State: BIHAR

Agriculture Contingency Plan for District: Arwal

1.0 District Agriculture profile				
1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	Northern Plain, Hot Sub humib (Dry) Eco- sub region (9.2)		
	Agro-Climatic Zone (Planning Commission)	Middle Gangetic Plain Region (IV)		
	Agro Climatic Zone (NARP)	South Bihar Alluvial Plain Zone (BI-3)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Aurangabad, Gaya, Jahanabad, Patna, Arwal, Rohtas, Nalanda, Bhojpur, Buxar, Bhabhua, Nawada (Earlier this district was carved out from Jehanabad)		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		25^0 - 25^0 15' N	84^0 - 85^0 15'E	67.9 m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	ARI, Lohia Nagar, Patna		
	Mention the KVK located in the district with address	Krishi Vigyan Kendra, Arwal, Lodipur farm, Po- Sarvarpur Dist- Arwal, Pin- 804428		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	BAC, Sabour , Bhagalpur		

1.2	**Rainfall**	**Normal RF(mm)**	**Normal Onset**	**Normal Cessation**
	SW monsoon (June-Sep)	972.25	3rd week of June	2nd week of October
	NE Monsoon(Oct-Dec)	28.8		
	Winter (Jan- Feb)	30.8		
	Summer (March- May)	42.2		
	Annual	1013.8		

1.3	**Land use pattern of the district (latest statistics)**	Geographical area	Cultivable area	Forest area	Land under non-agricultural use	Permanent pastures	Cultivable wasteland	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	Area (‘000, ha)	63.4	43.1		8.5	0.5	1.0	0.017	0.08	6.5	1.3

1. 4	**Major Soils**	**Area (‘000 ha)**	**Percent (%) of total**
	Sandy Soils	2.00	3.14
	Coarse Sandy Loam Soils	9.50	14.91
	Fine Sandy Loam Soils	12.60	19.78
	Clayey Soils	35.364	55.52
	Saline/ Calcareous Soils	4.236	6.65

*Arwal was carved out from Jehnabad district

1.5	**Agricultural land use**	Area (‘000 ha)	Cropping intensity %
	Net sown area	43.1	197%
	Area sown more than once	13.3	
	Gross cropped area	85.0	

1.6	**Irrigation**	Area (‘000 ha)		
	Net irrigated area	26.5		
	Gross irrigated area	45.1		
	Rainfed area	17.1		
	Sources of Irrigation	Number	Area (‘000 ha)	Percentage of total irrigated area
	Canals	-	7.2	16%

	Tanks	-	-	-
	Open wells	-	-	-
	Bore wells- Deep TW	-	17.1	38%
	Lift irrigation schemes (Surface lift)	-	-	-
	Micro-irrigation	-	-	-
	Other sources (please specify) Dug well & shallow well	-	20.7	46%
	Total Irrigated Area		45.137	
	Pump sets			
	No. of Tractors			
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)
	Over exploited			
	Critical			
	Semi- critical			
	Safe			
	Wastewater availability and use			
	Ground water quality			
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%				

1.7 Area under major field crops & horticulture (as per latest figures of 2008-09)

1.7	**Major field crops cultivated**	**Area ('000 ha)**							
		Kharif			***Rabi***				
		Irrigated	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**	**Summer**	**Grand total**
	Rice			44.1					44.1
	Wheat			-			15.0		15.0
	Maize			0.4					0.4
	Chickpea			-			4.9		4.9
	Lentil			-			6.2		6.2
	Pigeonpea			1.0					1.0

	Blackgram			0.6					0.6
	Pea			-			1.1		1.1
	Rapeseed and Mustard			-			2.3		2.3
	Linseed			-			2.0		2.0

	Horticulture crops - Fruits	**Area ('000 ha)**		
		Total	**Irrigated**	**Rainfed**
	Mango	0.226		
	Guava	0.206		
	Banana	0.009		
	Citrus	0.105		
	Aonla	0.002		
	Papaya	0.035		
	Ber	0.002		
	Horticulture crops – Vegetables	**Total**	**Irrigated**	**Rainfed**
	Potato	3.5		
	Cauliflower	0.3		
	Tomato	0.4		
	Brinjal	0.3		
	Onion	0.3		
	Cabbage	0.3		
	Okra	0.4		
	Pea	0.04		
	Radish	0.07		
	Carrot	0.03		
	Parwal	0.078		
	Medicinal and Aromatic crops	**Total**	**Irrigated**	**Rainfed**
	Lemon grass, Tulsi, Mentha and other	0.034		
	Plantation crops			
	Fodder crops			
	Total fodder crop area			

	Grazing land			
	Sericulture etc			

1.8	**Livestock**	**Male**	**Female**	**Total (‘000 ha)**
	Non descriptive Cattle (local low yielding)	15	12	27
	Improved cattle			
	Crossbred cattle	1.37	7.2	8.6
	Non descriptive Buffaloes (local low yielding)	5	23	28
	Descript Buffaloes			
	Goat			48.6
	Sheep			2.5
	Others (Camel, Pig, Yak etc.)**Pig**			6.9
	Commercial dairy farms (Number)			
1.9	**Poultry**	**No. of farms**	**Total No. of birds(‘000 ha)**	
	Commercial		46.0	
	Backyard		47.1	

1.10	**Fisheries** (Data source: Chief Planning Officer)						
	A. Capture						
	i) Marine (Data Source: Fisheries Department)	**No. of fishermen**	**Boats**		**Nets**		**Storage facilities (Ice plants etc.)**
			Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	
	ii) Inland (Data Source: Fisheries Department)	**No. Farmer owned ponds**		**No. of Reservoirs**		**No. of village tanks**	
		435				234	
	B. Culture						
				Water Spread Area (ha)		**Yield (t/ha)**	**Production (‘000 tons)**
	i) **Brackish water** (Data Source: MPEDA/ Fisheries Department)						
	ii) **Fresh water** (Data Source: Fisheries Department)			634			

Source: SREP, ATMA, NABARD(PLCP,ARWAL2010-11),DAO, Jehanabad, DSO,ARWAL

1.11 Production and Productivity of major crops (Average of last 5 years: 2004-08)

1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder (‘000 tons)
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	
Major Field crops (Crops identified based on total acreage)										
	Rice	159.1	3540			-	-	-	-	-
	Wheat	-		36.1	2431	-	-	-	-	-
	Maize	1.6	3714			-	-	-	-	-
	Chickpea	-	-	7.9	1600	-	-	-	-	-
	Lentil	-	-	9.8	1600	-	-	-	-	-
	Rapeseed & Mustard	-	-	3.7	1600	-	-	-	-	-
	Pigeonpea	1.870	1750			-	-	-	-	-
Major Horticultural crops (Crops identified based on total acreage)										
	Mango	-	-	-	-	-	-	2.4	105.9	
	Banana	-	-	-	-	-	-	0.1	150.0	
	Guava	-	-	-	-	-	-	2.5	120	
	Citrus	-	-	-	-	-	-	0.6	61	
	Papaya	-	-	-	-	-	-	1.2	350	

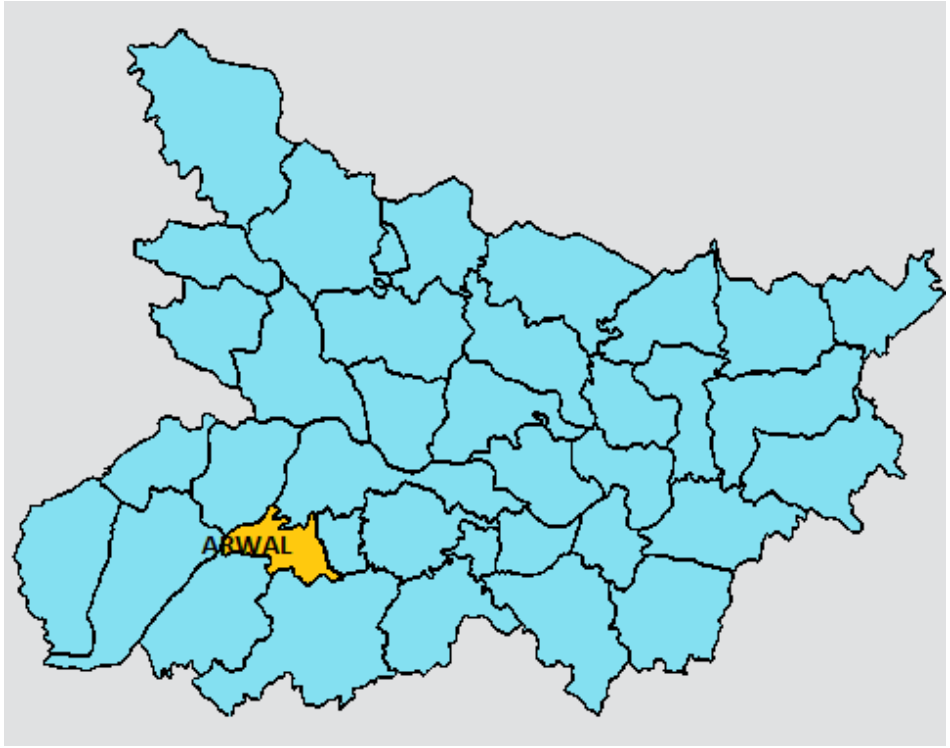
1.12	Sowing window for 5 major crops (start and end of sowing period)	Rice	Maize	Wheat	Potato	Mustard	Lentil
	Kharif rainfed	4th week of June - 2nd week of July	-	-	-	-	-
	Kharif irrigated	4th week of May- 4th week of June	3rd week of May - 4th week of June	-	-	-	-

	Rabi rainfed	-	-	-	-	-	3rd week of October – 3rd week of November
	Rabi irrigated	-	-	2nd week of November - 4th week of November (timely sowing) 2nd week of December- - 4th week of December (late sowing)	3rd week of October - 3rd week of November	2nd week of October – 4th week of October (timely sowing); 1st week of December- 4th week of December (late sowing)	4th week of Oct. – 2nd week of Nov.

1.13	**What is the major contingency the district is prone to?** (Tick mark)	**Regular**	**Occasional**	**None**
	Drought	√		
	Flood			√
	Cyclone			√
	Hail storm			√
	Heat wave		√	
	Cold wave		√	
	Frost			√
	Sea water intrusion			√
	Pests and disease outbreak		√	

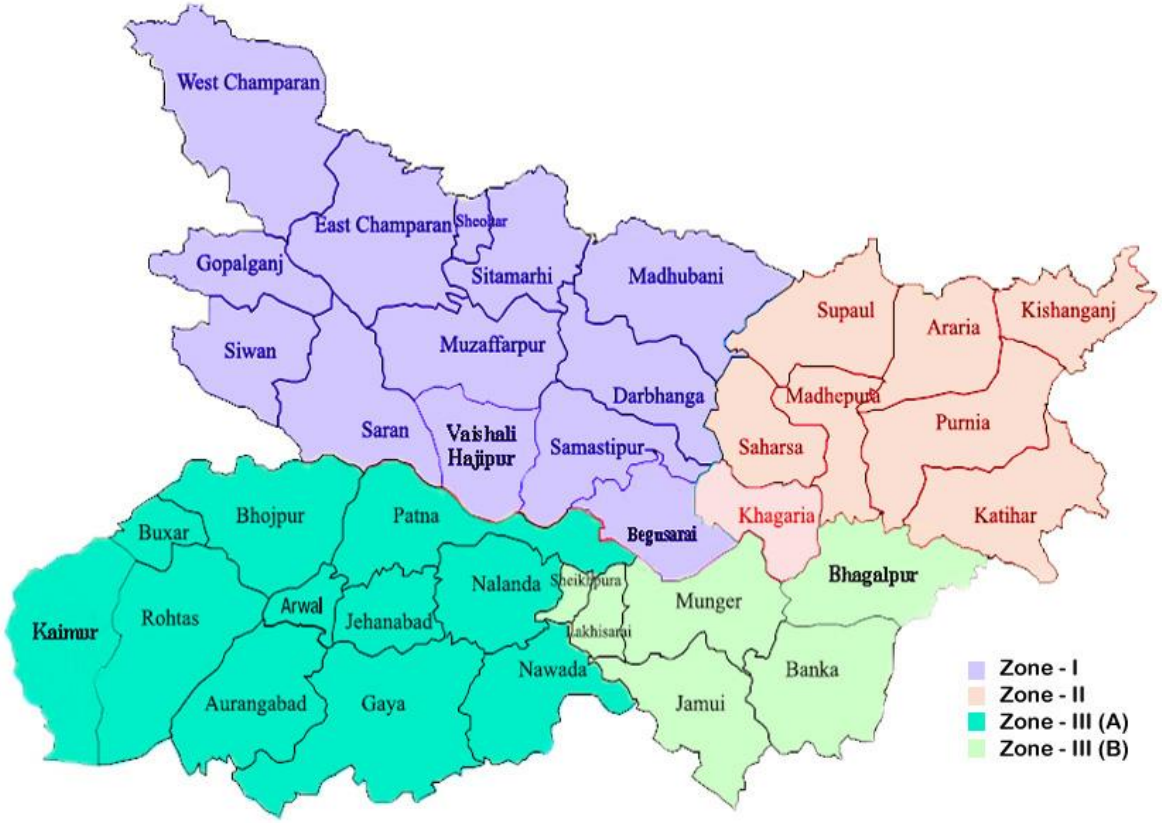
1.14	**Include Digital maps of the district for**	Location map of district within State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure 2	Enclosed: Yes
		Soil map as Annexure 3	Enclosed: Yes (This district came into existence in September 2001 and was earlier part of Jehanabad district)

Annexure-I



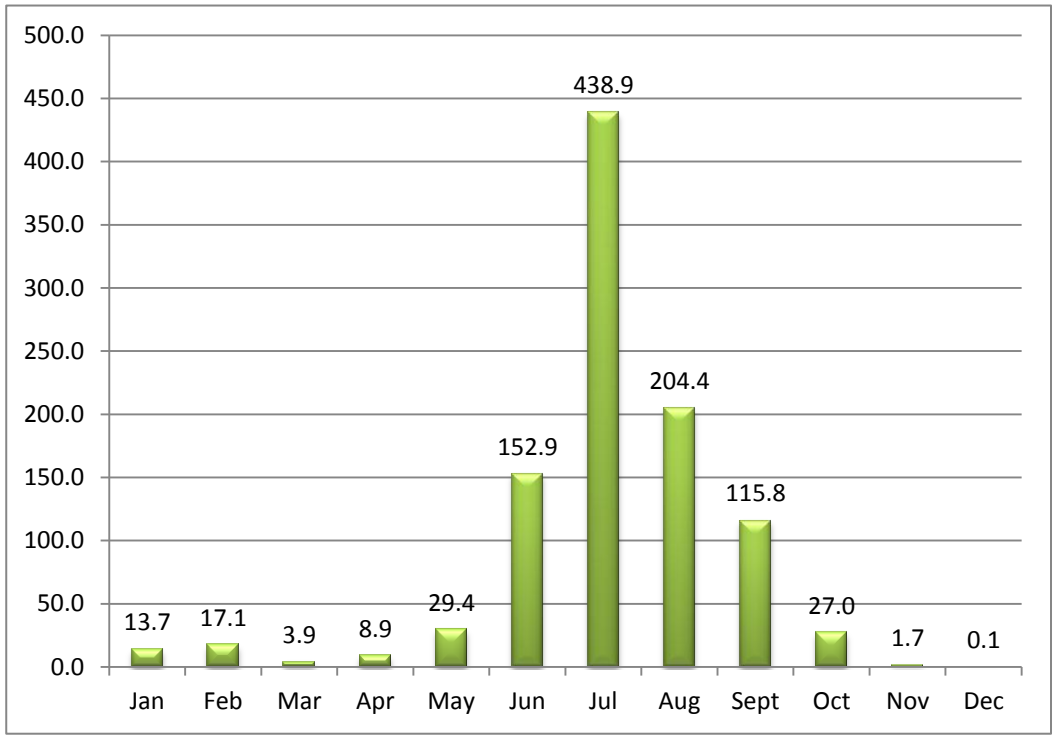
*Arwal was carved out from Jehnabad district

Agro climatic Zones of Bihar

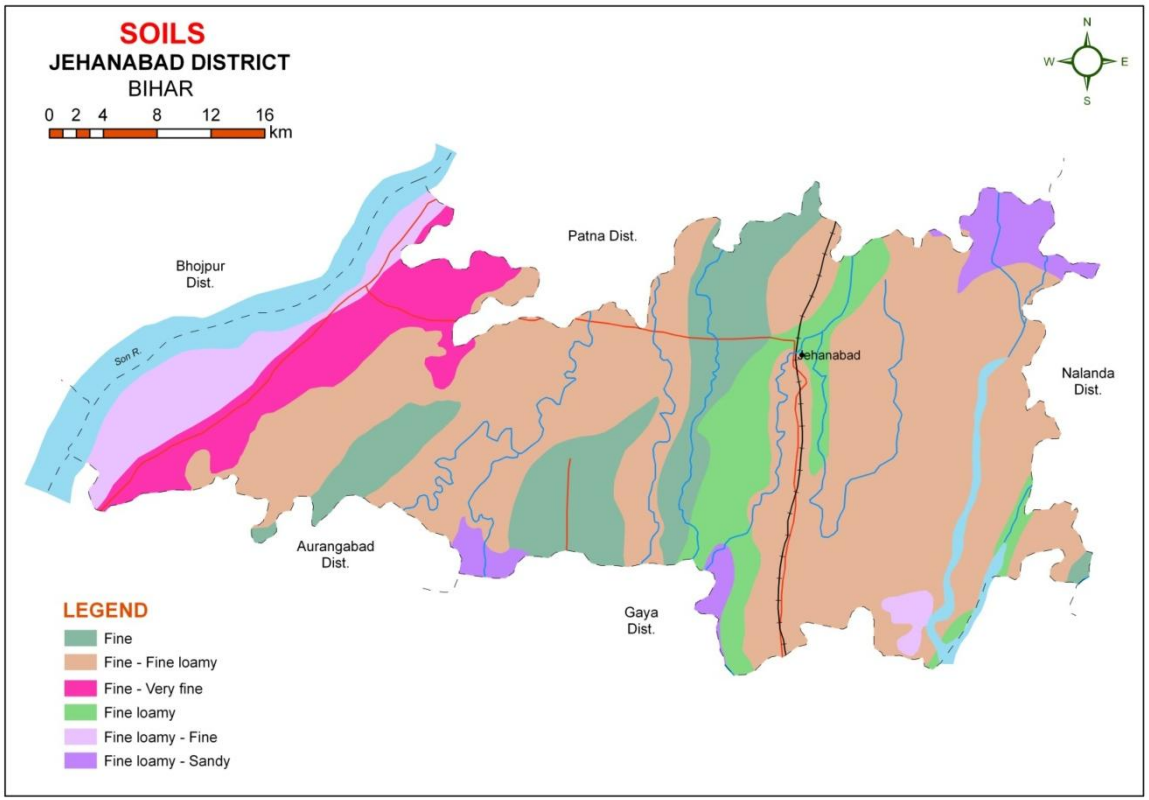


Source: krishi.bih.nic.in

Annexure-II


500.0
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
13.7
17.1
3.9
8.9
29.4
152.9
438.9
204.4
115.8
27.0
1.7
0.1
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
Dec

Annexure-III



*Arwal was carved out from Jehnabad district, so laft part of image shows the soil profile of arwal district

Source : NBSS& LUP, Regional Centre, Kolkata

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

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 2 weeks 1st week of July	Upland Very deep fine clay soils	1.Pigeonpea/ Maize/Blackgram 2. Vegetables- Wheat 3. Rice-Wheat 4. Rice- Lentil/Pea/ Chickpea 5. Rice – Mustard /Potato	No change Pigeonpea / Maize/Blackgram Rice- Chickpea Rice – Lentil/Pea/ Chickpea Rice – Mustard Pigeonpea –Bahar, Narendra arhar-I Blackgram- T-9, Pant 30 Maize – Deoki . Ganga -2	-	-
			Early Rice-Wheat Rice- Prefer Long to medium duration varieties	• Adopt normal package of practices •	
	Medium land	1.Rice-Wheat 2.Rice-Lentil/Pea/ Chickpea 3.Rice – Mustard	No change Rice- ajendra sweta (135-140d), Rajendra mahsuri (140-150 days), Sita (130-140d), Rajendra Bhagawati, Rajendra Suwasni, BPT 5204 , R. Kasturi,		
	Lowland	1. Rice-Wheat 2. Rice- Lentil 3. Rice - Chickpea	No change Rice- Rajshree, Santosh , Sita, Rajendra Mansuri-1, R-Sweta, BPT5204		

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 weeks 3rd week of July	Upland Very deep fine clay soils	1. Pigeonpea / Maize/ Blackgram 2. Vegetables- Wheat 3. Rice-Wheat 4. Rice- Lentil/Pea/ Chickpea 5. Rice – Mustard /Potato	Short duration Rice- Wheat Short duration Rice- Lentil Short duration Rice- Chickpea Rice- Prefer Medium to short duration varieties like Saroj (100-110d), Birsa Dhan-201 (100-115d) Rajendra Bhagwati, Pigeonpea – Bahar, Narendra arhar-I Blackgram- T-9, Pant 30 Maize – Deoki . Ganga -2	• Direct seeding of rice with medium duration drought tolerant varieties with pre emergence herbicide application under sufficient soil moisture conditions followed up with a post-emergence weedicide application 20-25 days later for effective weed management. • Interculture for timely weed control in direct seeded rice	Seeds from BRBN, BAU, Sabour, NSC, TDC
	Medium land	1.Rice-Wheat 2.Rice-Lentil/Pea/ Chickpea 3.Rice – Mustard	Medium duration Rice –Wheat/ Lentil/ Chickpea Direct sowing / 20d old dapog seedlings with medium to short duration varieties – BR34, Rajendra Dhan-201(130-135d), Saroj, Rajendra Suwasni, Santosh, R. Kasturi, Sita	• Where field is moist, direct seeding of medium duration varieties (125 days) can be done during second fortnight of July in midlands. Post-emergence herbicide application use is essential • Use mat nursery/ dapog nursery , mat nursery (dapog method) can be raised for quick availability of young seedlings for transplanting of medium duration varieties by first fortnight of August in mid and low lands • Raise staggered community nursery preferably with short duration varieties in mid and lowlands	
	Lowland	1. Rice-Wheat 2. Rice- Lentil 3. Rice - Chickpea	Long duration Rice –Wheat Lentil/ Chickpea Rice- Direct/ dapog seedlings with Rajshree, Santosh , Sita, Rajendra Suwasni, Rajendra Sweta, Swarna sub-1		

				• Transplant with 30-35 days old seedling may be used with 3-4 seedling per hill with close spacing. • Timely interculture for weed control in direct seeded rice	

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 6 weeks 1st week of August	Upland Very deep fine clay soils Rainfall (1200-1400 mm)	Rice –Wheat Rice-Lentil Pigeonpea / Maize/ Blackgram	Pigeonpea/ Vegetables –Wheat/Lentil/ Chickpea (short duration) Blackgram/ Finger millet-Wheat Blackgram-Pant U-31 , Pant U-19 Finger millet- RAU-7&8	• Life saving irrigation	Seeds from BRBN, BAU, Sabour, NSC, TDC
		Rice- Chickpea	Early Rice - Wheat Blackgram/ Finger millet-Wheat Blackgram- -Pant U-31,-Pant U19.Finger millet- RAU-7&8. Rice- Prefer short (early matured) varieties like Birsa Dhan 105 (85-90d), Birsa Dhan-106 (90-95d), Rajendra Bhagavathi (early-upland and midland), Dhanlaxmi, Richharia(<100d), Saroj (100-110d), Birsa Dhan-201 (100-115d), Prabhat, Turanta,	• Direct seeding of Rice • Application of fertilizers especially phosphorous and potash to be ensured under late sown/ transplanted conditions in severely affected districts	
	Medium land	Rice –Wheat Rice- Lentil Rice- Chickpea	Rice (Short duration)-–Wheat/Lentil/ Chickpea Rice- Prabhat, Dhanlaxmi, Richharia, Turanta Saroj	• Mat nursery (dapog method)/ Community nursery can be raised for quick availability of young seedlings for transplanting of medium duration varieties by first	

			Blackgram/ Finger millet-Wheat Blackgram- Pant U-31& 19 Finger millet- RAU-7&8	fortnight of August • Direct seedling of Rice • Raise staggered community nursery preferably with medium duration varieties in mid and lowlands	
	Lowland	Rice –Wheat Rice-Lentil Rice- Chickpea	Early Rice–Wheat/Pulses/ Oilseeds/Vegetables Rice (Short Duration)-Wheat Rice- Prabhat, Dhanlaxmi, Richharia, Turanta, Saroj If dry spell continues, direct seeding of early duration rice varieties (100 days) can be done in midlands by first fortnight of August and extra early duration (70-75 days) up to 25th August		

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 8 weeks 3rd week of August	Upland Very deep fine clay soils	Rice-Wheat Rice-Lentil Rice- Chickpea	Pigeonpea + Til/Blackgram Maize- Wheat Maize - Lentil/ Chickpea Blackgram/ /Finger millet -Wheat Sesame-Wheat Sept.Pigeonpea–Pusa-9, Sharad Narendra Arhar-I	• Direct seeding of Rice • Application of fertilizers especially phosphorous and potash to be ensured under late sown/ transplanted conditions in severely affected districts	Seeds from BRBN, BAU, Sabour, NSC, TDC

			Sesame : Krishna, Pragati Rice- Prefer Early matured varieties like Turanta dhan (75d), Prabhat (90d), Birsa Dhan 105 (85-90d), Birsa Dhan-106 (90-95d), Rajendra Bhagavathi (early-upland and midland), Dhanlaxmi, Richharia(<100d), Saroj (100-110d), Birsa Dhan-201 (100-115d)		
	Medium Land	Rice-Wheat Rice-Lentil Rice- Chickpea	Sept. Pigeonpea / Rice- Wheat/Lentil/ Chickpea/Lathyrus Sept.Pigeonpea–Pusa-9, Sharad Narendra Arhar-I Direct seeded rice (DSR) with short duration (80-90 days) varieties (Turanta dhan, Prabhat, Anjali, Vandana, CR-Dhan-40 etc.) Rice-Prabhat, Dhanlaxmi, Richharia, Turanta	• Direct seeding of rice • Mat nursery (dapog method)/ Community nursery can be raised for quick availability of young seedlings for transplanting of medium duration varieties by first fortnight of August • Use of 20 days old dapog seedling in rice. • Fodder varieties of Jowar, Maize, Bajra in combination with legumes (cowpea and horsegram) can be taken up wherever feasible to meet the fodder requirements in deficit rainfall districts	
	Lowland	Rice-Wheat Rice-Lentil Rice- Chickpea	Rice long duration (Direct seeded)-Wheat Rice- Rice long duration	• Re-transplanting of rice (karuhan) can be done with 30 + 45 days old seedlings of long duration or photosensitive varieties up to 30th August with close planting (40-45 hills per square meter) • Application of organic manure and vermi compost initially for Rice and other crops.	

				• Fodder varieties of Jowar, Maize, Bajra in combination with legumes (cowpea and horsegram) can be taken up wherever feasible to meet the fodder requirements in deficit rainfall districts	

Condition			**Suggested Contingency measures**		
Early season drought **(Normal onset)**	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/ Crop stand etc.	Upland Very deep fine clay soils	1.Pigeonpea 2.Vegetables -Wheat 3.Rice – Wheat/ Lentil / Chickpea/Mustard	• Gap filling if needed • Thinning	• Mulching • Tillage conservation • Inter cultivation • Mechanical weeding • Life saving irrigation	Seeds from BRBN, BAU, Sabour, NSC, TDC
	Medium land	Rice – Wheat/ Lentil / Chickpea/ Mustard			
	Lowland	Rice – Wheat/ Lentil / Chickpea/ Mustard			

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**	**Remarks on Implementation**

At vegetative stage	Upland Very deep fine clay soils	Rice – Wheat/ Lentil / Chickpea Rice- Prabhat, Richharia , Dhanlaxmi, Turanta Saroj	• Gap filling of existing crop • Postponement of top dressing	• Inter culturing • Mulching • Conservation tillage • Foliar spray with (1%) MOP • Life saving irrigation	
	Medium land	Rice – Wheat/ Lentil / Chickpea Rice- Rajendra Bhagawati, Saroj, Rajendra Suwasni, Santosh, R. Kasturi, Sita, Jaya			
	Lowland	Rice – Wheat/ Lentil/Chickpea Rice- Rajshree, Santosh , Sita, Rajendra Suwasni			

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At flowering/ fruiting stage	Upland	Rice – Wheat/ Lentil / Chickpea Rice- Prabhat, Richharia , Dhanlaxmi, Turanta Saroj	• Postponement of top dressing of nutrients • Life saving irrigation	• Interculture • Foliar application with 2% MOP • Mulching • Conservation tillage • Life saving irrigation	Seeds from BRBN, BAU, Sabour, NSC, TDC
	Medium land	Rice – Wheat/ Lentil / Chickpea Rice- Rajendra Bhagawati, Saroj, Rajendra Suwasni, Santosh, R. Kasturi, Sita, Jaya			
	Lowland	Rice – Wheat/ Lentil / Chickpea Rice- Rajshree, Santosh , Sita, Rajendra Suwasni			

Condition			**Suggested Contingency measures**

Terminal drought (Early withdrawal of monsoon)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Rabi crop planning**	**Remarks on Implementation**
	Upland	Rice-Wheat Rice-Prabhat, Dhanlaxmi, Richharia, Turanta, Saroj	• Foliar application with 2% Urea to boost up the vegetative growth • Mulching • Life saving irrigation	• For rabi land preparation open the furrow during evening, leave it open overnight and plank next morning before sunrise for growing early rabi crops like Wheat, Rabi Maize/Pulses /Oilseeds/ Vegetables etc. • Stored water to be used at critical stage of growth of LSI • Clean irrigation channel for preventing loss of moisture through seepage • Zero tillage sowing of wheat	Seeds from BRBN, BAU, Sabour, NSC, TDC
	Medium land	Maize-Wheat Maize - Shaktiman-1,2,3,4, Suwan, Ganga-11, Deoki, Pusa early hybrid Maka-3			
		Pigeonpea Var. Bahar, Narendra Pigeonpea-1			
	Lowland	Rice-Wheat-Greengram Rice- Rajshree, Santosh , Sita, Rajendra Suwasni			

2.1.2 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	Upland, Medium land, Low land	Rice-Wheat/ Lentil/Chickpea/ Oilseeds	Short duration Rice –Late Wheat Early Vegetables -Wheat Rice-Prabhat, Dhanlaxmi, Richharia, Turanta	• Direct seeding of rice • Use dapog nursery seedlings for transplanting in mid and lowlands • Life saving irrigation	Seeds from BRBN, BAU, Sabour, NSC, TDC

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	Upland & Medium land	Rice-Wheat/Lentil/Chickpea/ Oilseeds	Short duration Rice –Late Wheat Early Vegetables -Wheat Rice-Prabhat, Dhanlaxmi, Richharia, Turanta Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I Gram- Pusa-256, KPG-39 (Uday) , Pusa-372, SG-2 Lentil- PL-406, Malika, Arun ,PL 639	• Direct seeding of rice • Use dapog nursery seedlings • Adopt SRI technology • Spray of 20 kg/ha of nitrogenous fertilizer over & above basal dose when moisture is available (limited water) • Moisture conservation through mulching	Seeds from BRBN, BAU, Sabour, NSC, TDC
	Lowland	Rice-Wheat	Rice-Wheat/ Lentil/Chickpea/ Oilseeds Rice-, Santosh , Sita, Rajendra Suwasni, R.kasturi		

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	Upland & Medium land	Rice-Wheat/ Lentil/Chickpea/ Oilseeds Rice- Prabhat, Dhanlaxmi, Richharia, Rajendra Bhagwati, Saroj	1.Pigeonpea 2.Blackgram-Lentil / Chickpea/ Oilseeds 3.Sesame - Lentil / Chickpea/ Oilseeds	• Mulching for moisture conservation • Application of FYM/compost/ vermicompost • Foliar application of 2% MOP to resist in dry spell condition in standing crop	Seeds from BRBN, BAU, Sabour, NSC, TDC

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
				• Mechanical weeding	

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	Upland & Medium land	Rice-Wheat/ Lentil/Chickpea/ Oilseeds/ Potato	Prefer sesame	• Mulching for moisture conservation • Application of FYM/compost/ vermicompost • Foliar application of 2% MOP to resist in dry spell condition in standing crop • Mechanical weeding	Seeds from BRBN, BAU, Sabour, NSC, TDC

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	Upland & Medium land	Rice – Wheat	1. Short duration Rice–Late Wheat 2.Pigeonpea Rice-Prabhat,dhanlaxmi, Richharia, Turanta	• Mulching for moisture conservation • Application of FYM/compost/ vermicompost • Foliar application of 2% MOP to resist in dry spell condition in standing crop • Mechanical weeding	Seeds from BRBN, BAU, Sabour, NSC, TDC

2.2 Unusual rains (untimely, unseasonal etc) (for both rainfed and irrigated situations)

Condition	**Suggested contingency measure**			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Rice	• Drainage management • Re transplanting through Dapog nursery if needed • Gap filling, if required • Resowing through drum seeder	• Drainage management • Subsequent crop like Toria may be taken if present crop is substantially damaged/affected	• Drainage management • Subsequent crop if totally damaged • Harvest at physiological maturity	• Proper drying • Transportation
Maize	• Drainage management • Gap filling, if needed • Resowing, if sequentially affected	• Drainage management • Alternative Rabi maize or other rabi crop if substantially damaged	• Drainage management • Subsequent crop if totally damaged • Harvest at physiological maturity	• Proper drying • Safer storage and Transportation
Pigeonpea	• Drainage management • Gap filling if needed • September sowing of Pigeonpea if Kharif Pigeonpea is completely affected	• Drainage management	-	• Proper drying • Safer storage and Transportation
Horticulture				
Mango Banana Guava	• Drainage management • Gap filling • Replanting if completely damaged	• Drainage management	• Drenching with copper fungicides • Drainage management	Storage and transportation at safer place
Lemon	• Drainage management • Re-plantation	Drainage management	Drainage management	Storage at safer place
Coconut	• Drainage management • Re-plantation	Drainage management	Drainage management	Storage at safer place
Heavy rainfall with high speed winds in a short span				
Rice	• Gap filling, if required			• Safer storage
Maize	• Gap filling, if damage less than 20%			• Safer storage

	• If more, damage replanting			
Pigeonpea	• Gap filling if required			• Safer storage
Horticulture				
Mango	• Drainage management • Replanting, if completely damaged	-	-	Safe storage and transportation
Litchi		-	-	Safe storage and transportation
Banana		Staking with Bamboo	Staking with Bamboo	
Papaya		-	-	
Outbreak of pests and diseases due to unseasonal rains				
Rice	❖ Seedling treatment with granular insecticide with phorate 10G or carbofuran 3G. ❖ Maintain shallow water in nursery beds ❖ Providing good drainage.	❖ Use copper fungicides against Bacterial leaf blight (BLB). ❖ Split application of N fertilizer (3-4 times)	❖ Harvest at physiological maturity	Proper drying and safe storage
Maize	❖ Drainage, and yellowing mainly due to nitrogen deficiency apply N split doses ❖ Application of granular insecticides viz. Thimet 10g, or Carbofuran 3g. in whorl of maize	❖ Foliar blight control through Mancozeb @ 2.5g/l Or Zineb/ Maneb @ 2.5-4 g/lit of water (2-4 applications at 8-10 days interval)	❖ Cob harvesting from standing crop ❖ Harvest at physiological maturity	❖ Storage in safe places like farmer warehouse/tent covering of produce ❖ Ensure 10-12% moisture in grains before storage ❖ Proper dying
Pigeonpea	❖ Provide drainage ❖ Seed treatment with 1 g carbendizim +2g thiram/kg seed.	Provide drainage	Provide drainage	❖ Proper dying • Storage at safe place and transportation
Horticulture				
Vegetables	• Drainage of standing water • Spraying of pesticides with adjuvant.			Safe storage & transportation

Mango	Mango	**Anthracnose:-** The foliar infection can be controlled by spraying of copper oxychloride (0.3%) Use bio control agent viz *Streptosporangium pseudovulgare* **Bacterial canker:** Regular inspection of orchards, sanitation and seedling certification are Recommended as preventive measures. Mango stones for raising seedlings (root stock) should always be taken from healthy fruits. Use of wind-breaks helps in reducing brushing/ wounding and thus reduces the chance of infection.	**Anthracnose:-** Apply Carbendezim/ Thiophanate methyl (1g/lit) to control of Anthracnose. Blossom infection can be controlled effectively by spraying of Bavistin (0.1%) at 15 days interval. **Mango powdery mildew:** Spray wettable sulphur(0.2%) & calixin or karathane (0.1%) during second week of December	
Litchi	**Fruit Fly:** Monitor adult fruit flies emrgence by using methyl eugenol or sex pheromone traps.	**Fruit Fly:** First Spray delta menthrin 0.0025% plus molasses 0.1% . after 10-12 days spray fenthion 0.05% + molasses 0.1% followed by dimethoate 0.045% + molasses 0.1% if required	Harvest at proper time	
Banana	• Drainage of standing water			Safe storage & transportation
Papaya	• Drainage of standing water			Safe storage & transportation

2.3 Floods

Condition	Suggested contingency measure[o]			
Transient water logging/ partial inundation[1]	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Continuous submergence for more than 2 days[2]	Not Applicable			
Sea water intrusion[3]				

2.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm /Cyclone

Extreme event type	Suggested contingency measure[r]			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Heat Wave				
Rice Maize Pigeonpea	Provide irrigation	Provide irrigation,	Provide irrigation,	
Horticulture				
Mango, Papaya Litchi	Provide irrigation	Provide irrigation	Provide irrigation	
Cold wave				
Wheat, Pigeonpea, Lentil, Potato, Pulses		Light irrigation, Mulching		
Horticulture				
Bhendi, Brinjal, Chili, Tomato, Bottle guord		Light irrigation, Mulching Smoke generation to generate heat		
Frost				
Wheat, Chickpea, Pigeonpea, Lentil		Light irrigation, Mulching		
Horticulture				
Bhendi, Brinjal, Chilli		Light irrigation, Mulching		
Tomato & Potato		Earth up to 15cm ht. Light irrigation,		Harvest in dry

		Mulching		weather
Hailstorm	Not Applicable			
Cyclone	Not Applicable			

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event[s]	**During the event**	**After the event**
Drought			
Feed and fodder availability	1. Planning of Cultivation of fodder tree to combat such situation 2. Storage of Improved Quality Fodder • Conservation & Storage of Feed & Fodder, Hay and Silage: 3. Development & storage of: – (a) Complete Feed Block (b) Urea-Molasses-Mineral-Block	1. Feeding of Complete Feed Block 2. Feeding of Urea-Molasses-Mineral-Block & Fodder 3. Feeding of stored Hay/Silage/Improved Quality Fodder 4. Feeding of Tree leaves	Production of forage crops 1. Balanced feeding of Animal supported with little higher concentrate mixture 2. Cultivation of fodder Rabi maize if water stagnated upto Nov/ December 3. Jowar/Cowpea 4. Maize in September
Drinking water	Storage of water in reservoir	Drinking of stored water with salt	
Health and disease management	Normal vaccination schedule Veterinary Preparedness with Medicines, Vaccines and provision for mobile ambulatory van. The Govt. should take steps to procure sufficient quantity of essential life saving medicines. **List of life saving Medicines** Corticosteroids Nikethamide Antibloat	Putting ice block on head of animal Thathing of roof of animal shelter Hanging moist gunny bag around shelter Animal safety, Health camp and Treatment	Treatment, health camps Culling of Sick animals and disposal of carcass

	Adrenaline Antihistaminic Antidotes for common poisoning Antisnake venom Broad spectrum antibiotics Anti-inflammatory Antipyretic and Analgesics Fluids and Electrolytes		
Floods	Not applicable		
Cyclone	Not applicable		
Heat wave and cold wave	-		

2.5.2 Poultry

	Suggested contingency measures			**Convergence/linkages with ongoing programs, if any**
	Before the event[a]	**During the event**	**After the event**	
Drought				
Shortage of feed ingredients	Storage of adequate feed in advance	Feeding the balanced diet with mineral mixture		
Drinking water	Storage of water in reservoir	Drinking of water		
Health and disease management	Vaccines to be used for Poultry Mareks disease vaccine RDV (F_1 & R_2B), FPV, IBRV & IBDV	An emergency kit for poultry should be made ready well in advance. The Poultry kit should have Cage, mask, mash, pellet feed trough, waterers, detergents, poultry vaccines, Veterinary drugs, workers protection uniform etc.	Culling of Sick birds and disposal of dead.	
Floods	-			
Cyclone	-			
Heat wave and cold wave	-			

[a] based on forewarning wherever available

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event[a]	**During the event**	**After the event**
1) Drought			
A. Capture			
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	(i) Thinning of population (ii) Arrangement of water supply from external resource	(i) Partial harvesting (ii) Addition of water (iii) Stocking of air breathing fishes	(i) Maintenances of remaining stock till favorable condition achieved (ii) If not feasible, total harvesting or transfer of fishes may be done. (iii) Preparation of the pond for next crop.
(ii) Impact of salt load build up in ponds / change in water quality	(i) Regular monitoring of water quality parameter. (ii) Arrangement of aeration (iii) Addition of water from external resource	(i) Arrangement of aeration. (ii) Addition of water a. Monitoring of water quality b. Reduction of manuring according to water level.	
2) Floods			
A. Capture			
B. Aquaculture			
(i) Inundation with flood water	(i) Elevation/ Renovation of pond dyke. (ii) Sale of Table/marketable size fishes (iii) construction of earthen nursery ponds in upland areas	Collection of naturally bred seeds (Spawn /fry /fingerling) from flooded water Stocking in nursery ponds for rearing	-Retain the water in pond immediately after flood through repairing of damaged dyke etc. -Netting of pond -Removal of unwanted, predatory/weed fishes -Sell of large size fishes
(ii) Water contamination and changes in water quality	Arrangement of regular water quality monitoring		

(iii) Health and diseases	(a) Use lime/ potassium permanganate (b) Arrangement of CIFAX and medicines & chemical stock		-Sampling of fishes and water for disease analysis - Liming, use of drugs/ medicine if required in consultancy of fisheries experts
(iv) Loss of stock and inputs (feed, chemicals etc)	Raising the height of dyke by fencing with net and bamboo poles to prevent loss of stock	Arrangement of advance size fingerling/ yearlings for stocking	Stocking of large size fingerlings carp Fertilization of pond and regular feeding of fish Harvesting and sale of fish
(v) Infrastructure damage (pumps, aerators, huts etc)	Repairing/ arrangement of alternate safe place to keep pumps aerators etc.	A regular water on the flood and infrastructure facilities.	Re establishment of the infra structural facility.
3. Cyclone / Tsunami	Not Applicable		
4. Heat wave and cold wave	Not Applicable		

[a] based on forewarning wherever available