State: MEGHALAYA
Agriculture Contingency Plan for District: East Garo Hills, Williamnagar

1.0 District Agriculture profile				
1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	North-Eastern Hills (Purvachal), Warm to hot per humid ecosystem (17.1)		
	Agro-Climatic Zone (Planning Commission)	Eastern Himalayan Region (II)		
	Agro Climatic Zone (NARP)	Sub-Tropical Hill Zone(NEH-5)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	East Khasi Hills, Jaintia Hills, Ribhoi, South Garo Hills, West Garo Hills		
	Geographic coordinates of district headquarters	**Latitude**	**Longitude**	**Altitude**
		25. 50656º N	90.62172ºE	262 m above msl
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	ICAR Research Complex for NEH Region, Umroi Road, Umiam, Dist:- Ri-bhoi, Meghalaya- 793103		
	Mention the KVK located in the district with address	None but nearest KVK Krishi Vigyan Kendra, West Garo Hills district, Sangsanggre P.O- Dobasipara-794005, Meghalaya		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	District and Local Research Station and Laboratory, Govt. of Meghalaya, Sangsanggre, Tura, West Garo Hills		

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):	1292.1	79	First week of June	Last week of Sept
	NE Monsoon(Oct-Dec):	176.9	28	First week of Oct	Last week of Oct
	Winter (Jan- March)	102.1	17	-	
	Summer (Apr-May)	915.1	27	First week of April	Last week of May
	Annual	2486.2	151	-	-

Source: IMD

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)	260.3	-	124.6	5.8	-	37.0	25.2	4.7	4.9	20.3

Source: Department of Agriculture, Govt. of Meghalaya (2009-2010)

1. 4	**Major Soils (common names like red sandy loam deep soils (etc.,)***	**Area ('000 ha)****	**Percent (%) of total geographical area**
	1. Red and lateritic sandy loam soils	Not available	
	Others (specify):		

1.5	**Agricultural land use**	**Area ('000 ha)**	**Cropping intensity %**
	Net sown area	36.9	114.4
	Area sown more than once	5.3	
	Gross cropped area	42.2	

Source: Department of Agriculture, Govt. of Meghalaya (2009-2010)

1.7 Area under major field crops & horticulture

1.7	Major field crops cultivated	Area ('000 ha)							
		Kharif			*Rabi*				
		Irrigated	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**	**Summer**	**Grand total**
	Ahu rice	-	-	-	-	-	-	-	10.673
	Spring rice	-	-	-	-	-	-	-	0.090
	Winter rice	-	-	-	-	-	-	-	6.825
	Small millet	-	-	-	-	-	-	-	0.424
	Maize	-	-	-	-	-	-	-	1.059
	Wheat	-	-	-	-	-	-	-	0.045
	Potato	-	-	-	-	-	-	-	0.132
	Rape seed & mustard	-	-	-	-	-	-	-	0.658
	Gram pulses	-	-	-	-	-	-	-	0.223
	Mesta	-	-	-	-	-	-	-	0.063
	Jute	-	-	-	-	-	-	-	0.198
	Cotton(lint)	-	-	-	-	-	-	-	2.516
	Arhar	-	-	-	-	-	-	-	0.082
	Lentil	-	-	-	-			-	0.018
	Sesamum	-	-	-	-	-	-	-	0.240
	Rabi pulses	-	-	-	-	-	-	-	0.106
	Castor		-	-	-	-	-	-	0.011
	Soybean	-	-	-	-	-	-	-	0.123
	Sugarcane								0.025
	Tobacco								0.190

	Horticulture crops - Fruits	**Total('000 ha)**
	Pineapple	-
	Citrus	-
	Banana	1.852
		-
	Sweet potato	0.280
	Tapioca	1.637
	Horticulture crops - Vegetables	Total **('000 ha)**
	Medicinal and Aromatic crops	**Total ('000 ha)**
	Turmeric	0.99
	Ginger	4.618

	Blackpepper	0.650
	Plantation crops	**Total**
	Arecanut	2.061
	Fodder crops	**Total ('000 ha)**
	Others	-
	Total fodder crop area	**Not available**
	Grazing land	-
	Sericulture etc	-
	Others (specify)	-

Source: Directorate of Economic and Statistics, GOI (2012-13)

1.8	**Livestock**		**Male ('000)**	**Female ('000)**	**Total ('000)**
	Non descriptive cattle(local low yielding)		-	-	157.823
	Crossbred cattle		-	-	0.211
	Non descriptive Buffaloes (local low yielding)		-	-	1.415
	Graded Buffaloes		-	-	
	Goat		-	-	43.652
	Sheep		-	-	1.260
	Pig(crossbred)		-	-	9.466
	Pig(indigenous)		-	-	46.071
	Commercial dairy farms (Number)				
1.9	**Poultry**		**No. of farms**	**Total No. of birds ('000)**	
	Commercial				
	Backyard				
	Fowl (Desi)		-	505.718	
	Fowl (improved)		-	88.695	
	Ducks (Desi)			4.671	
	Ducks (improved)			0.659	
1.10	**Fisheries** (Data source: Chief Planning Officer)				
	A. Capture				
	i) Marine (Data Source: Fisheries Department	**No. of fishermen**	**Boats**	**Nets**	**Storage**

			Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	**facilities (Ice plants etc.)**
	ii) Inland (Data Source: Fisheries Department	**No. Farmer owned ponds**		**No. of Reservoirs**		**No. of village tanks**	

	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)	-	-	-
	Others (Inland), Data Source: Superintendent of Fisheries,	-	-	-

1.11 Production and Productivity of major crops (2011-12)

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 to be identified based on total acreage)										
	Ahu rice	-	-	-	-	-	-	15.161	1420	-
	Spring rice	-	-	-	-	-	-	0.126	1400	-
	Winter rice	-	-	-	-	-	-	10.869	1590	-
	Small millet	-	-	-	-	-	-	0.366	860	-
	Maize	-	-	-	-	-	-	1.318	1240	-
	Wheat	-	-	-	-	-	-	0.051	1130	-
	Potato	-	-	-	-	-	-	1.025	7770	-
	Rape seed & mustard	-	-	-	-	-	-	0.461	700	-
	Gram pulses	-	-	-	-	-	-	0.131	590	-
	Mesta	-	-	-	-	-	-	0.289	4590	-
	Jute	-	-	-	-	-	-	1.263	6380	-

	Cotton(lint)	-	-	-	-	-	-	1.776	710	-
	Arhar	-	-	-	-	-	-	0.071	870	-
	Lentil	-	-	-	-	-	-	0.010	560	-
	Sesamum	-	-	-	-	-	-	0.122	510	-
	Rabi pulses	-	-	-	-	-	-	0.065	610	-
	Castor	-	-	-	-	-	-	0.005	450	-
	Soybean	-	-	-	-	-	-	0.15	930	-
	Sugarcane	-	-	-	-	-	-	0.690	2760	-
Major Horticultural crops (Crops to be identified based on total acreage)										
	Banana	-	-	-	-	-	-	26.563	1434	-
	Sweet potato	-	-	-	-	-	-	0.874	3120	-
	Tapioca	-	-	-	-	-	-	8.431	5150	-
	Turmeric	-	-	-	-	-	-	0.549	5550	-
	Ginger	-	-	-	-	-	-	22.559	4890	-
	Blackpepper	-	-	-	-	-	-	0.250	380	-
	Arecanut	-	-	-	-	-	-	2.362	1150	-

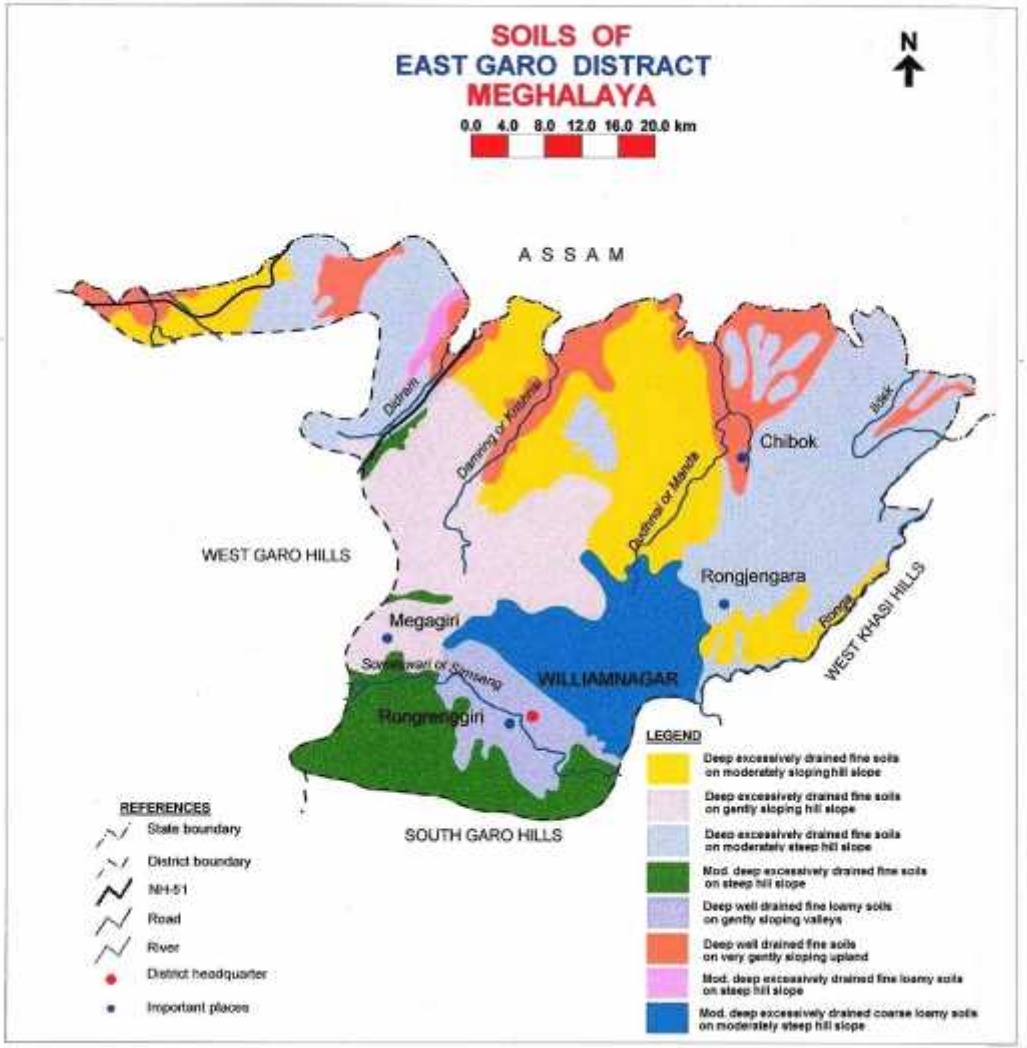
* Fibre crops in bales , Source: Directorate of Economic and Statistics, GOI (2012-13)
Source: Directorate of Economic and Statistics, GOI (2012-13)

1.12	**Sowing window for 5 major field crops** (start and end of normal sowing period)	Paddy	Maize	Rapeseed & Mustard	Cotton	Jute
	Kharif- Rainfed	1st week of June-last week of June	March-April	-	March-May	March-April
	Kharif-Irrigated	-		-	-	-
	Rabi- Rainfed	-	Oct-Nov	Oct-Nov	-	-
	Rabi-Irrigated	2nd week of Dec-1st week of Jan	Oct-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 (Paddy: Stem borer, Gandhi bug, rice hispa, Blast, leaf spot; Maize: cob borer & leaf spot)		√	
	Others (hail strom at milk stage of boro paddy)		√	

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: No
		Soil map as Annexure 3	Enclosed: Yes

Location map of East Garo Hills district
Annexure I


SOILS OF
EAST GARO DISTRACT
MEGHALAYA
0.0 4.0 8.0 12.0 16.0 20.0 km
N
ASSAM
Chibok
Rongjengara
Megagiri
WILLIAMNAGAR
Rongrenggiri
WEST GARO HILLS
WEST KHASI HILLS
SOUTH GARO HILLS
REFERENCES
State boundary
District boundary
NH-51
Road
River
District headquarter
Important places
LEGEND
Deep excessively drained fine soils on moderately sloping hill slope
Deep excessively drained fine soils on gently sloping hill slope
Deep excessively drained fine soils on moderately steep hill slope
Mod. deep excessively drained fine soils on steep hill slope
Deep well drained fine loamy soils on gently sloping valleys
Deep well drained fine soils on very gently sloping upland
Mod. deep excessively drained fine loamy soils on steep hill slope
Mod. deep excessively drained coarse loamy soils on moderately steep hill slope

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 (June 3rd week)	Rainfed upland	Jhum land Paddy + Maize + Pumpkin + Chilli +Tapioca + Sweet Potato+ Ginger + Turmeric Cotton, Mesta	No change of usual cropping practices	No change of usual cropping practices	-
	Rainfed medium land	Sali Paddy Sali paddy-mustard	-do-	-do-	
		Maize (sole)	-do-	-do-	
		Maize-mustard /vegetable Amaranthus, Bhendi	-do-	-do-	
		Jute	-do-	-do-	
	Rainfed lowland	Boropaddy	-do-	-do-	

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 (July 1st week)	Rainfed upland	Jhum land Paddy + Maize + Pumpkin + Chilli +Tapioca + Sweet Potato+ Ginger + Turmeric	**Paddy**: Bhalum-1, Bhalum-2 **Maize:** Da61a, Vijay composite **Intercropping:** Maize+ cowpea, Maize+ Blackgram/ greengram **Turmeric**: Lakadang, RCT-1 **Ginger:** Nadia	Conservation furrow, Intercultivation, mulching	-
	Rainfed medium land	Sali Paddy(sole) Sali paddy-mustard	**Paddy**: Sahsarang Swarna mahsuri	SRI, ICM method for paddy cultivation	

		Maize (sole)	**Maize:** Vivek hybrid, RCM-1-1, RCM-1-2 and RCM-1-3	Mulching with weed spp. Adopt closer spacing 40x30cm in maize	
		Maize-mustard/vegetable	**Maize:** Vivek hybrid, RCM-1-1, RCM-1-2 and RCM-1-3		
		Cowpea, bhendi, amaranthus, chilli, banana, pumpkin			
	Rainfed lowland	Boropaddy	**Boro paddy**: KRH-2, Jaymati, Naveen		

Early and mid season drought **Outbreak of pests and diseases due to unusual rains**	**Suggested contingency measures**			
	Vegetative stage	**Flowering stage**	**Crop maturity**	**Post harvest**
Paddy	1.Weed control 2.For seed and root pests and stem borers, seedling maggots and locust suitable IPM measures should be followed 3.For Rhizoctonia root rot-cultural, chemical (mancozeb 3g/lit of water for foliar application) and biological control	Follow suitable crop protection measures	Spray with suitable insecticides to avoid cut worm infestation Rodent holes should be treated with Aluminium phosphide @ 6 pellets per hole.	Harvest the crop at maturity, dry properly and store in gunny bags.
Pulses	1.Remove weeds 2.seedling mortality can be reduced by delayed planting until mid November 3.For powdery mildew disease spray the crop at he appearance of the disease with wettable sulphur like sulfex. Spray at 15 days interval. 4 For hairy caterpillars and loopers spray with phosphomedon 2ml/lit of water.	Follow suitable crop protection measures	Rodent holes should be treated with Aluminium phosphide @ 6 pellets per hole. After harvest collect the plants left in the field and burn them.	leave the harvested crop in small heaps for 2-3 days for curing. After curing collect the crop at one place and detach the pods either by hand or using groundnut plucker for separating the pods from the plants.
Maize, pumpkin, tapioca, sweet potato(mixed cropping)	Need based plant protection measures both IPM & IDM.	Need based plant protection measures both IPM & IDM	Need based plant protection measures both IPM & IDM	-

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 (July 3rd week)	Rainfed upland	Jhum land Paddy + Maize + Pumpkin + Chilli +Tapioca + Sweet Potato+ Ginger + Turmeric	**Intercropping:** Maize+ cowpea(2:1), Maize+Blackgram/ greengram(1:1) Blackgram: T 9, kalindi Green gram: K-851, samrat Soybean: JS 80-21, JS 335	Conservation furrow, mulching, harvest green cob of maize	
	Rainfed medium land	Sali Paddy Sali paddy-mustard/vegetable	**Paddy:** Satyaranjan, Basundhara French bean, Bhendi, Amaranthus	SRI/ICM method for Paddy cultivation, Zero tillage Mustard	
	Rainfed lowland	Boropaddy	**Boro paddy:** Jaymati, Kanaklata, Naveen		

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 8 weeks (August 1st week)	Rainfed upland	Jhum rice + Maize + Pumpkin + Chilli +Tapioca + Sweet Potato+ Ginger + Turmeric	**Sesamum:** AST-1 Short duration Blackgram (var. kalindi), Green gram (Samrat/K-851)	Adopt closer spacing 25x10cm	
	Rainfed medium land	Sali Paddy (sole) Sali paddy-mustard/vegetable	**Paddy:** Disang, Luit, Kapilee Radish, Pumpkin. French bean	Direct seeding of rice , *SRI method for Paddy cultivation, *Direct wet seeding of sprouted rice seeds, *Zero tillage Mustard/greengram	
	Rainfed lowland	Boropaddy	**Boropaddy:** Jaymati, kanaklata, KRH-2, chandrama, TRC Borodhan, Naveen	- Short duration rice varieties such as Luit, Kolong, Dishang etc. can also be selected (transplanting up to last part of August). 20-25 days old	

				seedling should be transplanted at 20x15 cm spacing with 4-5 seedlings/hill. - Rice varieties such as Pankaj, Kushal, Lakhimi can be grown up to August 15 with 45 -50 days old seedlings. -Rice varieties that can be grown as late Sali up to last part of August are Manohar Sali, Andrew Sali, Salpona etc. and traditional photosensitive coarse grain varieties with up to 60 days old seedlings.	

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.	Rainfed upland	Jhum land Paddy + Maize + Pumpkin + Chilli +Tapioca + Sweet Potato+ Ginger + Turmeric	Thinning and gap filling of existing crop,	IPNS (Oragnic + inorganic+ BF), INM(Organic + inorganic), Weed mulching	
	Rainfed medium land	Sali Paddy(sole) Sali paddy-mustard/vegetable	Life saving irrigation, Resowing, if required Gap filling weeding	SRI, ICM method for paddy cultivation, Direct wet seeding of sprouted seeds,	
		Radish cowpea, palak and Coriander			
	Rainfed lowland	Boropaddy			

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	Rainfed upland	Jhum land Paddy + Maize + Pumpkin + Chilli +Tapioca + Sweet Potato+ Ginger + Turmeric	Weeding, Life saving irrigation from Jalkund, farm pond	Jalkund, mulching, conservation furrow, repair bunds	
	Rainfed medium land	Sali Paddy(sole) Sali paddy-mustard	Dual cropping of paddy with Azolla Postponement of topdressing of Nitrogen, life saving irrigation, IPM, IDM for pest & disease management	Azolla, Compost, Vermicompost, Integrated nutrient management	
		Maize (sole)			
		Maize- mustard/vegetable			
		Cowpea, French bean, coriander, radish, palak			
	Rainfed lowland	Boropaddy	No change	-	

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	Rainfed upland	Jhum land Paddy + Maize + Pumpkin + Chilli +Tapioca + Sweet Potato+ Ginger + Turmeric	Life saving irrigation from Jalkund, fam pond	Jalkund, Vermicompost @ 2t/ha,	
	Rainfed medium to shallow land	Sali Paddy(sole) Sali paddy-mustard	Weeding, life saving irrigation Earthing up for maize	Vermicompost@ 2t/ha, FYM@ 5 t/ha, Mulching, farm pond	
		Maize (sole)			
		Maize- mustard/vegetable			
	Rainfed lowland	Boropaddy	Life saving irrigation		

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**
Heavy uneven rainfall, mid season dry spell, medium to shallow soils	Rainfed upland	Jhum land Paddy + Maize + Pumpkin + Chilli +Tapioca + Sweet Potato+ Ginger + Turmeric	Harvest mature crops Damaged crops may used as fodder depending on the suitability	Plan for Winter vegetables (cabbage, cauliflower, tomato, broccoli etc)	
	Rainfed medium land	Sali Paddy(sole) Sali paddy-mustard		Mustard, Pea Vegetables greengram	
		Maize (sole)	Harvest green cob		
		Maize- mustard/vegetable			
		Cole crops, French bean, radish, carrot,	Cole crops nursery under protected polyhouse, Ridge plot for frenchbean, radish	- Rabi cropping with cole crops such as Cauliflower (mid season varieties – Improved japaneses, Pusa Synthetic, Pusa snowball etc.) and Cabbage (Varieties – Golden acre, Pride of india, Pusa Mukta etc.), Knolkhol (White viena) etc. - Growing of Tomato, Brinjal, pea, potato and Leafy vegetables like Spinach, Radish etc. with recommended varieties and package of practices. --Growing of rabi field crops like toria, lentil, - Rabi cropping with cole crops such as Cauliflower (mid season varieties – Improved japaneses, Pusa Synthetic,	

				Pusa snowball etc.) and Cabbage (Varieties – Golden acre, Pride of india, Pusa Mukta etc.), Knolkhol (White viena) etc. - Growing of Tomato, Brinjal, pea, potato and Leafy vegetables like Spinach, Radish etc. with recommended varieties and package of practices. --Growing of rabi field crops like toria, lentil,	
	Rainfed lowland	Boropaddy			

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	Medium to shallow land	Sali Paddy(sole) Sali paddy-mustard	Boro paddy	Weeding, life saving irrigation Earthing up for maize, Mulching	-
		Maize (sole)	Intercropping		
		Maize- mustard			
		Cowpea and frenchbean			

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 to shallow land	Sali Paddy(sole) Sali paddy-mustard Maize (sole) Maize- mustard	Boro paddy Rice-fallow	Life saving irrigation, Mulching	
		Bhindi, radish, tomato, abbage, cauliflower			

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	Lateritic soils	Fallow	Sali Paddy(sole late sown)	Life saving irrigation weeding	
		Tapioca, colocasia, sweet potato			

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 to shallow land	Fallow	Boro paddy	Weeding, life saving irrigation	
		Vegetables	Root crops, onion, colocasia	Mulching	

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	Low land shallow tube well	Cropping system 1: Fallow	Boro paddy Lentil, pea, mustard, vegetables	Limited irrigation at critical stages, SRI & ICM method	

2.2 Unusual rains (untimely, unseasonal etc

Condition	Suggested contingency measure			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Paddy + soybean /blackgram/greengram	Provide drainage	Provide drainage	Drain out excess water Harvesting at physiological maturity stage	Shift to safer place & dry shed, safe storage against storage pest& diseases
Maize + soybean/blackgram/greengram				
Redgram +sesamum				
Redgram+millet				
Paddy sole	Making bunds	-		
Horticulture	Ridge making for French bean, tomato, cabbage, cauliflower	-	-	-
Heavy rainfall with high speed winds in a short span	-	-	-	-
Horticulture	-	-	-	-
Outbreak of pests and diseases due to unseasonal rains	-	-	-	-
Paddy + soybean /blackgram/greengram	Need based plant	Need based plant		Safe storage against

Maize + soybean/blackgram/greengram	protection measures	protection IPDM method		storage pest and diseases
Redgram +sesamum				
Redgram +millet				
Paddy sole				
Horticulture				

Outbreak of pests and diseases due to unseasonal rains	**Suggested contingency measures**			
	Vegetative stage	**Flowering stage**	**Crop maturity**	**Post harvest**
Rice	1.Drain the excess water as early as possible. 2.Proper weed control should be taken. Take up 3.suitable plant protection measures against pest & disease outbreaks • **Leaf folder:** Spray Chlorpyriphos@2.5ml or Acephate 1.5g or Cartaphydrochloride 2.0g / l or apply 8.0kg Cartaphydrochloride granuals per acre. • **Sheath blight:** Apply recommended nitrogen in 3-4 splits. Spray Propiconazole 1.0 ml or Hexaconazole 2.0 ml or validamycin 2.0 ml /l at 15 days interval based on need. • Blast : remove weeds on the bunds Spray Tricyclozole 0.6/ml or Edifenphos 1.0 ml • **Bacterial leaf blight:** Avoid application of excess Nitrogen	1.Drain the excess water as early as possible. 2.Proper weed control should be taken. **Rodents: F**umigate the burrow with luminium phosphide 2 pellets of 0.6 g per burrow. Poison bait with bromadiolone • **False smut:** Spray Carbendazim 1.0g or COC 2.5g at weekly interval • **Sheath blight:** Apply recommended nitrogen in 3-4 splits. Spray Propiconazole 1.0 ml or Hexaconazole 2.0 ml or validamicin 2.0 ml /lt at 15 days interval • **Blast** : remove weeds on the bunds Spray Tricyclozole 0.6ml or Edifenphos 1.0 ml • **Bacterial leaf blight:** Nitrogen management	Drain the excess water as early as possible • Take up suitable plant protection measures against grain fest and disceases • **Cut worm:** SprayChlorpyriphos 2.5 ml or DDVP 1.0 ml • **Rodents** :Fumigate the burrow with aluminium phosphide 2 pellets of 0.6 g per burrow. Poison bait with bromadiolone	Thresh after drying the sheathes properly

Maize	Drain the excess water as early as possible Take up timely control measures for Pink stem borer, sheath blight and Turcicum leaf blight	Drain the excess water as early as possible Take up timely control measures for Pink stem borer, sheath blight and Turcicum leaf blight Take up timely control measures for sheath blight and post flowering stalk rots	Allow the crop to dry completely before harvesting	Harvest the cobs after dried up properly. Dry the grain to optimum moisture condition before storing
Pulses(Black gram,red bram,green gram etc)	Drain the excess water as early as Possible Spray fungicides like Copper oxychloride 0.3 % or Carbendazim 0.1 % or Mancozeb 0.25% two to three times by rotating the chemicals • Take up timely control measures against sucking pets whitefly that transmits YMV	Drain the excess water as early as Possible Spray fungicides like Copper oxy chloride 0.3 % or Carbendazim 0.1 % or Mancozeb 0.25% two to three times by rotating the chemicals • Take up timely control measures against bihar hairy caterpillar.	Drain the excess water as early as Possible Allow the crop to dry completely before harvesting	Thresh the bundles after they are dried properly • Dry the grain to proper moisture per cent before bagging and storing to prevent deterioration in quality during storage
pumpkin,tapioca,sweet potato(mixed cropping)	Need based plant protection measures both IPM & IDM	Need based plant protection measures both IPM & IDM	Need based plant protection measures both IPM & IDM	-

2.3 Floods

Condition	**Suggested contingency measure**			
Transient water logging/ partial inundation	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Paddy	Modified Mat nursery	Drain out excess water	Drain out excess water	Harvesting at physiological maturity stage
Horticulture	-	-	--	-

Continuous submergence for more than 2 days	-	-	--	-
Horticulture	-	-	--	-
Sea water intrusion	-	-	--	-

2.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm /Cyclone- Not applicable

Extreme event type	**Suggested contingency measure**			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Heat Wave	Not applicable			
Horticulture				
Cold wave				
Horticulture				
Frost				
Horticulture				
Hailstorm				
Horticulture				
Cyclone				
Horticulture				

2.5 Contingent strategies for live stock, poultry & Fisheries
2.5.1 Livestock

	Suggested contingency measures		
Drought	**Before the event**	**During the event**	**After the event**
	*Establishment of local emergency management group involving local people. * Insurance of the animals. *Establishment of permanent sites for livestock camps in drought prone areas. *perennial fodder cultivation on sloppy area, terrace and wastelands *Establishment of fodder banks *cultivation of tree fodders	1. Active part of the local management group to give information about camps, fodder banks to the farmers. 2. Bringing the animals to the established camps. 3.Fodder trees for livestocks 4. Hay and silage making 5. Concentrate feeding with locally available feed ingredients 6. transporting excess fodder/crop residue from adjoining area	1.Restocking of animals 2. Proper health and nutritional management 3. Arrangement for financial assistance from banks at low interest rates if declared a natural disaster area.

Feed and fodder availability	1. Establishment of feed, fodder and seed bank. 2. Encouraging cultivation of drought tolerant perennial grasses like **Stylosanthes**, trees and bushes on field boundaries, bunds and waste land. 3. Burning of paddy straw (Common in tribal people) should not be allowed. Paddy straw can be fortified using urea and molasses and transported to areas of fodder scarcity. 4. Efforts should be made to increase the production of supplements like UMMB (Urea Molasses Mineral Block) lick, which can be easily transported (as animal chocolate) to be offered to the animals along with crop residues to increase their palatability and digestibility. 5. Storage of fodder as hay and silage	1. Utilising feed and fodder from the bank reserves. 2. Transporting excess fodder, paddy straw from surplus area. 3. Supply of UMMB. 4. Vegetable/fruit wastes can be collected from the market yards and factories. After Sun-drying these can be transported to deficit areas. The nutritive value of these by-products is reported quite high. Apart from providing additional feed resource, such type of recycling also helps in reducing the environmental pollution. 5. State Forest Dept. to arrange for the cutting and bailing of grasses in forests, where ever possible. 6. Feeding of perennial fodder tree top feed 7. feeding of hay and silage	1. Culling of unproductive livestock to minimize the feed and fodder requirement.
Drinking water	1. Preserving water in tank/pond for drinking purpose. 2. Rainwater harvesting provided its quality is retained. 3.Excavation of bore wells	1. Using preserved water in tank/pond. 2. Wherever ground water resources are available. 3. Priority for drinking purpose.	
Health and disease management	1.Veterinary preparedness with medicines and vaccines 2. Culling of non-productive animals	1. Organizing mass animal health camps. 2. Vaccination and treatment of the animals. 3. Guard against heat stress. 4. Deworming of the animals will improve fodder and feed absorption.	1.Culling of sick animals 2. Supplementation of minerals mixture and vitamins

	Suggested contingency measures		
Flood	Before the event	During the event	After the event
	1. Establishment of local emergency management group involving local people. 2. Insurance of the animals. 3. Establishment of permanent sites for livestock camps in the location of high grounds away from the	1. Active part of the local management group to give information about flood forecasts, road closures, relief camps, fodder banks to the people. 2. Evacuate the animals immediately and	1. Restocking of animals 2. Arrangement for financial assistance from banks at low interest rates if declared a natural disaster area.

	flood.	bringing to the established camps.	
Feed and fodder availability	Establishment of feed, fodder and seed bank in the place away from flood.	1. Distribution of emergency feed and fodder. 2. Supply of UMMB.	Culling of unproductive livestock to minimize the feed and fodder requirement.
Drinking water		Sanitation programme.	Measure against the occurrence of water borne diseases.
Health and disease management	Veterinary preparedness with medicines and vaccines	Veterinary aid to the animals. Balance feeding Mineral mixture supplements	1. Organizing mass animal health camps. 2. Vaccination and treatment of the animals. 3.Culling of sick animals

Vaccination programme for cattle and buffalo

Disease	**Age and season at vaccination**
Anthrax	In endemic areas only, Feb to May
Haemorrhagic septicaemia (HS)	May to June
Black quarter(BQ)	May to June
Foot and Mouth disease (FMD)	July/August and November/December

Vaccination programme for small ruminants (sheep & Goat)

Disease	**Age and season at vaccination**
Foot and Mouth disease (FMD)	Preferably in winter/autumn
Peste des Petits Ruminants (PPR)	Preferably in January
Black quarter(BQ)	May to June
Enterotoxaemia(ET)	May
Haemorrhagic septicaemia (HS)	May to June
Sheep pox(SP)	November

2.5.2 Poultry

	Suggested contingency measures		
Drought	**Before the event**	**During the event**	**After the event**
	1. Establishment of local emergency management group involving local people. 2. Insurance of the birds. 3. Establishment of feed bank	1. Active part of the local management group to give information about feed and fodder banks to the people.	1.Strengthening feed serve banks 2. Availing insurance. 3. Arrangement for financial assistance from banks at low interest rates if declared a natural disaster area

Shortage of feed ingredients	1. Establishment of feed reserve bank on community basis.	1. Distribution of emergency feed from the reserves.	1. Strengthening feed reserve banks.
Drinking water	1. Preserving water in tank/pond for drinking purpose. 2. Rainwater harvesting provided its quality is retained. 3.Excavation of bore wells	1. Birds should be provided sufficient drinking water by using preserved water in tank/pond. 2. Wherever ground water resources are available.	
Health and disease management	Veterinary preparedness with medicines and vaccines	1. Veterinary aid to the birds. 2. Mass Vaccination.	Culling of sick birds
Flood			
	1. Establishment of local emergency management group involving local people. 2. Insurance of the birds. 3. Establishment of relief camps in the location of high grounds away from the flood.	1. Active part of the local management group to give information about flood forecasts, road closures, relief camps, advice on evacuation to the people. 2. Evacuate the birds immediately and bringing to the camps.	1. Availing insurance. 2. Arrangement for financial assistance from banks at low interest rates if declared a natural disaster area.
Shortage of feed ingredients	-	Distribution of emergency feed	Culling of unproductive livestock to minimize the feed and fodder requirement.
Drinking water	-	Sanitation programme.	Measure against the occurrence of water borne diseases.
Health and disease management	Veterinary preparedness with medicines and vaccines	Veterinary aid to the birds. .	1. Organizing mass vaccination camps. 2.Culling of sick animals

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	-	-	-
(ii) Changes in water quality	-	-	-
(iii) Any other	-	-	-
B. Aquaculture	-	-	-
(i) Shallow water in ponds due to insufficient rains/inflow	Desilting or deepening of pond so that more water can be stored	Provision of additional bore well in plain area and use Euryhaline specie	Manitaining pond water level at least one metre depth
(ii) Impact of salt load build up in ponds / change in water quality	Replacement of water in pond with fresh water	30 % exchange of water	10% exchange of water
(iii) Any other	-	-	-
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	-	-	-
(v) Health and diseases	-	-	-
B. Aquaculture	-	-	-
(i) Inundation with flood water	Repair, strengthening of dykes	Enhancement of dykes height by sand bags, catch the fish and keep in nets	
(ii) Water contamination and changes in water quality	Use of calcium hydroxide@ 150 kg/ha	Infected fishes to be treated with KMNo4 1% as prophylactics	Lime treatment for oxidation
(iii) Health and diseases	Antibiotics fortified feeding as prophylactics	Disinfectant formalin treatments as prophylactics	-do-
(iv) Loss of stock and inputs (feed, chemicals etc)	Stock cover under insurance	-	-
(v) Infrastructure damage (pumps, aerators, huts etc)			Repaire and maintencnce of aquastructure to be given
(vi) Any other	-	-	-
3. Cyclone / Tsunami	-	-	-
A. Capture	-	-	-

Marine	-	-	-
(i) Average compensation paid due to loss of fishermen lives	-	-	-
(ii) Avg. no. of boats / nets/damaged	-	-	-
(iii) Avg. no. of houses damaged	-	-	-
Inland	-	-	-
B. Aquaculture	-	-	-
(i) Overflow / flooding of ponds	-	-	-
(ii) Changes in water quality (fresh water / brackish water ratio)	-	-	-
(iii) Health and diseases	-	-	-
(iv) Loss of stock and inputs (feed, chemicals etc)	-	-	-
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)	-	-	-
(vi) Any other	-	-	-
4. Heat wave and cold wave	-	-	-
A. Capture	-	-	-
Marine	-	-	-
Inland	-	-	-
B. Aquaculture	-	-	-
(i) Changes in pond environment (water quality)	-	-	-
(ii) Health and Disease management	-	-	-
(iii) Any other			