State: CHHATTISGARH

Agriculture Contingency Plan for District: Durg

1.0 District Agriculture profile				
1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	Moderately To Gently Sloping ChattisgarhMahanadi Basin, Hot Moist/Dry Subhumid Transitional ESR With Deep Loamy To Clayey Red And Yellow Soils (11.0)		
	Agro-Climatic Zone (Planning Commission)	Eastern plateau and hills region (VII)		
	Agro Climatic Zone (NARP)	Chhattisgarh plain zone (MP-1)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Raipur, Bilaspur, Korba, Raigarh, Janjgir-champa, Kabirdham, Rajnandgaon, Durg, Dhamtari, Mahasamund, Kanker (11 districts)		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		21°13' N	81°17'E	289 m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	ZARS, Raipur		
	Mention the KVK located in the district with address	Krishi Vigyan Kendra, Anjora, Durg (C.G.)		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	Department of Agrometeorology, College of Agriculture, IGKV, Raipur (C.G.)		

1.2	**Rainfall**	**Normal RF(mm)**	**Normal Rainy days (number)**	**Normal Onset (specify week and month)**	**Normal Cessation (specify week and month)**
	SW monsoon (June-Sep)	923		3rd week of June	4th week of September
	NE Monsoon(Oct-Dec)	66		-	-
	Winter (Jan- Feb)	9		-	-
	Summer (Mar-May)	29		-	-
	Annual	1027		-	-

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)	870.1	548.3	99.6	90.7	61.4	-	0.2	38.8	14.7	18.9

Source: Agricultural Statistics, 2009, Commissioner of land records, Raipur, Govt. of Chhattisgarh

1. 4	Major Soils	Area ('000 ha)	Percent (%) of total
	Entisol (Bhata-gravely)	81.1	15
	Inceptisol (Matasi-Sandyloam)	114.8	21
	Alfisols (Dorsa-clayloam)	95.7	17
	Vertisols (Kanhar-clayey)	157.5	29
	Bharri	92.5	17

* Source: Directorate of Agriculture, 2009, Govt. of Chhattisgarh

1.5	**Agricultural land use**	Area ('000 ha)	Cropping intensity %
	Net sown area	548.3	141
	Area sown more than once	226.2	
	Gross cropped area	774.6	

1.6	**Irrigation**	Area ('000 ha)		
	Net irrigated area	227.5		
	Gross irrigated area	303.3		
	Rainfed area	471.0		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals	296	121.9	40
	Tanks	535	3.3	1

	Open wells	3253	2.5	1
	Bore wells	32385	151.9	50
	Lift irrigation schemes			
	Micro-irrigation			
	Other sources (please specify)		23.5	8
	Total Irrigated Area		303.3	
	Pump sets	7781		
	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%				

Source: Directorate of Agriculture, 2009, Govt. of Chhattisgarh

Source: Agricultural Statistics, 2009, Commissioner of land records, Govt. of Chhattisgarh

1.7 Area under major field crops & horticulture (2008-09)

1.7	**Major field crops cultivated**	**Area ('000 ha)**							
		Kharif			***Rabi***				
		Irrigated	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**	**Summer**	**Grand total**
	Rice			422.1				17.5	439.6
	Maize			0.4			0.1		0.5
	Millets			2.3					2.3
	Wheat						21.0		21
	Total Cereals			**424.8**			**38.7**		463.5

	Pigeonpea			10.7					10.7
	Gram						90.9		90.9
	Greengram			0.5			0.7		1.2
	Blackgram			3.4			1.3		4.7
	Horsegram			0.2			0.5		0.7
	Pea						1.3		1.3
	Lentil						4.7		4.7
	Lathyrus						95.8		95.8
	Total Pulses			**14.7**			**195.2**		209.9
	Rapeseed-mustard						2.8		2.8
	Linseed						7.7		7.7
	Groundnut			0.5					0.5
	Sesame			1.1					1.1
	Soybean			31.2					31.2
	Sunflower						0.2		0.2
	Safflower			0.1			0.4		0.5
	Total Oilseeds			**32.8**			**11.0**		43.8
	Vegetables			15.1			11.0		26.1
	Sugarcane						2.4		2.4
	All Crops			**487.4**			**258.2**		745.6

Source: Agricultural Statistics, 2009, Commissioner of land records, Govt. of Chhattisgarh

	Horticulture crops - Fruits	**Area (‘ 000 ha)**		
		Total	**Irrigated**	**Rainfed**
	Mango	2.7		
	Banana	1.9		
	Papaya	1.2		
	Gauva	0.8		
	Lemon	0.4		
	Ber	0.1		
	Others	0.7		
	All fruits	8.1		
	Horticulture crops - Vegetables	Total	**Irrigated**	**Rainfed**
	Cauliflower	4.8		
	Cabbage	4.6		
	Brinjal	5.1		
	Tomato	6.9		

	Bhendi	4.3		
	Potato	2.2		
	Cowpea	2.5		
	Pea	2.1		
	Bitter gouard	2.3		
	Cluster beans	1.5		
	Bottle gouard	2.5		
	Onion	1.4		
	Others	2.4		
	Spices	7.0		
	All vegetables	48.5		
	Medicinal and Aromatic crops	Total		
	Lemon grass	0.404		
	Aloevera	0.221		
	E-citridora	0.602		
	Patchauli	0.694		
	Pam.+Jam.rosa	0.595		
	Total	2.611		
	Plantation crops	Total		
	Fodder crops			
	Total fodder crop area			
	Grazing land			
	Sericulture etc			

Source: Directorate of Horticulture, 2010, Govt. of Chhattisgarh

1.8	**Livestock**	**Male (‘000)**	**Female (‘000)**	**Total (‘000)**
	All kinds of cattle			940.1
	Non descriptive Cattle (local low yielding)			-
	Improved cattle			-
	Crossbred cattle			-
	Non descriptive Buffaloes (local low yielding)			-
	Descript Buffaloes			152.1
	Goat			130.8
	Sheep			10.3
	Pig			11.1

	Commercial dairy farms (Number)							
1.9	**Poultry**		**No. of farms**		**Total No. of birds ('000)**			
	Commercial				776.3			
	Backyard							
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**		
		2231		355		5491		
	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)			7662.7		3.58	25.0	

Source: Agricultural Statistics, 2009, Commissioner of land records, Govt. of Chhattisgarh
Directorate of Fisheries, Govt. of Chhattisgarh
Directorate of veternary science, 2006-07, Govt. of Chhattisgarh

1.11 Production and Productivity of major crops

1.11	Name of crop	**Kharif**		**Rabi**		**Summer**		**Total**		**Crop residue as fodder**
		Production ('000 m t)	Productivity (kg/ha)	Production ('000 m t)	Productivity (kg/ha)	Production ('000 m t)	Productivity (kg/ha)	Production ('000 m t)	Productivity (kg/ha)	

										('000 tons)
Major Field crops (Crops identified based on total acreage)										
	Rice	681.1	1569.8	-	-	51.0	2908	732.1	2239	
	Soybean	24.3	865.0	-	-	-	-	24.3	865	
	Blackgram	3.5	409.0	-	-	-	-	3.5	409	
	Pigeonpea	13.5	671.6	-	-	-	-	13.5	672	
	Groundnut	2.9	1433.6	-	-	-	-	2.9	1434	
	Wheat	-	-	21.7	1032	-	-	21.7	1032	
	Lathyrus	-	-	42.6	445	-	-	42.6	445	
	Linseed	-	-	2.4	308	-	-	2.4	308	
	Chickpea	-	-	107.7	1185	-	-	107.7	1185	
	Lentil	-	-	1.7	359	-	-	1.7	359	
	All crops	834.5	1277.8	235.2	911.1			1069.7	1094	
Major Horticultural crops (Crops identified based on total acreage) – Fruits & Vegetables										
	Mango							9.3	3400	
	Banana							61.8	32000	
	Papaya							48.2	40000	
	Gauva							6.1	7500	
	Lemon							2.4	6000	
	Ber							1.5	10500	
	Cluster beans							11.3	7500	
	Bhindi							38.9	9000	
	Onion							39.2	28000	
	Potato							48.6	24000	
	Bottle gouard							64	25000	
	Cabbage							83.5	18000	
	Brinjal							87.2	17000	
	Cauliflower							96.9	20000	
	Tomato							209.3	30000	

Source: Agricultural Statistics, 2009, Commissioner of land records, Govt. of Chhattisgarh

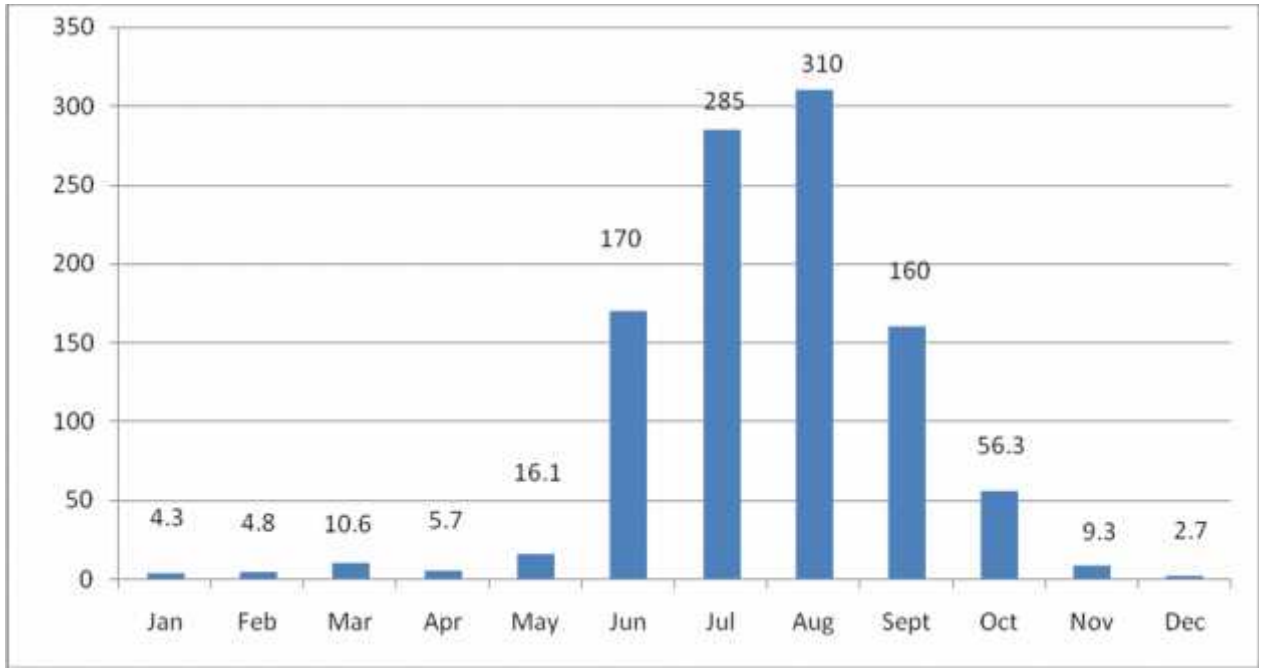
1.12	**Sowing window for 5 major field crops**	**Rice**	**Soybean**	**Black gram**	**Pigeon pea**	**Groundnut**
	Kharif- Rainfed	2nd week of June to 1st week of July	3rd week of June to 4th week of June	3rd week of June to 4th week of June	3rd week of June to 2nd week of July	3rd week of June to 4th week of June
	Kharif-Irrigated	2nd week of June – 3rd week of June	-	-	-	-
	Major Rabi Crops	**Wheat**	**Lathyrus**	**Linseed**	**Chickpea**	**Lentil**
	Rabi- Rainfed	3rd week of October to 4th week of October	3rd week of October to 4th week of October	3rd week of October to 4th week of October	1st week of November to 2nd week of November	1st week of November to 2nd week of November
	Rabi-Irrigated	3rd week of November to 4th week of December	-	3rd week of November to 4th week of November	3rd week of November to 4th week of November	-

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. Rice - Stem borer, WBPH, leaf hopper 2. Soybean - Girdle beetle, Bihar hairy caterpillar 3. Black gram - Yellow vein mosaic, hairy caterpillar 4. Pigeon pea - Pod borer complex, wilt 5. Groundnut - Tikka disease	✓		

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

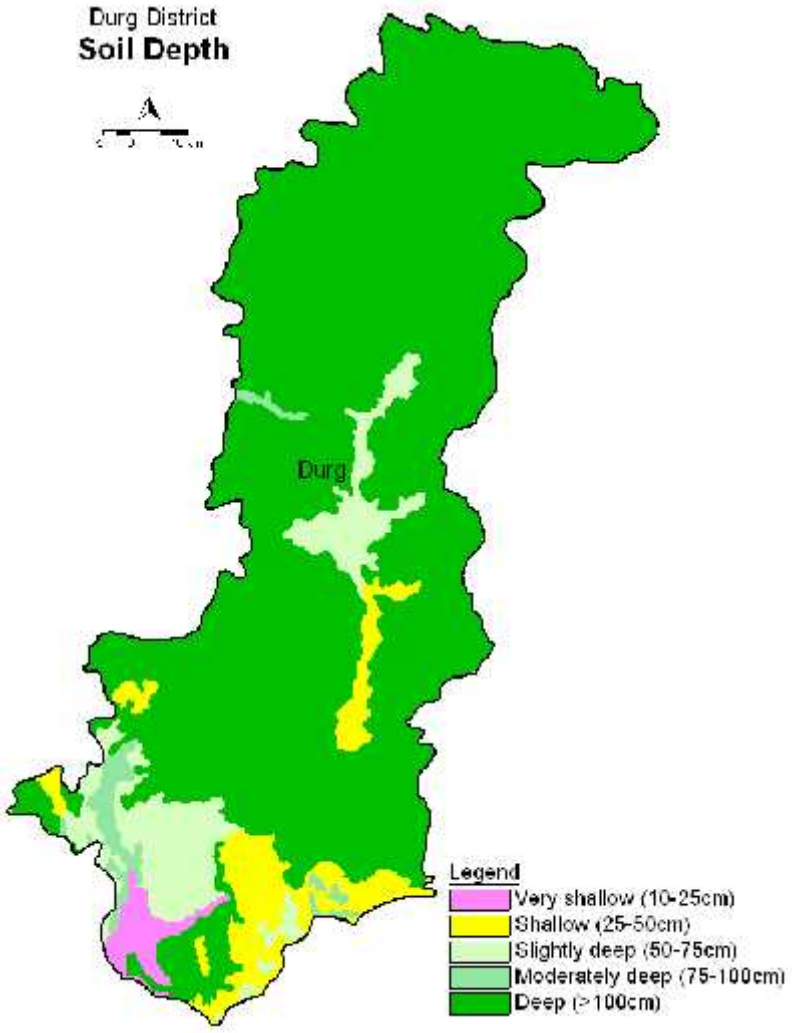
Annexure I

Annexure II



Mean annual rainfall (mm)

Annexure III



Source: NBSS&LUP

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[c] including variety**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks 1st week of July	Unbunded upland Bharri	Greengram	Pusa vishal and Malviya Jyoty,		-
		Blackgram	PU-30 and TPU-4.		
		Groundnut	ICGS-11/ 37/44.		
	Bunded upland Bharri	Rice	Rice		
	Midland Inceptisol (Matasi-Sandy loam)	Rice	Rice	1. Direct dry seeding in line technique suggested for better crop yield and double cropping 2. Line sowing to avoid mortality of germinating seed in case of drought follows after scanty rainfall 3. Application of post emergence herbicide for timely weed management and avoiding biasi operation	
	Shallow Low land	Rice	Rice-Mahamaya		
	Bahra lowland Vertisols	Rice	Rice		

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation[a]**	**Normal Crop / Cropping system[b]**	**Change in crop / cropping system[c] including variety**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
Delay by 4 weeks 3rd week of July	Unbunded upland Bharri	Greengram	Pusa vishal and Malviya Jyoty,		Supply of seed through NFSM
		Blackgram	PU-30 and TPU-4.		
		Groundnut	Erect variety- GG-5/G-20		
	Bunded upland Bharri	Rice	Rice- Tulsi, Indira barani dhan-1, Annda		

	Midland Sandy loam soils	Rice	MTU1010, Samleshwari, Danteshwari, Indira barani dhan-1	3. Direct dry seeding in line technique suggested for better crop yield and double cropping 4. Line sowing to avoid mortality of germinating seed in case of drought follows after scanty rainfall 3. Application of post emergence herbicide for timely weed management and avoiding biasi operation	
	Low land sandy loam soils	Rice	Chandrahasni IR64, Mahamaya, Bambleshwari, karma masuri		
	Lowland black soils	Rice	Mahamaya, swarna sub1, Jaldubi		

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 6 weeks 1st week of august	Unbunded upland Bharri	Blackgram	Horsegram	25 % higher seed rate	Supply of seed through NFSM
		Groundnut	PU-30 and TPU-4.	25 % higher seed rate	
	Bunded upland Bharri	Rice	Purnima, Tulsi, Indira barani dhan-1, Aditya	Sowing of sprouted seed (*lai-chaupa*) adopting lehi method of rice cultivation	
	Midland Sandy loam soils	Rice	Indira barani dhan-1, Samleshwari, Danteshwari, MTU1010, purnima	• Direct dry seeding in line technique suggested for better crop yield and double cropping • Promote direct seeding of rice and discourage transplanting • Sowing of sprouted seed (*lai-chaupa*)adopting lehi method of rice cultivation • Line sowing to avoid mortality of germinating seed in case drought follows after scanty rainfall events • Application of post emergence herbicide for timely weed	
	Low land Sandy loam soils	Rice	IR64, Chandrahasni Bambleshwari, karma masuri		
	Lowland Black soils	Rice	IR64, Chandrahasni Bambleshwari, karma masuri		

				management and avoiding biasi operation	

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation[a]**	**Normal Crop / Cropping system[b]**	**Change in crop / cropping system[c] including variety**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
Delay by 8 weeks 3rd week of august	Un bunded upland Bharri	Groundnut	Blackgram- PU-30 and TPU-4.	25 % higher seed rate	Supply of seed through NFSM
	Bunded upland Bharri	Rice	Mung -pusa vishal, pragya, Hum1, pairimung Pigeonpea-ICPL87, Rajivlochan, Maruti	Sowing of sprouted seed (*lai-chaupa*) adopting lehi method of rice cultivation	
	Midland Sandy loam soils	Rice	-	• Direct dry seeding in line technique suggested for better crop yield and double cropping • Promote direct seeding of rice and discourage transplanting • Sowing of sprouted seed (*lai-chaupa*)adopting lehi method of rice cultivation • Line sowing to avoid mortality of germinating seed in case drought follows after scanty rainfall events • Application of post emergence herbicide for timely weed management and avoiding biasi operation	
	Low land Sandy loam soils	Rice	-		
	Lowland Black soils	Rice	-		

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measues	Remarks on Implementation
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/ crop stand etc.	Unbunded upland	Mung /Urd	▪ Gap filling ▪ Re sowing in line when very poor population ▪ Increase the seed rate	• Inter tilling for soil mulch • Mulching with paddy straw or use plastic mulch or other locally available material • Compartmental bunding, • Ridge and Furrows, Tied ridges to conserve rainwater during kharif for regular sowing of rabi crops	• Linkage with RKVY / NFSM / state seed corporation for timely supply of seed of suitable varieties of upland crops and rice
		Blackgram /Greengram			
	Bunded upland	Rice- MTU1010, Purnima, Annda			
		Blackgram: Pusa vishal, Pragya, Hum1, Pairimung Pigeonpea: ICPL87, Rajivlochan. Maruti			
	Midland Sandy loam soils	Rice- MTU1010, IR64, Chandrahasni	• Gap filling • Sowing of sprouted seed (*lai-chaupa*) adopting lehi method of rice cultivation		
	Lowland clay loam soils	Rice-Mahamaya, swarna, Sampda, Bambleshwari			
	Lowland black soils	Rice- swarna, swarna sub1, Jaldubi, Mahamaya, Indira sona,			
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period): At vegetative stage	Unbunded upland soils	Blackgram /Greengram	Weeding and protection against sucking pests Avoid top dressing of urea Supplemental irrigation from water harvesting structures using micro irrigation i.e. drip and sprinklers	• Inter tilling for soil mulch • Mulching with paddy straw or use plastic mulch or other locally available material	• Linkage with Agriculture Department /RKVY for supply of interculture implements for intercultIvation
		Groundnut			
	Bunded upland soils	Rice			
		Blackgram			
	Midland Sandy loam soils	Rice		• Compartmental bunding, Ridge and Furrows, • Tied ridges to conserve rainwater	
	Lowland Black clay loam soils	Rice-Mahamaya, swarna, Sampda, Bambleshwari, Chandrahasni Bambleshwari, karma masuri			
	Bahra Lowland black soils	Rice			
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period):	Unbunded upland soils Bharri	Blackgram /Greengram	• Weeding and protection against insect and pests • Supplemental irrigation from water harvesting	Mulching Inter tilling Compartmental bunding, Ridge and Furrows, Tied ridges to conserve	• Linkage with Agriculture Department /RKVY for supply of interculture
		Groundnut			
	Bundeded upland Bharri	Rice			
		Blackgram/ Pigeonpea			

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measues	Remarks on Implementation
At flowering/ fruiting stage	Midland Sandy loam soils	Rice	structures using micro irrigation i.e. drip and sprinklers	rainwater	implements for intercultivation • Linkage with micro irrigation scheme of Agriculture Department for supply of drip system and sprinklers
	Shallow Lowland black soils	Rice			
	Bahra lowland black soils (Kanhar-clayey)	Rice			
Terminal drought (Early withdrawal of monsoon)	Unbunded upland Bharri	Blackgram /Greengram	Harvest mature plants, Thin out plant population	Mulching Inter tilling Compartmental bunding, Ridge and Furrows Tied ridges to conserve rainwater	• Linkage with Agriculture Department /RKVY for supply of interculture implements for intercultivation • Linkage with micro irrigation scheme of Agriculture Department for supply of drip system and sprinklers
		Groundnut			
	Bundeded upland Bharri	Rice- MTU1010, purnima, Annda	Life saving irrigation if available		
		Blackgram: Pusa vishal, Pragya, Hum1, Pairimung Pigeonpea: ICPL87, Rajivlochan. Maruti	Harvest mature plants		
	Midland Sandy loam soils	Rice- MTU1010, IR64, Chandrahasni, Indira barani dhan-1, Samleshwari, Danteshwari,	• Weeding and protection against insect and pests • Supplemental irrigation from water harvesting structures using micro irrigation i.e. drip and sprinklers		
	Shallow Lowland black soils	Rice-Mahamaya, swarna, Sampda, Bambleshwari, Chandrahasni Bambleshwari, karma masuri			
	Bahra lowland black soils (Kanhar-clayey)	Rice- Mahamaya, swarna, swarna sub1, Jaldubi, Indira sona, masuri			

2.1.2 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	Unbunded upland Bharri	Blackgram /Greengram	Blackgram /Greengram		• Linkage with RKVY / NFSM / IWMP/ micro irrigation schemes for construction of shallow tube wells and WHS including farm ponds for conjunctive use of water in canal command
		Groundnut	Groundnut		
	Bunded upland Bharri	Rice	Blackgram: Pusa vishal, Pragya, Hum1, airi mung Pigeonpea: ICPL87, Rajivlochan. Maruti		
	Midland Sandy loam soils	Rice		• Direct seeding of rice preferably in line • In case of failure of crop or poor crop stand then Sowing of sprouted seed (*lai-chaupa*)adopting lehi method of rice cultivation • If seedlings raised for transplanting then it should be done with rainwater or from other sources of water • Weed control by herbicide and avoid biasi operation	
	Shallow Lowland Black clay loam	Rice			
	Lowland Black soils	Rice			
Limited release of water in canals due to low rainfall	Unbunded upland Bharri	Blackgram /Greengram	Blackgram /Greengram		• Linkage with RKVY / NFSM / IWMP/ micro irrigation schemes for construction of shallow tube wells and WHS including farm ponds for conjunctive use of
		Groundnut	Groundnut		
	Bundeded upland Bharri	Rice	Blackgram: Pusa vishal, Pragya, Hum1, airimung Pigeonpea: ICPL87, Rajivlochan. Maruti		
	Midland Sandy loam soils	Rice	Rice- Indira barani dhan-1, Samleshwari,	• Direct seeding of rice	

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
			Danteshwari, purnima	preferably dry seeding in line • In case of failure of crop or poor crop stand then Sowing of sprouted seed (*lai-chaupa*)adopting lehi method of rice cultivation • Avoid transplanting of rice • Weed control by herbicide and avoid biasi operation	water in canal command • Linkage with RKVY / NFSM / IWMP/ micro irrigation schemes for supply of micro irrigation systems
	Shallow Lowland Black clay loam soils	Rice	Rice- IR64, Chandrahasni Bambleshwari, karma masuri		
	Bahra lowland Black soils	Rice	Rice- Mahamaya, swarna sub1, Jaldubi, masuri		
Non release of water in canals under delayed onset of monsoon in catchment	Unbunded upland Bharri	Blackgram /Greengram	Blackgram /Greengram		• Linkage with RKVY / NFSM / IWMP/ micro irrigation schemes for construction of shallow tube wells and WHS including farm ponds for conjunctive use of water in canal command • Linkage with RKVY / NFSM / IWMP/ micro irrigation schemes for supply of micro irrigation systems
		Groundnut	Groundnut		
	Bundeded upland Bharri	Rice	Blackgram: Pusa vishal, Pragya, Hum1, airimung Pigeonpea: ICPL87, Rajivlochan. Maruti		
	Midland Sandy loam soils	Rice	Rice- Indira barani dhan-1, Samleshwari, Danteshwari, purnima	• Direct seeding of rice preferably dry seeding in line • Avoid transplanting of rice • Weed control by herbicide and avoid biasi operation • Supplemental irrigation from WHS using drip and sprinklers	
	Shallow Lowland Black clay loam soils	Rice	Rice- IR64, Chandrahasni Bambleshwari, karma masuri		
	Bahra lowland Black soils	Rice	Rice- Mahamaya, swarna sub1, Jaldubi, masuri		
Lack of inflows into	Unbunded upland	Blackgram /Greengram	Blackgram /Greengram		• Linkage with

Condition	Major Farming situation	**Normal Crop / Cropping system**	**Suggested Contingency measures**		
			Change in crop/cropping system	**Agronomic measures**	**Remarks on Implementation**
tanks due to insufficient /delayed onset of monsoon	Bharri	Groundnut	Groundnut		RKVY / NFSM / IWMP/ micro irrigation schemes for construction of shallow tube wells and WHS including farm ponds for conjunctive use of water in canal command • Linkage with RKVY / NFSM / IWMP/ micro irrigation schemes for supply of micro irrigation systems
	Bundeded upland Bharri	Rice	Blackgram: Pusa vishal, Pragya, Hum1, airimung Pigeonpea: ICPL87, Rajivlochan. Maruti Rice- Indira barani dhan-1, Samleshwari, Danteshwari, purnima		
	Midland Sandy loam soils	Rice	Rice- IR64, Chandrahasni Bambleshwari, karma masuri	• Direct seeding of rice preferably dry seeding in line • Avoid transplanting of rice • Weed control by herbicide and avoid biasi operation • Supplemental irrigation from WHS using drip and sprinklers • Adopt zero tillage technique for sowing of rabi crops	
	Shallow Lowland Black clay loam soils	Rice	Rice- Mahamaya, swarna sub1, Jaldubi, masuri		
	Bahra lowland Black soils	Rice	Rice- Mahamaya, swarna sub1, Jaldubi, masuri		
Insufficient groundwater recharge due to low rainfall	Unbunded upland Bharri	Blackgram /Greengram	Blackgram /Greengram		• Linkage with RKVY / NFSM / IWMP/ micro irrigation schemes for construction of shallow tube wells and WHS including farm ponds for conjunctive use of water in canal
		Groundnut	Groundnut		
	Bundeded upland Bharri	Rice	Pigeonpea(ICPL87, Rajivlochan. Maruti)	• Direct seeding of rice preferably dry seeding in line • Avoid transplanting • Weed control by herbicide and avoid	
	Midland Sandy loam soils	Rice			
	Shallow Lowland Black clay loam	Rice			

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
	soils			biasi operation • Supplemental irrigation from WHS using drip and sprinklers	command • Linkage with RKVY / NFSM / IWMP/ micro irrigation schemes for supply of micro irrigation systems
	Bahra lowland Black soils	Rice			

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

Condition	Suggested contingency measure			
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Continuous high rainfall in a short span leading to water logging				
Blackgram /Greengram	Drain out excess water		Picking of matured pods	To cover produce with plastic sheet or shift produces to farm shed
Groundnut/ pigeon pea	Drain out excess water	Drain out excess water	Drain out excess water, Harvesting and drying of plants	To cover produce with plastic sheet or shift produces to farm shed
Rice	Drain out excess water	Drain out excess water	Drain out excess water	To cover produce with plastic sheet or shift produces to farm shed
Rabi oilseeds and pulses	Drain out excess water	Drain out excess water	Drain out excess water	To cover produce with plastic sheet or shift produces to farm shed
Wheat	Provide Surface drainage	Provide Surface drainage	Provide Surface drainage	To cover produce with plastic sheet or shift produces to farm shed
Horticulture				
Tomato/ Brinjal	Provide Surface drainage , Earthing and fertilizer application after water drain out	Provide Surface drainage , Earthing and fertilizer application after water drain out	Provide Surface drainage, picking up matured fruits	
Garlic/ Onion	Provide Surface drainage	Provide Surface drainage	Provide Surface drainage	To cover produce with plastic sheet or shift produces to farm shed
Outbreak of pests and diseases due to unseasonal rains				
Blackgram	Spraying of contact	Spraying of contact		

/Greengram	insecticide for control of caterpillar/ color rot	insecticide for control of pest		
Groundnut/ Pigeon pea	Spraying of contact insecticide for control of caterpillar/ color rot	Spraying of insecticide		
Rice	Spraying of insecticide for control of stem borer	Spraying of insecticide		
Rabi oilseed and pulses	Spraying of insecticide for control of aphid	Spraying of insecticide		
Wheat	Spraying of insecticide for control of stem borer	-		
Horticulture				
Tomato/ brinjal	Spraying of contact insecticide for control of caterpillar Stacking for protecting fungal diseases	Spraying of contact insecticide for control of caterpillar/ fruit borer Stacking for protecting fungal diseases	Harvest the fruit	
Mango	-	Spray 0.2% wettable sulphur for protection against Powdery mildew	Harvest at pre maturity stage	Unripe fruit may be used for pickles.
Citrus	Control citrus canker by Copper Oxy chloride 0.5 % & streptocycline 100 ppm	Control citrus canker by Copper Oxy chloride 0.5 % & streptocycline 100 ppm	Control citrus canker by Copper Oxy chloride 0.5 % & streptocycline 100 ppm, collect mature fruits	

2.3 Floods

Condition	**Suggested contingency measure[o]**			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Transient water logging/ partial inundation[1]				
Blackgram /Greengram	Provide Surface drainage	Provide Surface drainage	Provide Surface drainage	
Groundnut/ pigeon pea	Provide Surface drainage	Provide Surface drainage	Provide Surface drainage	
Rice	Provide Surface drainage	After draining apply urea	Drain out excess water	

Rabi oilseed and pulses	Provide Surface drainage	Provide Surface drainage	Provide Surface drainage	
Wheat	Provide Surface drainage	Provide Surface drainage	Provide Surface drainage	
Horticulture				
Tomato/ brinjal	Provide Surface drainage	Provide Surface drainage	Provide Surface drainage	
Garlic/ Onion	Provide Surface drainage	Provide Surface drainage	Provide Surface drainage	
Mango	Provide Surface drainage	Provide Surface drainage	Provide Surface drainage	
Citrus	Provide Surface drainage	Provide Surface drainage	Provide Surface drainage	
Continuous submergence for more than 2 days[2]				
Blackgram /Greengram	Provide Surface drainage	Provide Surface drainage	Provide Surface drainage	
Groundnut/ pigeon pea	Provide Surface drainage	Provide Surface drainage	Provide Surface drainage	
Rice	Provide Surface drainage	After draining apply urea	Drain excess water	
Rabi oilseed and pulses	Provide Surface drainage	Provide Surface drainage	Provide Surface drainage	
Wheat	Provide Surface drainage	Provide Surface drainage	Provide Surface drainage	
Horticulture				
Tomato/ brinjal	Provide Surface drainage	Provide Surface drainage and staking of plants	Provide Surface drainage and staking of plants	
Garlic/ Onion	Provide Surface drainage	Provide Surface drainage	Provide Surface drainage	
Mango	Provide Surface drainage	Provide Surface drainage	Provide Surface drainage	
Citrus	Provide Surface drainage	Provide Surface drainage	Provide Surface drainage	

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		**Not Applicable**		
Cold wave				
Frost				
Hailstorm				
Cyclone				

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	Preservation of surplus fodder, encourage fodder cultivation and tree plantation and also encourage Supply of molasses to cattle feed plants.	Arrangement of feeds and fodder from adjoining areas, exploitation of non conventional feed resources, use of area treated straw and feed blocks.	Promotion of fodder seed production, cultivation and storage establishment of fodder block making machines in fodder surplus areas.
Drinking water	Repairs of tube wells, clear of the sludge in the canals and local water catchments and clean the water tanks, large ponds and lakes	Harvesting water through the existing reservoirs and exploitation of groundwater.	To strengthen reservoirs by promoting recharging of water and rain water harvesting during rainy season.
Floods			
Feed and fodder availability	Conservation of the fodder in the form of hay and silage.	Feeding of feed blocks and silages	Provide treated feed and fodder to animals against moulds and fungi.
Drinking water	Regular inspection of ponds and canals for any obstruction.	Provide drinking water in small through and plastic bucket.	Disinfection of contaminated water especially for drinking purpose.
Health and disease management	Storage of medicines	Treatment of injured animals	Disposal of dead animals.
Cyclone	NA		
Feed and fodder availability	Stocking of feed and fodder in prone areas.	Feeding of stored feeds or blocks	Provide treated feed and fodder to animals

Drinking water	Storage of water in tanks	Use of stored water	Disinfection of contaminated water especially for drinking purpose.
Health and disease management	Storage of medicines	Treatment of injured animals	Disposal of dead animals
Heat wave and cold wave	NA		
Shelter/environment management	Construction of wind breaks, shed should have sufficient over hangs, fixing of sprinklers, provide thatch on the roof. Construction of wind breaks, keep curtains ready, arrange for heating devices.	Construct wind breaks keep animals under shade during hot hours of the day, provide cooling fans in shades and also sprinkle water at regular intervals. Construction wind breaks, put gunny bags on all openings of shed.	
Health and disease management		Grazing should be allowed during night and early hours of the day, vaccination and veterinary checkup time to time.	

[s]based on forewarning wherever available

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 feed	Provide non conventional feed, supplement anti oxidant and anti stress		
Drinking water	Storage of water in tanks	Add vit-C and other anti stress ingredient with water		
Health and disease management	Regular vaccination	Vaccination and treatment of diseased one	Disposal of dead birds	
Floods				
Shortage of feed ingredients	Storage of feed in safe storage bins to avoid mould and fungi	Use pellet feeding		
Drinking water	Safe storage of water in tanks	Provide treated water		
Health and disease management	Regular vaccination	Vaccination and treatment of diseased one, proper litter management and	Disposal of dead birds	

		addition of lime as per need		
Cyclone	NA			
Shortage of feed ingredients	Storage of feed	Use stored feed carefully avoiding dampness		
Drinking water	Safe storage of water in tanks	Provide treated water		
Health and disease management		Vaccination and treatment of diseased one, proper litter management	Disposal of dead birds	
Heat wave and cold wave	NA			
Shelter/environment management	Construction of wind breaks, poultry shed should have sufficient over hangs fixing of sprinklers on the roofs, provide thatch on the roof, decrease stocking density, decrease litter depth. Construction of wind breaks, keep curtains ready, arrange for heating devices, increase stocking density, decrease litter depth.	Provide cooling fans in shades and also sprinkle water on the roof at regular intervals. Use of wind breaks, put gunny bags on all openings of shed , use heating devices.		
Health and disease management	Routine health care	Reduce energy content and increase protein content in feed, add anti stress factors, provide cool drinking water. Increase energy content in food		

[a] based on forewarning wherever available

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
1) Drought			

A. Capture			
Marine			
Inland			
(i) Shallow water depth due to insufficient rains/inflow	1. Harvest all the large fish except the brood stock. 2. Move other fish into pens or small confined waters. 3. Provision for Rainwater harvesting 4. Deepening/Desilting of existing water bodies.	1. Harvest all the fish. 2. Stock water bodies with desirable species for culture. 3. Shallow derelict waters can stocked with stunted fish seed for culture. 4. Pens of 0.2 to 0.5 ha may facilitate easy operation of culture.	1. Stocking and management of grow out water bodies to improve growth of stock
(ii) Changes in water quality	1.Monitor water quality 2. Avoid polluting materials entry into water body.	1. Monitor water quality as small water bodies have less tolerance to environmental changes leading to algal blooms and fish mortality.	1. Advent of monsoon will mitigate the water shortage and normal stocking and culture practice may be adopted.
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	1. Harvest all the large fish except the brood stock. 2. Move other fish into pens or small confined waters with at least one meter depth. 3. Go for low stocking density. 4. Provision for Rainwater harvesting 5. Deepening/Desilting of existing water bodies. 6. Removal of debris and compaction of pond bunds.	1. Harvest all the fish. 2. Stock ponds with desirable species for culture. 3. Transfer the brood stock to deep water ponds if the existing ponds cannot be filled with bore well water. 4. Postpone breeding operations till the first heavy rains or 5. Start breeding if sufficient bore well water is available. 6. Start pond preparations, like deweeding, desilting & repair of dykes.	1. Start breeding operation with full preparations. 2. Undertake nursery and rearing operations. 3. Stocking and management of grow out ponds to improve growth of stock.
(ii) Impact of salt load build up in ponds / change in water quality	1. Add bore well water and if available, canal-water	1. Add bore well/ canal water if available or else harvest the stock. 2. Implement standard water conservation management practices.	1. Exchange pond water with fresh surface runoff water.

2) Floods			
A. Capture			
Marine			
Inland			
(i) No. of boats / nets/damaged			
(ii) No. of houses damaged			
(iii) Loss of stock			
(iv) Changes in water quality		1. Drainage of excess water need to be done. 2. Erect pens to protect the stock 3. Harvest big fish	1. Repair the embankments. 2. Restock with fish
(v) Health and diseases			1.Treat symptomatically
B. Aquaculture			
(i) Inundation with flood water	1. Dyke level shall be 0.5 m higher than highest flood level. Dyke walls should be checked for its strength specially compactness. 2. Inlets & outlets with proper sieves need to be maintained properly. 3. Pens may be erected to check fish stock loss in the periphery of small ponds.	1. Round the clock watch in is necessary. 2. Hapas should be installed in ponds to take care of spawn in case sudden or natural breeding occurs.	1. Check the brood stock condition. 2. Segregate male & female and various fish sizes. 3. Application of bleaching powder or liming must be done to avoid decaying of various organisms.
(ii) Water contamination and changes in water quality	-	1. Turbidity need to be controlled	1. Application of lime/ bleaching powder be done to avoid rotting and decaying of organisms.
(iii) Health and diseases	-	1. Apply lime/ bleaching powder as a prophylactic measure.	1. Apply bleaching powder. 2. Remove severely diseased & injured fishes.

			3. Treat the remaining fishes as per symptoms.
(iv) Loss of stock and inputs (feed, chemicals etc)			
(v) Infrastructure damage (pumps, aerators, huts etc)			
3. Cyclone / Tsunami	NA		
4. Heat wave and cold wave			
A. Capture			
Marine			
Inland	-	1. Harvest the stock.	1. Stock with fingerlings with the advent of rains.
B. Aquaculture			
(i) Changes in pond environment (water quality)	-	1. Add bore well water and if available, canal-water.	1. Exchange pond water with fresh surface runoff water.
(ii) Health and Disease management	-	1. Provide shelter (weeds) in a small area of the pond to prevent sun burn.	1. Remove weeds. 2. Liming or bleaching powder need to be added.

[a] based on forewarning wherever available