rice transplanted – Vegetable / Mustard	No change	Normal transplanting of 2-3 seedlings/ hill	

Contingency measures- Mid season

Condition				
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures
At vegetative stage	Medium deep to very deep fine loamy soils (hill-brown forest soils)	Tea	- By pruning/skiffing plants transpiration loss can be reduced. - Shade tree provides resistant to excessive radiation & heat.	- Mulching with pruned litters - Foliar application of Potassium in the form of Muriate of potash @ 1-2% at the interval of 15-21 days during drought. - Irrigation by sprinkler & surface irrigation
		Cardamom	Provide shade	- Apply life saving irrigation - Mulching with coir mat, tree twigs etc - Apply well decomposed forest litter or Neem cake for moisture retention.

Condition			Suggested contingency measures	
Mid season drought (long dry spell)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures
At flowering/ fruiting stage	Medium deep to very deep fine loamy soils (hill-brown forest soils)	Tea	Watering followed by mulching is recommended for survival of tea plants as well as to reduce the excessive dropping of flower buds and fruits	-
		Cardamom	Aeration should be provide	Mulching with leaves of shade tree Earthing up

Condition			Suggested Contingency measures	
Terminal drought (Early withdrawal of monsoon)	Major Farming situation	Normal Crop/cropping system	Crop management	Rabi Crop planning
	Medium deep to very deep fine loamy soils (hill- brown forest soils)	Tea	Delay the crop maturity and harvesting. Foliar application of Potash 1% and MgSO ₄ 1% followed by micro nutrient spraying thrice at 15 days interval	-
		Cardamom	No effect	-

Drought - Irrigated situation:

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	NA				

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall	Medium deep to very deep fine loamy soils (hill- brown forest soils)	Rice - Potato-/ Mustard/Wheat/ Late Vegetable	No change	- Adopt SRI method for rice cultivation - Irrigation at critical crop growth stages - Alternate wetting and drying upto primordial initiation stage to save water - Efficient weed management practices - Adopt alternate furrow irrigation for potato / Vegetable	-
	Sandy loam soils (Medium lands to foot hills)	Potato – Maize- Fallow	No change	Adopt alternate furrow irrigation for potato Mulching for maize	
	Shallow to medium deep Loamy soils(plains)	Rice- early potato/ Mustard/ Wheat/Vegetable	No change	- Adopt SRI method for rice cultivation - Irrigation at critical crop growth stages - Alternate wetting and drying upto primordial initiation stage to save water - Efficient weed management practices - Adopt alternate furrow irrigation for potato / Vegetable	

Condition			Suggested Contingency measures		
	Major Farming situation	Normal 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	NA				

Condition			Suggested Contingency measures		
	Major Farming situation	Normal 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	NA				

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	NA				

Resource management technologies

- Supplementary irrigation through Jalkund
- *In-situ* moisture conservation through organic and poly mulching in vegetable crops
- Poly mulching in Dalley Chilli
- Plastic mulch in bitter gourd production in trellis system during kharif season
- *In-situ* moisture conservation practices through zero tillage technology in Wheat
- Resource Conservation through Zero Tillage in Maize/Wheat
- Harvesting as a sustainable source of potable water for versatile use in rural Sundarbans
- Renovation of existing pond for harvesting, storing and recycling of rain water

Actionable Comprehensive Plans for Contingency

State	WEST BENGAL	District	KOCHBIHAR
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Rainfall info (mm)

Month/season	Normal rainfall (mm)	Expected deficiency, %	Expected rainfall (mm)
June-Sep	2354.9	More than 19%	Less than 1907.469
June	566.4		
July	736.6		
August	522.7		
September	529.2		

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

Irrigation info:

Net irrigated area:	0	Gross irrigated area:	0
Net Rainfed area		Gross rainfed area	

Source wise irrigation area details (ha)

Source of irrigation	Net	Gross
Canals	-	-
Wells	-	-
Tanks	-	-
Other sources	-	-

Crop Profile (Kharif)

Cereals

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Rice	216338	0	
2	Jowar	-	-	
3	Maize	55258		55258
4	Bajra	-		
5	Ragi	-		

Pulses & Oilseeds

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Arhar/ Redgram	-		
2	Groundnut	411		411
3	Sesamum	566		566
4	Soyabean	-		
5	Sunflower	20		20
6	Castor	-		

Fibre

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Cotton	-		
2	Jute	45023		45023
3	Mesta	234		234
4	Sunhemp	10		10

Other crops

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Sugarcane	172		172
2	Tobacco	12230		12230
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	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Delay by 4 weeks 1 st week of July	Deep to very deep fine loamy to clayey soils	Jute – Rice	No change. Prefer varieties like JRO66, 8462, 128, 204, and AAU-oj1 and JBO2003	- Intercultivation in between the rows of jute - Increase the seed rate by 10%	Link with Govt. farm of department of agriculture, NSC, WBSC, RRS Pundibari farm UBKV for good quality of seed
		Rice – Toria	No change. Prefer varieties like Rasi. khitish, kiron bhupen, and Anjali	Transplant 2-3 seedlings per hill	

	Deep to very deep sandy loam soils	Jute – Rice	No change. Prefer varieties like JRO66,8462,128,204, and AAU-oj1 and JBO2003	- Intercultivation in between the rows of jute - Increase the seed rate by 10%	
		Rice – Toria	No change. Prefer varieties like Rasi. Khitish, kiron and bhupen, and Anjali	Direct sowing using drum seeder in medium to high land	
	Coarse sandy soils in uplands	Jute - Rice	No change. Prefer varieties like JRO66,8462,128,204, and AAU-oj1 and JBO2003	- Intercultivation in between the rows of jute - Increase the seed rate by 10%	

Contingency measures- Mid season

Condition	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures
Mid-season drought (long dry spell) At flowering/ fruiting stage	Deep to very deep fine loamy to clayey soils	Jute – Rice	- Timely weeding - Plan for <i>rabi</i> rice if damage is very severe	Supplemental irrigation with farm pond water / other sources
	Deep to very deep sandy loam soils	Rice – Toria	- Timely weeding - Plan for <i>rabi</i> toria if damage is very severe	-do-
		Jute – Rice	- Timely weeding - Plan for <i>rabi</i> rice if damage is very severe	-do-
	Coarse sandy soils in uplands	Rice – Toria	- Timely weeding - Plan for <i>rabi</i> toria if damage is very severe	-do-
		Jute - Rice	- Timely weeding - Plan for <i>rabi</i> rice if damage is very severe	-do-

Contingency measures- End of the season

Condition	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures
Terminal drought (Early withdrawal of monsoon)				
	Deep to very deep fine loamy to clayey soils	Jute – Rice	Land preparation for <i>rabi</i> rice	Supplemental irrigation with farm pond water / other sources
	Deep to very deep sandy loam soils	Rice – Toria	Rabi planning for Toria	-do-
		Jute – Rice	Land preparation for <i>rabi</i> rice	-do-
	Coarse sandy soils in uplands	Rice – Toria	Rabi planning for Toria	-do-
		Jute - Rice	Land preparation for <i>rabi</i> rice	-do-

Drought - Irrigated situation-

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	NA				

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall	NA				

Condition			Suggested Contingency measures		
	Major Farming situation	Normal 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	NA				

Condition			Suggested Contingency measures		
	Major Farming situation	Normal 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	NA				

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Soil nutrient & moisture conservation measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Shallow tube well irrigated Deep to very deep fine loamy to clayey soils	Rice – Rice/ Potato/ Mustard/Late Vegetable	Rice- Potato-/ Mustard/Late Vegetable	- Adopt SRI method for rice cultivation - Adopt alternate furrow irrigation for potato / mustard / Vegetable	Link farm pond technology with watersheds, NREGS
	Shallow tube well irrigated Deep to very deep sandy loam soils	Rice- early potato/Tobacco/ Mustard/ Vegetable	No Change	-do-	

	Shallow tube well irrigated Coarse sandy soils in uplands	Rice-early potato/vegetable/tobacco/potato	No Change	-do-	
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Resource management technologies

- Supplementary irrigation through Jalkund
- *In-situ* moisture conservation through organic and poly mulching in vegetable crops
- Poly mulching in Dalley Chilli
- Plastic mulch in bitter gourd production in trellis system during kharif season
- *In-situ* moisture conservation practices through zero tillage technology in Wheat
- Resource Conservation through Zero Tillage in Maize/Wheat
- Harvesting as a sustainable source of potable water for versatile use in rural Sundarbans
- Renovation of existing pond for harvesting, storing and recycling of rain water

Actionable Comprehensive Plans for Contingency

State	WEST BENGAL	District	MALDAH
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Rainfall info (mm)

Month/season	Normal rainfall (mm)	Expected deficiency, %	Expected rainfall (mm)
June-Sep	1182.4	More than 19%	Less than 957.744
June	234.4		
July	332.4		
August	273.2		
September	342.4		

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

Irrigation info:

Net irrigated area:	0	Gross irrigated area:	0
Net Rainfed area		Gross rainfed area	

Source wise irrigation area details (ha)

Source of irrigation	Net	Gross
Canals	-	-
Wells	-	-
Tanks	-	-
Other sources	-	-

Crop Profile (Kharif)

Cereals

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Rice	146525	0	
2	Jowar	-	-	
3	Maize	45904		45904
4	Bajra	-		
5	Ragi	-		

Pulses & Oilseeds

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Arhar/ Redgram	56		56
2	Groundnut	283		283
3	Sesamum	346		346
4	Soyabean	-		
5	Sunflower	-		
6	Castor	-		

Fibre

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Cotton	-		
2	Jute	28352		28352
3	Mesta	569		569
4	Sunhemp	-		

Other crops

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Sugarcane	1899		1899
2	Tobacco	-		
3	Guar seed	-		
4	Other Fodder crops	-		

Crop Plan- Beginning of the season

Conditions			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Delay by 4 weeks 1 st week of July	Deep clay to clay loam Low Land (Tal)	Maize- Rice	No change	Increase seed rate by 20% and closer spacing of 45 cm	Linkage with seed farms of Department of Agriculture, NSC, WBSC, UBKV for supply of seed
		Rice (aus)- fallow- Mustard	No change	Transplanting with 4-5 seedling / hill	
		Jute-Rice	No change	Increase the seed rate by 10% and close spacing of 30 cm	
	Medium sandy loam to loam Medium Land (Diara)	Jute - Rice	No change	-do-	
		Maize- Blackgram	No change	Increase seed rate by 20% and closer spacing of 45 cm	
		Sugarcane	No change	- Mulching with sugarcane trash - Ridge and furrow planting - Furrow / sprinkler irrigation	

	Deep Clay loam High Land (Barind)	Jute - Rice	No change	Increase seed rate by 20% and closer spacing of 45 cm	
		Sugarcane	No change	- Mulching with sugarcane trash - Ridge and furrow planting - Furrow / sprinkler irrigation	

Contingency measures- Mid season

Conditions			Suggested contingency measures	
	Major Farming situation	Normal Crop / Cropping system	Crop management	Soil nutrient & moisture conservation measures
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period) At vegetative stage	Deep clay to clay loam Low Land (Tal)	Maize-Rice	Intercultivation by harrowing	- Spray 2% urea during dry spell - Supplemental irrigation by alternate furrows - Top dressing with 10-20 kg N/ha after relief of dry spell
		Rice (aus)-fallow /Mustard	- Transplanting with 4-5 seedling / hill - Weed control either mechanical or herbicidal	- Supplemental irrigation - Top dressing with 10-20 kg N/ha after relief of dry spell
		Jute-Rice	Inter cultivation by harrowing	- Spray 2% urea during dry spell - Supplemental irrigation
	Medium sandy loam to loam Medium Land (Diara)	Jute - Rice	Inter cultivation by harrowing	- Spray 2% urea during dry spell - Top dressing of 20-30 kgN/ha after relief of dry spell - Supplemental irrigation
		Maize-Blackgram	Inter cultivation by harrowing	- Spray 2% urea during dry spell - Supplemental irrigation by alternate furrows - Conservation furrows for every 3 rows if feasible
		Sugarcane	- Gap filling with 2-3 budded setts if population is less than 75% - Weed control either mechanical or herbicidal	- Mulching with sugarcane trash - Supplemental irrigation by sprinkler - Top dressing of 20-30 kgN/ha after relief of dry spell
	Deep Clay loam High Land (Barind)	Jute - Rice	Inter cultivation by harrowing	- Spray 2% urea during dry spell - Supplemental irrigation - Conservation furrows for every 3 rows if feasible
		Sugarcane	- Gap filling with 2-3 budded setts if population is less than 75% - Weed control either mechanical or herbicidal	- Mulching with sugarcane trash - Supplemental irrigation by sprinkler - Top dressing of 20-30 kgN/ha after relief of dry spell

Conditions			Suggested contingency measures	
	Major Farming situation	Normal Crop / Cropping system	Crop management	Soil nutrient & moisture conservation measures
Mid season drought (long dry spell) At flowering/ fruiting stage	Deep clay to clay loam Low Land (Tal)	Maize-Rice	-	- Spray 2% urea during dry spell - Supplemental irrigation by alternate furrow or micro irrigation system if feasible
		Rice (aus)-Fallow/Mustard	-	-do-
		Jute-Rice	-	Supplemental irrigation by alternate furrow or micro irrigation system if feasible
	Medium sandy loam to loam	Jute - Rice	-	-do-
		Maize-Blackgram	-	Spray 2% urea during dry spell

	Medium Land (Diara)			Supplemental irrigation by alternate furrow or micro irrigation system if feasible
		Sugarcane	-	Supplemental irrigation by alternate furrow or micro irrigation system if feasible
	Deep Clay loam High Land (Barind)	Jute - Rice	-	-do-
		Sugarcane	-	Supplemental irrigation by alternate furrow or micro irrigation system if feasible

Contingency measures- End of the season

Conditions	Major Farming situation	Normal Crop / Cropping system	Suggested contingency measures	
			Crop management	Rabi crop planning
Terminal drought (Early withdrawal of monsoon)	Deep clay to clay loam Low Land (Tal)	Maize-Rice	Supplemental irrigation	Harvest as fodder crop if damage is severe and plan for <i>rabi</i> rice
		Rice (aus)-Fallow-Mustard	-do-	Plan for <i>rabi</i> mustard if damage is very severe
		Jute-Rice	-do-	Plan for early rabi if damage is severe
	Medium sandy loam to loam Medium Land (Diara)	Jute - Rice	-do-	-do-
		Maize-Blackgram	-do-	Harvest as fodder crop if damage is severe plan for <i>rabi</i> blackgram
		Sugarcane	- Apply 40-50 kg N/ha after relief of dry spell - Spray 2% urea	Ratoon the crop if the damage is severe and plan for ratoon crop cultivation
	Deep Clay loam High Land (Barind)	Jute - Rice	-do-	Plan for <i>rabi</i> rice if damage is severe
		Sugarcane	-do-	Ratoon the crop if the damage is severe and plan for ratoon crop cultivation

Drought - Irrigated situation

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	NA				

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall	NA				

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of	NA				

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
monsoon in catchment					

Condition			Suggested Contingency measures		
	Major Farming situation	Normal 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	Medium sandy loam to loam Medium Land (Diara)	Maize-Rice/Wheat/Mustard	No Change	- Alternate furrow irrigation - Irrigation at critical crop growth stages	- Linkage with NFSM, ISOPOM for seed - Link watersheds, NRGES farm pond technology
		Jute-Rice/Wheat/Mustard	-do-	-do-	
		Maize-Blackgram/Potato	-do-	-do-	
		Sugarcane	-do-	-do-	
	Deep Clay loam High Land (Barind)	Maize-Rice/Wheat/Mustard	Maize-Wheat/Mustard	- Alternate furrow irrigation - Irrigation at critical crop growth stages - Mulching	
		Jute-Rice/Wheat/Mustard	Jute-Wheat/Mustard	-do-	
		Maize-Blackgram/Potato/Cole crops	No change	-do-	
		Sugarcane	-do-	- Alternate furrow irrigation - Irrigation at critical crop growth stages - Mulching with sugarcane trash	

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Medium sandy loam to loam Medium Land (Diara)	Maize-Rice/Wheat/Mustard	Maize-Wheat/Mustard	- Alternate furrow irrigation - Timely interculture operation for weed control - Irrigation at critical crop growth stages	- Linkage with NFSM, ISOPOM for seed - Link watersheds, NRGES farm pond technology
		Jute-Rice/Wheat/Mustard	Jute-Wheat/Mustard	-do-	
		Maize-Blackgram-Potato	No change	-do-	
		Sugarcane	-do-	- Mulching with sugarcane trash - Sprinkler method of irrigation	
	Deep Clay loam High Land (Barind)	Maize-Rice-Wheat/Mustard	Maize-Wheat/Mustard	- Alternate furrow irrigation - Timely interculture operation for weed control - Irrigation at critical crop growth stages through farm pond water/ other sources - Mulching in between crop rows after top dressing of N	
		Jute-Rice-Wheat/Mustard	Jute-Wheat/Mustard	-do-	
		Maize-Blackgram-Potato	No change	-do-	
		Sugarcane	-do-	- Mulching with sugarcane trash - Sprinkler method of irrigation	

Resource management technologies

- Supplementary irrigation through Jalkund
- *In-situ* moisture conservation through organic and poly mulching in vegetable crops
- Poly mulching in Dalley Chilli
- Plastic mulch in bitter gourd production in trellis system during kharif season
- *In-situ* moisture conservation practices through zero tillage technology in Wheat
- Resource Conservation through Zero Tillage in Maize/Wheat
- Harvesting as a sustainable source of potable water for versatile use in rural Sundarbans
- Renovation of existing pond for harvesting, storing and recycling of rain water

Actionable Comprehensive Plans for Contingency

State	WEST BENGAL	District	PURULIYA
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Rainfall info (mm)

Month/season	Normal rainfall (mm)	Expected deficiency, %	Expected rainfall (mm)
June-Sep	1112.4	More than 19%	Less than 901.044
June	233.2		
July	308.3		
August	280.8		
September	290.1		

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

Irrigation info:

Net irrigated area:	0	Gross irrigated area:	0
Net Rainfed area		Gross rainfed area	

Source wise irrigation area details (ha)

Source of irrigation	Net	Gross
Canals	-	-
Wells	-	-
Tanks	-	-
Other sources	-	-

Crop Profile (Kharif)

Cereals

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Rice	201347	0	
2	Jowar	50	-	
3	Maize	6176		6176
4	Bajra	65		65
5	Ragi	600		600

Pulses & Oilseeds

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Arhar/ Redgram	-		
2	Groundnut	3486		3486
3	Sesamum	1037		1037
4	Soyabean	-		
5	Sunflower	10		10
6	Castor	-		

Fibre

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Cotton	-		
2	Jute	-		
3	Mesta	227		227
4	Sunhemp	126		126

Other crops

S.No	Crop name	Total area (ha)	Irrigated area (ha)	Rainfed area (ha)
1	Sugarcane	892		892
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	Normal Crop / Cropping system	Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Delay by 4 weeks 1 st week of July	Red & laterite soils, undulated land. Shallow to moderately deep coarse loamy fine loamy soils (hillocks, gravelly situation)	Aman rice- Fallow	No change	Transplant 3-4 seedlings/hill	Linkage with Seed farms, Department of Agriculture, NSC, WBSC, BCKVV for supply of seed
		Aman rice- Wheat/ Mustard/ Vegetables	-do-	-do-	
		Cauliflower	No change. Prefer varieties like Pusa	- Raising of seed bed under transparent plastic cover - Spray the 15 days old seedlings with the	

				starter solution of ammonium sulphate (50g/10litres of	
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			Deepali, Pusa Katki	water) • Transplant healthy seedlings of 35-40 days old • Three foliar sprays of 0.3% borax after 20, 35 and 50 days after transplanting	
		Okra	No change. Prefer varieties like Arka Anamika, Arka Abhay, Pusa A-4, VRO-6, Azad Krishna (OP), Mahyco-12, No-152 (Hybrid)	• Soaking the seeds in 0.2% Bavistin over night to protect the seedlings from wilt disease; • 4-5 foliar sprays of Imidacloprid (3.5 ml/ 10 l or Thiamethoxam (3.5 ml/ 10 l) to control whitefly	
		Cucurbits (Cucumber, Ridge gourd, Bottle gourd, Bitter gourd etc.)	No change. Prefer local cultivars	• Prepare mounds in the furrow for sowing of seeds • Application of 150-20-50 PPM Ethrel (1.5-2.0 ml/10 l of water), 400 ppm (4 ml/10 l of water), maleic hydrazide twice, first at two true leaves stage of plants i.e. 15 days after sowing and subsequently repeated 7 days after helps in increasing the yield • The crop needs to be trained over low trellis of 1.5 m high above the ground • After 85 to 90 days of sowing, older leaves near the bottom of the vine are to be pruned • Timely control of downy mildew disease	
		Cabbage	High temperature tolerant hybrids	• Raising of seed bed under transparent plastic cover • Spray the 15 days old seedlings with the starter solution of ammonium sulphate (50g/10litres of water) • Transplant healthy seedlings of 35-40 days old • Three foliar sprays of 0.3% borax after 20, 35 and 50 days after transplanting	

	Red & laterite soils, undulated land. Moderately deep to deep coarse loamy to fine loamy red soils	Aman rice-Fallow	No change	- Follow staggered dry nursery to fill up the gaps. - Dry seeding of rice/ drum seeding if the damage is severe. - Proper weeding.	
		Aman rice-Wheat/ Mustard/ Vegetables	-do-	-do-	
		Cauliflower	No change. Prefer varieties like Early Kunwari, Pusa Early Synthetic, Synthetic 78-1	- Raising of seed bed under transparent plastic cover - Spray the 15 days old seedlings with the starter solution of ammonium sulphate (50g/10litres of water) - Transplant healthy seedlings of 35-40 days old	
				Three foliar sprays of 0.3% borax after 20, 35 and 50 days after transplanting	
		Okra	No change. Prefer varieties like Arka Anamika, Arka Abhay, Pusa A-4, VRO-6, Azad Krishna (OP), Mahyco-12, No-152 (Hybrid)	- Soaking the seeds in 0.2% Bavistin over night to protect the seedlings from wilt disease; - Gap fill with the same varieties if population is <50%. 4-5 foliar sprays of Imidacloprid (3.5 ml/ 10 l or Thiamethoxam (3.5 ml/ 10 l) to control whitefly	
		Cucurbits (Cucumber, Ridge gourd, Bottle gourd, Bitter gourd etc.)	No change. Prefer local cultivars	- Prepare mounds in the furrow for sowing of seeds - Application of 150-20-50 PPM Ethrel (1.5-2.0 ml/10 l of water), 400 ppm (4 ml/10 l of water), maleic hydrazide twice, first at two true leaves stage of plants i.e. 15 days after sowing and subsequently repeated 7 days after helps in increasing the yield - The crop needs to be trained over low trellis of 1.5 m high above the ground - After 85 to 90 days of sowing, older leaves near the bottom of the vine are to be pruned - Timely control of downy mildew disease	

		Cabbage	High temperature tolerant hybrids	• Raising of seed bed under transparent plastic cover • Spray the 15 days old seedlings with the starter solution of ammonium sulphate (50g/10litres of water) • Transplant healthy seedlings of 35-40 days old • Three foliar sprays of 0.3% borax after 20, 35 and 50 days after transplanting	
	Red & laterite soils, undulated land. Shallow to moderately deep loamy soils	Aman rice-Fallow	No change	Transplant 3-4 seedlings/hill	
		Aman rice-Wheat/ Mustard/ Vegetables	-do-	-do-	
		Cauliflower	No change. Prefer varieties like Early Kunwari, Pusa Early Synthetic, Synthetic 78-1	• Raising of seed bed under transparent plastic cover • Spray the 15 days old seedlings with the starter solution of ammonium sulphate (50g/10litres of water) • Transplant healthy seedlings of 35-40 days old • Three foliar sprays of 0.3% borax after 20, 35 and 50 days after transplanting	

		Okra	No change. Prefer varieties like Arka Anamika, Arka Abhay, Pusa A-4, VRO-6, Azad Krishna (OP), Mahyco-12, No-152 (Hybrid)	• Soaking the seeds in 0.2% Bavistin over night to protect the seedlings from wilt disease; • 4-5 foliar sprays of Imidacloprid (3.5 ml/ 10 l or Thiamethoxam (3.5 ml/ 10 l) to control whitefly	
		Cucurbits (Cucumber, Ridge gourd, Bottle gourd, Bitter gourd etc.)	No change. Prefer local cultivars	• Prepare mounds in the furrow for sowing of seeds • Application of 150-20-50 PPM Ethrel (1.5-2.0 ml/10 l of water), 400 ppm (4 ml/10 l of water), maleic hydrazide twice, first at two true leaves stage of plants i.e. 15 days after sowing and subsequently repeated 7 days after helps in increasing the yield • The crop needs to be trained over low trellis of 1.5 m high above the ground • After 85 to 90 days of sowing, older leaves near the bottom of the vine are to be pruned • Timely control of downy mildew disease	
		Cabbage	High temperature tolerant hybrids	• Raising of seed bed under transparent plastic cover • Spray the 15 days old seedlings with the starter solution of ammonium sulphate (50g/10litres of water) • Transplant healthy seedlings of 35-40 days old • Three foliar sprays of 0.3% borax after 20, 35 and 50 days after transplanting	

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	Normal Crop/ cropping system	Crop management	Soil nutrient & moisture conservation measures
Vegetative stage	Red & laterite soils, undulated land. Shallow to moderately deep coarse loamy fine loamy soils	Aman rice- Fallow	- Take up gap filling either with available nursery or by splitting the tillers from the surviving hills - Interculture / weeding - Supplemental irrigation.	Apply 30-50 kg N /ha after relief of drought.
		Aman rice- Wheat/ Mustard/ Vegetables	-do-	-do-

	(hillocks, gravelly situation)			
	Red & laterite soils, undulated land. Moderately deep to deep coarse loamy to fine loamy red soils	Aman rice- Fallow	-do-	-do-
		Aman rice- Wheat/ Mustard/ Vegetables	-do-	-do-
	Red & laterite soils, undulated land. Shallow to moderately deep loamy soils	Aman rice- Fallow	-do-	-do-
		Aman rice- Wheat/ Mustard/ Vegetables	-do-	-do-

Condition			Suggested contingency measures	
Mid season drought (long dry spell)	Major Farming situation	Normal Crop/ cropping system	Crop management	Soil nutrient & moisture conservation measures
At flowering/ fruiting stage	Red & laterite soils, undulated land. Shallow to moderately deep coarse loamy fine loamy soils (hillocks, gravelly situation)	Aman rice- fallow	- Supplemental irrigation - Plan for land preparation to sow the fodder crops like maize and sorghum	- Spray 2% urea or DAP - Top dressing of 50 kg N/ha after the relief of dry spell - Need based pesticide application
		Aman rice- wheat/ mustard/ vegetables	If the damage is severe, prepare land for rabi vegetables	-do-
	Red & laterite soils, undulated land. Moderately deep to deep coarse loamy to fine loamy red soils	Aman rice- fallow	- Supplemental irrigation - Plan for land preparation to sow the fodder crops like maize and sorghum	-do-
		Aman rice- wheat/ mustard/ vegetables	If the damage is severe, prepare land for <i>rabi</i> vegetables	-do-
	Red & laterite soils, undulated land. Shallow to moderately deep loamy soils	Aman rice- fallow	- Supplemental irrigation - Plan for land preparation to sow the fodder crops like maize and sorghum	-do-
		Aman rice- wheat/ mustard/ vegetables	If the damage is severe, prepare land for <i>rabi</i> vegetables	-do-

Contingency measures- End of the season

Condition			Suggested contingency measures	
	Major Farming situation	Normal Crop/ cropping system	Crop management	Rabi Crop planning
Terminal drought (Early)	Red & laterite soils, undulated land. Shallow to	Aman rice- Fallow	Supplemental irrigation with farm pond water / other sources	Sowing of linseed/ Khesari as paira crop

withdrawal of monsoon)	moderately deep coarse loamy fine loamy soils (hillocks, gravelly situation)	Aman rice- Wheat/ Mustard/ Vegetables	-do-	- Sowing of short duration rapreseed varieties like Sanjucta, Asech, B-54, Jhanti - Sowing of lentil / wheat / mustard/ vegetables
	Red & laterite soils, undulated land.	Aman rice- Fallow	-do-	Sowing of linseed/ Khesari as paira crop
	Moderately deep to deep coarse loamy to fine loamy red soils	Aman rice- wheat/ mustard/ vegetables	-do-	- Sowing of short duration rapreseed varieties like Sanjucta, Asech, B-54, Jhanti - Sowing of lentil / wheat / mustard/ vegetables
	Red & laterite soils, undulated land.	Aman rice- fallow	-do-	Sowing of linseed/ Khesari as paira crop
	Shallow to moderately deep loamy soils	Aman rice- wheat/ mustard/ vegetables	-do-	- Sowing of short duration rapreseed varieties like Sanjucta, Asech, B-54, Jhanti - Sowing of lentil / wheat / mustard/ vegetables

Drought - Irrigated situation

Condition	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Suggested Contingency measures	
				Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	Red & laterite soils, undulated land. Shallow to moderately deep coarse loamy fine loamy soils (hillocks, gravelly situation)	Aman rice- fallow	No change. Prefer direct sowing of short duration rice variety.	- Adopt SRI method - Adopt alternate wetting and drying upto primordial initiation stage to save water - Better weed Management.	Linkage with NFSM, ISOPOM, NREGS
		Aman rice- wheat/ mustard/ vegetables	-do-	- Adopt alternate wetting and drying upto primordial initiation stage to save water - Better weed management - If rice crop cannot be taken, select fodder crops like maize and sorghum or prepare land for <i>rabi</i> wheat / mustard	
	Red & laterite soils, undulated land. Moderately deep to deep coarse loamy to fine loamy red soils	Aman rice- fallow	-do-	- Adopt alternate wetting and drying upto primordial initiation stage to save water - Better weed Management.	
		Aman rice- wheat/ mustard/ vegetables	-do-	- Adopt alternate wetting and drying upto primordial initiation stage to save water - Better weed management - If rice crop cannot be taken, select fodder crops like maize and sorghum or prepare land for <i>rabi</i> wheat / mustard	
	Red & laterite soils, undulated land.	Aman rice- fallow	-do-	- Adopt alternate wetting and drying upto primordial initiation stage to save water - Better weed Management.	

	Shallow to moderately deep loamy soils	Aman rice- wheat/ mustard/ vegetables	-do-	• Adopt alternate wetting and drying upto primordial initiation stage to save water • Better weed management • If rice crop cannot be taken, select fodder crops like maize and sorghum or prepare land for <i>rabi</i> wheat / mustard	
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Condition			Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation		
Limited release of water in canals due to low rainfall	Red & laterite soils, undulated land. Shallow to moderately deep coarse loamy fine loamy soils (hillocks, gravelly situation)	Aman rice- fallow	No change. Prefer direct sowing of short duration rice variety.	• Adopt SRI method • Adopt alternate wetting and drying upto primordial initiation stage to save water • Better weed Management.	Linkage with NFSM, ISOPOM, NREGS		
		Aman rice- wheat/ mustard/ vegetables	-do-	• Adopt alternate wetting and drying upto primordial initiation stage to save water • Better weed management • If rice crop cannot be taken, select fodder crops like maize and sorghum or prepare land for <i>rabi</i> wheat / mustard			
	Red & laterite soils, undulated land. Moderately deep to deep coarse loamy to fine loamy red soils	Aman rice- fallow	-do-	• Adopt alternate wetting and drying upto primordial initiation stage to save water • Better weed Management.			
		Aman rice- wheat/ mustard/ vegetables	-do-	• Adopt alternate wetting and drying upto primordial initiation stage to save water • Better weed management • If rice crop cannot be taken, select fodder crops like maize and sorghum or prepare land for <i>rabi</i> wheat / mustard			
	Red & laterite soils, undulated land. Shallow to moderately deep loamy soils	Aman rice- fallow	-do-	• Adopt alternate wetting and drying upto primordial initiation stage to save water • Better weed Management.			
		Aman rice- wheat/ mustard/ vegetables	-do-	• Adopt alternate wetting and drying upto primordial initiation stage to save water • Better weed management • If rice crop cannot be taken, select fodder crops like maize and sorghum or prepare land for <i>rabi</i> wheat / mustard			
	Condition			Suggested Contingency measures			
		Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system		Agronomic measures	Remarks on Implementation

Insufficient groundwater recharge due to low rainfall Any other condition	Red & laterite soils, undulated land. Shallow to moderately deep coarse loamy fine loamy soils (hillocks, gravelly situation)	Aman rice- fallow	No change. Prefer direct sowing of short duration rice variety.	• Adopt SRI method • Adopt alternate wetting and drying upto primordial initiation stage to save water • Better weed Management. • If rice crop cannot be taken, select fodder crops like maize and sorghum or prepare land for <i>rabi</i> wheat / mustard	Linkage with NFSM, ISOPOM, NREGS.
		Aman rice- wheat/ mustard/ vegetables	Prefer direct sowing of short duration rice variety to follow the crop sequences of Rice – khesari / linseed / pulses / oilseed (mustard / rape seed)	• Adopt alternate wetting and drying upto primordial initiation stage to save water • Better weed management	
	Red & laterite soils, undulated land. Moderately deep to deep coarse loamy to fine loamy red soils	Aman rice- fallow	No change. Prefer direct sowing of short duration rice variety.	• Adopt SRI method • Adopt alternate wetting and drying upto primordial initiation stage to save water • Better weed Management. • If rice crop cannot be taken, select fodder crops like maize and sorghum or prepare land for <i>rabi</i> wheat / mustard	
		Aman rice- wheat/ mustard/ vegetables	Prefer direct sowing of short duration rice variety to follow the crop sequences of Rice – khesari / linseed / pulses / oilseed (mustard / rape seed)	• Adopt alternate wetting and drying upto primordial initiation stage to save water • Better weed management	
	Red & laterite soils, undulated land. Shallow to moderately deep loamy soils	Aman rice- fallow	No change. Prefer direct sowing of short duration rice variety.	• Adopt SRI method • Adopt alternate wetting and drying upto primordial initiation stage to save water • Better weed Management. • If rice crop cannot be taken, select fodder crops like maize and sorghum or prepare land for <i>rabi</i> wheat / mustard	

Resource management technologies

- Supplementary irrigation through Jalkund
- *In-situ* moisture conservation through organic and poly mulching in vegetable crops
- Poly mulching in Dalley Chilli
- Plastic mulch in bitter gourd production in trellis system during kharif season
- *In-situ* moisture conservation practices through zero tillage technology in Wheat
- Resource Conservation through Zero Tillage in Maize/Wheat

- Harvesting as a sustainable source of potable water for versatile use in rural Sundarbans
- Renovation of existing pond for harvesting, storing and recycling of rain water