State: SIKKIM

Agriculture Contingency Plan for District: East Sikkim

1.0 District Agriculture profile				
1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	Eastern Himalayas, Warm Perhumid Eco-Region (16.2)		
	Agro-Climatic Zone (Planning Commission)	Eastern Himalayan Region(II)		
	Agro Climatic Zone (NARP)	Sub-Tropical Sub-Humid toTemperate Humid ESR with shallow to medium deep loamy Brown and Red Hill soils, low to medium AWC and LGP 300 days (C11A10).		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	East Sikkim District		
	Geographic coordinates of district headquarters	**Latitude**	**Longitude**	**Altitude**
		27º9' to 27º25' N	88º27' to 88º56' E	300-5000 mts above MSL
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	1. ICAR Research Complex Sikkim Centre, Tadong 2. NRC on Orchid, Pakyong 3. ICRI Regional Research Station, Spices board, Tadong 4. CAEPHT, CAU, Ranipool, Gangtok		
	Mention the KVK located in the district with address	Krishi Vigyan Kendra, ICAR Sikkim Centre, Ranipool, East Sikkim- 737 135 E.mail- esikkimkvkicar@yahoo.co.in, Fax No. – 035892 251311		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	ICAR Research Complex Sikkim Centre, Tadong, Gangtok-737102 East Sikkim		

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)	1539	60	1st week of June	4th week of September
	NE Monsoon (Oct-Dec)	306	25	3rd week of October	1st week of December
	Winter (Jan-March)	121	15	1st week of January	4th week of March
	Summer (Apr-May)	559	35	2nd week of April	4th week of May
	Annual	2525	135		

Source: ICAR Sikkim Centre, Tadong, Gangtok

1.3	**Land use pattern of the district**	Geographical area	Cultivable area	Forest area	Land under non-agricultural use	Permanent Pastures	Cultivable wasteland	Land under Misc. tree	Barren and uncultivable land	Current Fallows	Other fallows (Old fallow)

	(latest statistics)							crops and groves			
	Area (000' ha)	95.4	10.5	9.112	3.277	1.652	7.500	1.5069	8.1786	0.7872	7.5

Source: Sikkim a Statistical Profile 2006-07, Land Utilization Statistics of Sikkim

1. 4	**Major Soils**	**Area ('000 ha)**	**Percent (%) of total geographical area**
	Haplumbrepts and pachic haplumbrepts (Inceptisol)	1.535	1.60
	Typic hapudolls and umbric dystrochrepts (Inceptisol)	2.070	2.16
	Cumilic haplumbrepts and pachic haplumbrepts (Inceptisol)	0.267	0.27
	Haplodolls, cumilic haplodolls, typic dystrochrepts, cumilic Dystrochrepts, typic haplumbrepts etc. (Inceptisol)	22.791	23.88
	Typic hapldystrochrepts, entic haplodolls, typic haplumbrepts etc. (Inceptisol)	23.640	24.77

Source: Sikkim a Statistical Profile 2006-07, Land Utilization Statistics of Sikkim

1.5	**Agricultural land use**	Area ('000 ha)	Cropping intensity %
	Net sown area	18.1	150 %
	Area sown more than once	0.61	
	Gross cropped area	31.9	

1.6	**Irrigation**	Area ('000 ha)		
	Net irrigated area	2.532		
	Gross irrigated area			
	Rainfed area	10.5		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals			
	Tanks			
	Open wells			
	Bore wells	2		
	Lift irrigation schemes			

	Micro-irrigation			
	Other sources (Springs)	60		
	Total Irrigated Area			
	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	All	100	
	Wastewater availability and use			
	Ground water quality	Fresh and fit for both drinking and irrigation purpose. Chemical constituents within permissible limit (BIS std.)		
*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) (2006-07)

1.7	**Major field crops cultivated**	**Area ('000 ha)**							
		Kharif			***Rabi***				
		Irrigated	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**	**Summer**	**Grand total**
	Maize		8.76	8.76					8.76
	Rice		5.50	5.50					5.50
	Soybean		0.79	0.79					0.79
	Wheat					1.43	1.43		1.43
	Finger Millet		1.00	1.00					1.00
	Rapeseed and Mustard					1.92	1.92		1.92
	Black gram		0.39	0.39					0.39

	Horticulture crops - Fruits	**Area ('000 ha)**		
		Total	**Irrigated**	**Rainfed**
	Mandarin	4.12		4.12
	Passion fruit Banana	2.25		2.25

	Guava Peach			
	Horticulture crops - Vegetables	**Total**	**Irrigated**	**Rainfed**
	Rabi	1.20		1.20
	Kharif	0.90		0.90
	Off- season	0.89		0.89
	Medicinal and Aromatic crops	**Total**	**Irrigated**	**Rainfed**
	Spices crops	**Total**	**Irrigated**	**Rainfed**
	Large Cardamom	3.60		3.60
	Ginger	2.21		2.21
	Turmeric	0.13		0.13
	Others			5.94
	Plantation crops	**Total**	**Irrigated**	**Rainfed**
	Fodder crops	**Total**	**Irrigated**	**Rainfed**
	Total fodder crop area			
	Grazing land			
	Sericulture etc			

1.8	**Livestock**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Indigenous cattle	9. 655	7.331	16.986
	Improved / Crossbred cattle	8.12	30.504	38.624
	Buffaloes (local low yielding)	0.157	0.269	0.426
	Graded Buffaloes			
	Goat	17.687	0.359	18.046
	Sheep	0.120	0.150	0.27
	Pig	7.339	2.100	9.439
	Yak	0.435	1.014	1.449
	Commercial dairy farms (Number)	-	-	-
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
	Commercial	1250	68.823	
	Backyard	62915		
1.10	**Fisheries** (Non potential area)			

	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**	
		200		1		200	
	B. Culture						
				Water Spread Area (ha)	**Yield** (kg/tank)	**Production (' tons)**	
	i) **Brackish water** (Data Source: MPEDA/ Fisheries Department)						
	ii) **Fresh water** (Data Source: Fisheries Department)			1	40	8	
	Others / Village ponds			2	-	-	

Source: Fishery department, Govt. of Sikkim

1.11 Production and Productivity of major crops (2006-07)

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)										
	Maize	13.730	1567.35					13.730	1567.35	
	Rice	8.500	1546.55					8.500	1546.55	
	Wheat			2.810	1965.03			2.810	1965.03	
	Finger-Millet	0.860	860.00					0.860	860.00	
	Black gram	0.280	717.95					0.280	717.95	
	Rapeseed & Mustard			1.390	723.96			1.390	723.96	
	Soybean	0.740	936.71					0.740	936.71	
Major Horticultural crops (Crops identified based on total acreage)										
	Mandarin							4.170	1855	
	Other fruits							1.490	2126	

	Rabi vegetables			5.520	4582			5.520	4582	
	Kharif vegetables	4.380	4876					4.380	4876	
	Off season vegetables	2.00	1500	2.750	3844			4.750	5344	
Major spice crops										
	Cardamom	0.830	231					0.830	231	
	Ginger	11.690	5314					11.690	5314	
	Turmeric							0.450	3462	
	Other spices							12.970	2182	

Sikkim a Statistical Profile 2006-07

1.12	**Sowing window for 5 major field crops**	**Maize**	**Rice**	**Soybean**	**Fingermillet**	**Rapeseed & Mustard**	**Wheat**
	Kharif- Rainfed	2nd week of February to 4th week of April	4th week of June to 4th week of July	June to July	June to July		
	Kharif-Irrigated						
	Rabi- Rainfed					October to November	October to November
	Rabi-Irrigated						

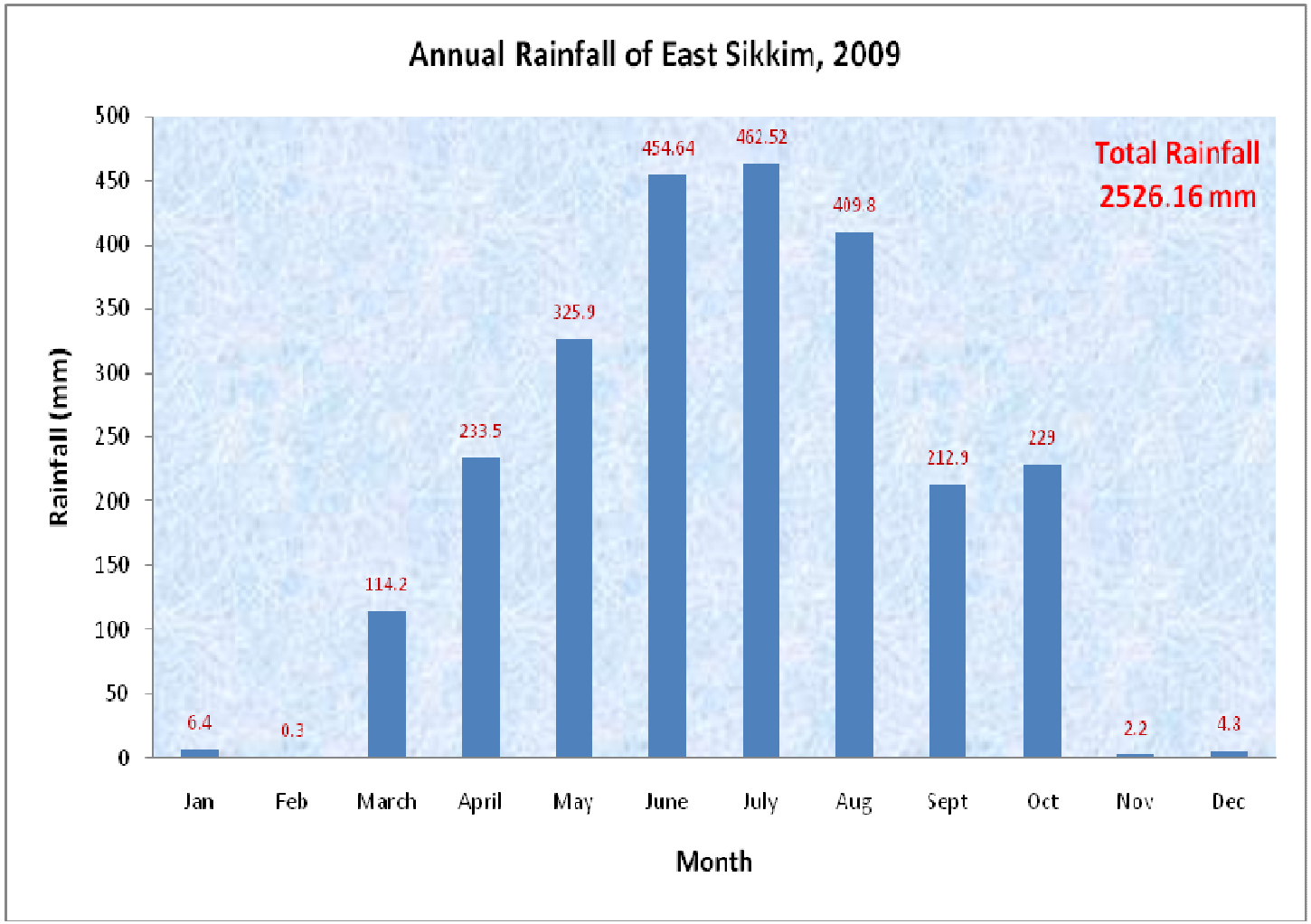
1.13	**What is the major contingency the district is prone to?**	**Regular**	**Occasional**	**None**
	Drought			√
	Flood			√
	Cyclone			√
	Hail storm	√		
	Heat wave			√
	Cold wave		√	
	Frost		√	
	Sea water intrusion			√
	Pests and disease outbreak		√	
	Landslides	√		

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 II	Enclosed: Yes
		Soil map as Annexure III	Enclosed: Yes

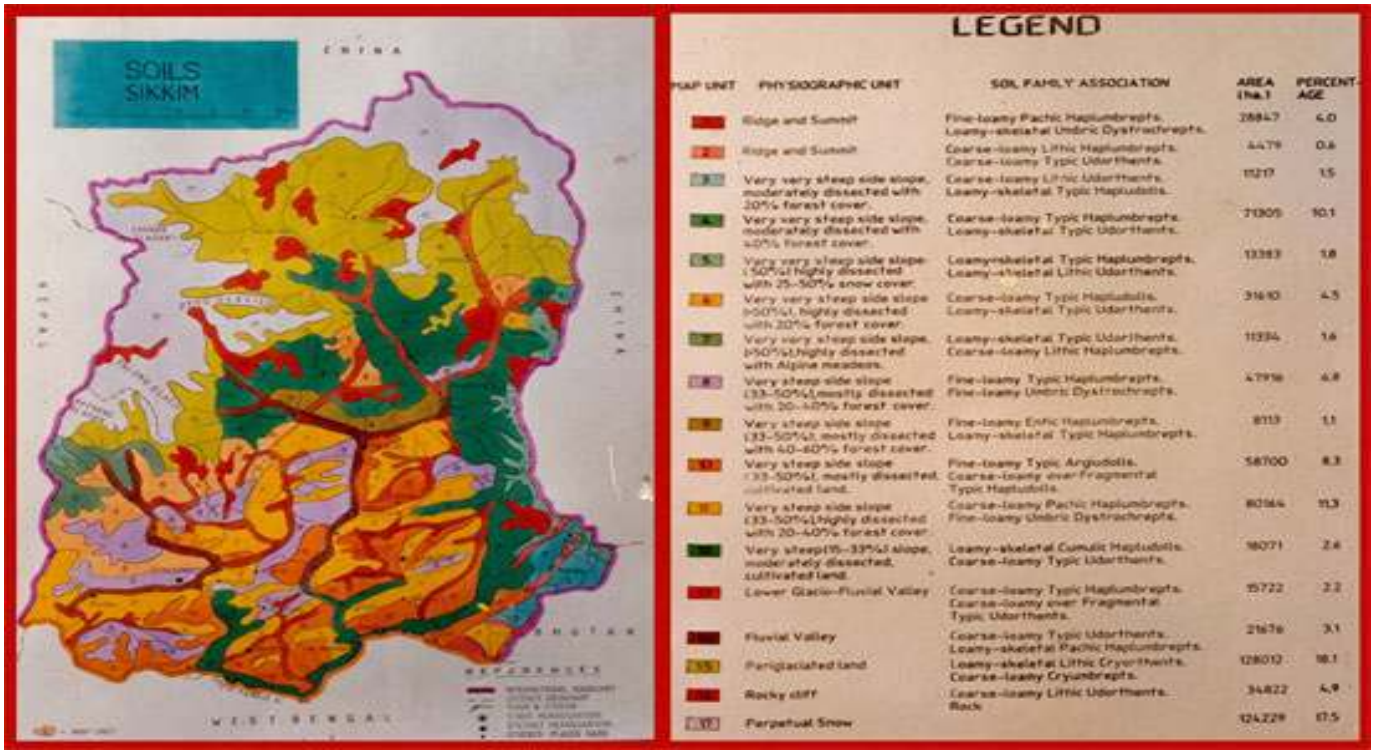
Annexure I


EAST SIKKIM
Sikkim
North District
N
Rate chhu
Dik chhu
Nakchok
Rakdong
Nabhe
Chharggu
Kambul
Nampung
Bazar
Lingzung
Samdong
GANGTOK
Kupup
Tumin
Mangkha
Pabyak
Simik
Nathang
Badong
Martam
Saramsa
Bara Pathing
Ranipool
Aho
Lungthung
Khamdong
Namgejong
Sirwani
Phyakkapu
Machong
Padamchen
Singtam
Pakyong
South District
Damlakha
Amba
Lingtam
Burdang
Bhasme
Rangli
Sajong
Rigu
Rangpo Chhu
Rhenok
BHUTAN
31A
WEST BENGAL
District Boundary
River
National Highway
State Highway
District Headquarter
Town
Map not to scale
KVK ICAR

Annexure II


Annual Rainfall of East Sikkim, 2009
Rainfall (mm)
500
450
400
350
300
250
200
150
100
50
0
6.4
0.3
114.2
233.5
325.9
454.64
462.52
409.8
212.9
229
2.2
4.3
Total Rainfall
2526.16 mm
Jan
Feb
March
April
May
June
July
Aug
Sept
Oct
Nov
Dec
Month

Annexure III



2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
Early season drought (delayed onset)			**Change in crop / cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks 3rd week of June	Rainfed	Maize based cropping system 1. Maize - rice/soybean - potato/vegetables/ wheat/mustard 2. Maize - Maize + French Beans (Local)/vegetables 3. Ginger + Maize 4. Maize - Finger Millet/ Rice Bean (Relay) + vegetable 5.Rice - Wheat/Barley/ Mustard/Vegetables	No change	Wider spacing (60 X 30 cm) for maize. Thinning to retain one seedling at 30 cm. Transplanting of rice should be completed by mid week of July.	Supply of seeds through NSC, ATMA, SAUs

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
Early season drought (delayed onset)			**Change in crop / cropping system[c] including variety**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 weeks 1st week of July	Rainfed	Maize based cropping system 1. Maize - rice/soybean - potato/vegetables/ wheat/mustard 2. Maize - Maize + French Beans (Local)/vegetables 3. Ginger + Maize 4. Maize - Finger Millet/ Rice	No change	Wider spacing (60 X 30 cm) for maize. Thinning to retain one seedling at 30 cm. Transplanting of rice should be completed by mid	Supply of seeds through ICAR, NSC, ATMA, SAUs

		Bean (Relay) + vegetable 5.Rice - Wheat/Barley/ Mustard/Vegetables		week of July.	

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
Early season drought (delayed onset)			**Change in crop / cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Delay by 6 weeks 1st Week of August	Rainfed	Maize based cropping system 1. Maize - rice/soybean - potato/vegetables/ wheat/mustard 2. Maize - Maize + French Beans (Local)/vegetables 3. Ginger + Maize 4. Maize - Finger Millet/ Rice Bean (Relay) + vegetable 5.Rice - Wheat/Barley/ Mustard/Vegetables	**Maize:** HQPM-I, RCM 1- 1, RCM 1-2, RCM 1-3, Madhuri, Vivek Maize Hybrid 15, Vivek Hybrid 9, Vivek Maize Hybrid 23, Vivek Sankul Makka 11. **Rice:** Bali, Joli, Kalinga-3, Aditya, Heera, Jawahar, BG 367-7, Diwani, VL 4930, VL 30218, PD-10, VL Dhan 61, VL-62, VL Dhan 65, VL Dhan 86, VL Dhan 209, VL-206, KRH-2, Krishnabhog, Satyaranjan, Shah Sarang-1, DR-92, Pant Dhan 10. **Millets:** VL Mandua 324, VL Mandua 315, Indaf 5, 8,9; VL-101,149, Muskey **Soybean**: Ahilya-1, PK 327, PK 472, PK-1042, PK-1024, JS-80-21, JS-335, JS 75-46, PK 262, NRC 37, VL Soya 47. **Horticultural crops** **Potato:** Kufri Jyoti, K. Chandramukhi, Kufri Badshah **Cabbage**: Pusa Mukta, Green Ball, Bahar, Green Express, BC-76 **Cauliflower**: Pusa Kartik Shanker, Suwashini, Girija, Barkha, Excel-16, Pusa Sukti, Dania Kalimpong.	Wider spacing (60 X 30) cm for maize Thinning to retain one seedling at 30 cm Intercropping of pulses with maize *In-situ* soil moisture conservation measures SRI/ ICM method of paddy cultivation (spacing 20x20 cm) Frequent intercultural operation for moiture conservation	Supply of seeds through ICAR, NSC, ATMA, SAUs

			Knol-Khol : Pusa Virat, Winner, **Tomato:** Avinash, Anup, Romeo, Rockey, Rupali, Kashi Vishesh **Broccoli:** Everest, Aishwarya, Palam Samridhi, Pusa KTS-1, Puspa. **Pea :** Arkel, Arka Ajit**,** Vivek Matar 9, Vivek Matar 8, Bonvelle, Azad. **Cowpea:** Kashi Kanchan, Pusa Komal. **Carrot:** Pusa Asita, Pusa Pudhira. **Okra:** VL Bhindi 1, Kashi Mangali, Kashi Vibhuti, Kashi Pragati, Kashi Satdhari. **Brinjal**: Pusa Sheetal, Pusa Shyamal, Pusa Bhairav, Kashi Taru, PPL, PPR. **French bean**: Arka Komal, Arka Sunidhi, VL Lata Bean 17, VL Lata Bean 12. **Bottle Gourd:** Pusa Naveen, Pusa Summer Prolific Long. **Turmeric :** Lakadong, Megha Turmeric-1 **Ginger :** Nadia, Bhaisey, **Citrus** : Sikkim Mandarin **Large Cardamom** : Ramsey, Sawaney, Golsey, Varlangey	Crops should be mulched with green leaves Short duration crops (80-90 days) should be selected Soil acidity management	

Condition	**Major Farming situation**	**Normal Crop / Cropping system[b]**	**Suggested Contingency measures**		
Early season drought (delayed onset)			**Change in crop / cropping system[c] including variety**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
Delay by 8 weeks 3rd Week of August	Rainfed	Maize based cropping system 1. Maize - rice/soybean - potato/vegetables/	**Agronomical crops** **Maize:** HQPM-I, RCM 1- 1, RCM 1-2, RCM 1-3, Madhuri, Vivek Maize Hybrid 15, Vivek Hybrid 9, Vivek	Wider spacing (60 X 30) cm for maize Thinning to	Supply of seeds through ICAR, NSC, ATMA, SAUs

		wheat/mustard 2. Maize - Maize + French Beans (Local)/vegetables 3. Ginger + Maize 4. Maize - Finger Millet/ Rice Bean (Relay) + vegetable 5.Rice - Wheat/Barley/ Mustard/Vegetables 6.Perennials crops –Mandarin orange, other fruits, L. cardamom 7.Ginger 8.Turmeric	Maize Hybrid 23, Vivek Sankul Makka 11. **Rice:** Bali, Joli, Kalinga-3, Aditya, Heera, Jawahar, BG 367-7, Diwani, VL 4930, VL 30218, PD-10, VL Dhan 61, VL-62, VL Dhan 65, VL Dhan 86, VL Dhan 209, VL-206, KRH-2, Krishnabhog, Satyaranjan, Shah Sarang-1, DR-92, Pant Dhan 10. **Millets:** VL Mandua 324, VL Mandua 315, Indaf 5, 8,9; VL-101,149, Muskey, **Soybean**: Ahilya-1, PK 327, PK 472, PK-1042, PK-1024, JS-80-21, JS-335, JS 75-46, PK 262, NRC 37, VL Soya 47. **Horticultural crops** **Potato:** Kufri Jyoti, K. Chandramukhi, Kufri Badshah **Cabbage**: Pusa Mukta, Green Ball, Bahar, Green Express, BC-76 **Cauliflower**: Pusa Kartik Shanker, Suwashini, Girija, Barkha, Excel-16, Pusa Sukti, Dania Kalimpong. **Knol-Khol** : Pusa Virat, Winner, **Tomato:** Avinash, Anup, Romeo, All Rounder, Rockey, Rupali, Kashi Vishesh **Broccoli:** Everest, Aishwarya, Palam Samridhi, Pusa KTS-1, Puspa. **Pea :** Arkel, Arka Ajit**,** Vivek Matar 9, Vivek Matar 8, Bonvelle, Azad. **Cowpea:** Kashi Kanchan, Pusa Komal. **Carrot:** Pusa Asita, Pusa Pudhira. **Okra:** VL Bhindi 1, Kashi Mangali, Kashi Vibhuti, Kashi Pragati, Kashi	retain one seedling at 30 cm Intercropping of pulses with maize *In-situ* soil moisture conservation measures Early sowing of winter vegetables/field crops SRI/ ICM method of paddy cultivation (spacing 20x20 cm) Frequent intercultural operation for moiture conservation Crops should be mulched with green leaves Short duration crops (80-90 days) should be selected	

			Satdhari. **Brinjal**: Pusa Sheetal, Pusa Shyamal, Pusa Bhairav, Kashi Taru, PPL, PPR. **French bean**: Arka Komal, Arka Sunidhi, VL Lata Bean 17, VL Lata Bean 12. **Bottle Gourd:** Pusa Naveen, Pusa Summer Prolific Long. **Turmeric :** Lakadong, Megha Turmeric-1 **Ginger :** Nadia, Bhaisey, **Citrus** : Sikkim Mandarin **Large Cardamom** : Ramsey, Sawaney, Golsey, Varlangey	Soil acidity management	

Condition	**Major Farming situation**	**Normal Crop / Cropping system[b]**	**Suggested Contingency measures**		
Early season drought (Normal onset)			**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.	Rainfed	Maize based cropping system 1. Maize - rice/soybean - potato/vegetables/ wheat/mustard 2. Maize - Maize + French Beans (Local)/vegetables 3. Ginger + Maize 4. Maize - Finger Millet/ Rice Bean (Relay) + vegetable 5.Rice - Wheat/Barley/ Mustard/Vegetables	1. Thinning and gap filling the existing crop. 2.Re sowing. **Maize :** C-1415, C-1837 **Soyabean :** PK-1042 **Paddy :** PD-10, ULD-61	Furrow application of FYM Mulching with green/dry leaves & grasses Wider spacing (60 X 30) cm for maize, followed with intercropping *In-situ* soil moisture conservation measures	Supply of seeds through ICAR, NSC, ATMA, SAUs

		6.Perennials crops –Mandarin orange, other fruits, L. cardamom 7.Ginger 8.Turmeric		Frequent intercultural operation for moiture conservation Cover cropping with main crops should be followed	

Condition	**Major Farming situation**	**Normal Crop / Cropping system[b]**	**Suggested Contingency measures**		
Mid season drought (Long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)			**Crop management**	**Soil nutrient & moisture conservation measues[d]**	**Remarks on Implementation[e]**
At vegetative stage	Rainfed	Maize based cropping system 1. Maize - rice/soybean - potato/vegetables/ wheat/mustard 2. Maize - Maize + French Beans (Local)/vegetables 3. Ginger + Maize 4. Maize - Finger Millet/ Rice Bean (Relay) + vegetable 5.Rice - Wheat/Barley/ Mustard/Vegetables 6.Perennials crops –Mandarin orange, other fruits, L. cardamom 7.Ginger 8.Turmeric	Thinning to maintain optimum plant population. Life saving irrigation by using water of Dug-out ponds and rain water harvesting structure. Weeding and weed mulching.	Furrow application of FYM Mulching with green/dry leaves & grasses Wider spacing (60 X 30) cm for maize, followed with intercropping *In-situ* soil moisture conservation measures Frequent intercultural operation for moiture conservation	Supply of seeds through ICAR, NSC, ATMA, SAUs

Condition	Major Farming situation	Normal Crop / Cropping system[b]	Suggested Contingency measures		
Mid season drought (long dry spell)			**Crop management**	**Soil nutrient & moisture conservation measues[d]**	**Remarks on Implementation[e]**
At flowering/ fruiting stage	Rainfed	Maize based cropping system 1. Maize - rice/soybean - potato/vegetables/ wheat/mustard 2. Maize - Maize + French Beans (Local)/vegetables 3. Ginger + Maize 4. Maize - Finger Millet/ Rice Bean (Relay) + vegetable 5.Rice - Wheat/Barley/ Mustard/Vegetables 6.Perennials crops –Mandarin orange, other fruits, L. cardamom 7.Ginger 8.Turmeric	Thinning to maintain optimum plant population. Life saving irrigation by using water of Dug-out ponds and rain water harvesting structure. Weeding and weed mulching.	Furrow application of FYM Mulching with green/dry leaves & grasses Wider spacing (60 X 30) cm for maize *In-situ* soil moisture conservation measures Frequent intercultural operation for moiture conservation	Supply of seeds through ICAR, NSC, ATMA, SAUs

Condition	Major Farming situation	Normal Crop / Cropping system[b]	Suggested Contingency measures		
			Crop management	**Rabi Crop planning[d]**	**Remarks on Implementation[e]**
Terminal drought (Early withdrawal of monsoon)	Rainfed	Maize based cropping system 1. Maize - rice/soybean - potato/vegetables/ wheat/mustard 2. Maize - Maize + French Beans (Local)/vegetables 3. Ginger + Maize 4. Maize - Finger Millet/ Rice	Wider spacing (60 X 30) cm for maize *In-situ* soil moisture conservation measures Mulching with green/dry leaves & grasses Furrow application of FYM	Mustard var. B-9 (drought tolerant). Long duration Wheat variety. Incorporation of French Bean and Rajma which can be harvested at	Supply of seeds through ICAR, NSC, ATMA, SAUs

		Bean (Relay) + vegetable 5.Rice - Wheat/Barley/ Mustard/Vegetables 6.Perennials crops –Mandarin orange, other fruits, L. cardamom 7.Ginger 8.Turmeric	Frequent intercultural operation for moiture conservation	physiological maturity if needed.	

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	Not applicable				
Limited release of water in canals due to low rainfall	Not applicable				
Non release of water in canals under delayed onset of monsoon in catchment	Not applicable				
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Not applicable				
Insufficient groundwater recharge due to low rainfall	Not applicable				

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	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**

water logging				
Field crops				
Maize	Ridge planting, proper drainage	Provide drainage	Drain out, Harvesting at physiological maturity stage	Dry and store in air tight condition
Rice	Drain out excessive water	Drain out excessive water		
Wheat				
Finger-Millet				
Urd	Ridge planting, proper drainage	Provide drainage		
Rapeseed & Mustard				
Soybean				
Horticultural crops				
Mandarin	Proper drainage	Application of PGRs, (Auxin) and boron to enhance fruit set	Drain out and harvest the crop at maturity.	
Other fruits				
Rabi vegetables	Ridge planting, proper drainage	Provide drainage	Drain out and harvest the crop at optimum stage.	Store at optimum temperature and packed properly
Kharif vegetables				
Off season vegetables				
Cardamom	Provide drainage	Optimize population of pollinator	Drain out and harvest the crop at physiological maturity stage.	Dry and store in air tight condition
Ginger	Ridge planting, proper drainage	Provide drainage		Store at optimum temperature and packed properly
Turmeric				
Other spices				
Heavy rainfall with high speed winds in a short span[2]	**Vegetative stage[k]**	**Flowering stage[l]**	**Crop maturity stage[m]**	**Post harvest[n]**
Agronomical crops				
Maize	Ridge planting, proper drainage	Provide drainage	Drain out, Harvesting at physiological maturity stage	Dry and store in air tight condition
Rice	Drain out excessive water	Drain out excessive water		

Wheat Finger-Millet				
Urd Rapeseed & Mustard Soybean	Ridge planting, proper drainage	Provide drainage	Drain out, Harvesting at physiological maturity stage	Dry and store in air tight condition
Horticultural crops				
Mandarin Other fruits	Provide drainage	Application of PGRs, (Auxin) and boron to enhance fruit set	Drain out and harvest the crop at maturity.	
Rabi vegetables *Kharif* vegetables Off season vegetables	Ridge planting, proper drainage	Proper drainage	Drain out and harvest the crop at optimum stage.	Store at optimum temperature and packed properly
Cardamom	Provide drainage	Optimize population of pollinator	Drain out and harvest the crop at physiological maturity stage.	Dry and store in air tight condition
Ginger Turmeric Other spices	Ridge planting, proper drainage	Provide drainage		Store at optimum temperature and packed properly
Outbreak of pests and diseases due to unseasonal rains	**Vegetative stage[k]**	**Flowering stage[l]**	**Crop maturity stage[m]**	**Post harvest[n]**
Agronomical crops				
Maize Rice Wheat Finger-Millet Urd Rapeseed & Mustard Soybean	Disease resistant varieties, Need based plant protection IPDM	Need based plant protection IPDM		Safe storage against storage pest and diseases

Horticultural crops				
Mandarin Other fruits	Need based plant protection IPDM	Need based plant protection IPDM		Safe storage against storage pest and diseases
Rabi vegetables *Kharif* vegetables Off season vegetables Cardamom Ginger Turmeric Other spices	• Disease resistant varieties, • Need based plant protection IPDM, • Crop rotation	• Bio control agents, • Need based plant protection IPDM	Harvest the crops at maturity stage	Safe storage against storage pest and diseases

2.3 Floods- Not applicable

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]				
Sea water intrusion[3]				

2.4 Extreme events: Cold wave/mild frost/ occational hailstorm

Extreme event type	**Suggested contingency measure[r]**			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Heat Wave[p]				
Cold wave[q]				
Agronomical crops				

Maize Rice Wheat Finger-Millet Urd Rapeseed & Mustard Soybean	Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised.	• Planting of trees around field to act as wind break and replanting of damaged plants • Application of K to enhance tenacity in plants • Staking of plants	Planting of trees around field to act as wind break	Early harvest the crops
Horticultural crops				
Mandarin Other fruits *Rabi* vegetables *Kharif* vegetables Off season vegetables Cardamom Ginger Turmeric Other spices	Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised.	• Planting of trees around field to act as wind break and replanting of damaged plants, • Application of K to enhance tenacity in plants, • Staking of plants	Planting of trees around field to act as wind break	Early harvest the crops
Frost				
Agronomical crops				
Maize Rice Wheat Finger-Millet Urd Rapeseed & Mustard Soybean	• Frost resistant varieties, • Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised.			
Horticultural crops				
Mandarin Other fruits	Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised.			

Rabi vegetables *Kharif* vegetables Off season vegetables Cardamom Ginger Turmeric Other spices	• Frost resistant varieties, • Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised.	• Planting of trees around field to act as wind break and replanting of damaged plants, • Application of K to enhance tenacity in plants, • Staking of plants	Planting of trees around field to act as wind break	Early harvest the crops
Hailstorm				
Agronomical crops				
Maize Rice Wheat Finger-Millet Urd Rapeseed & Mustard Soybean	Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised.	• Planting of trees around field to act as wind break and replanting of damaged plants, • Application of K to enhance tenacity in plants, • Staking of plants	Planting of trees around field to act as wind break	Early harvest the crops

Horticultural crops				
Mandarin Other fruits *Rabi* vegetables *Kharif* vegetables Off season vegetables Cardamom Ginger Turmeric Other spices	Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised.	• Planting of trees around field to act as wind breaker and replanting of damaged plants, • Application of K to enhance tenacity in plants, • Staking of plants	Planting of trees around field to act as wind breaker	Early harvest the crops
Cyclone	Not applicable			

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

Drought	**Suggested contingency measures**		
	Before the event[s]	**During the event**	**After the event**
Feed and fodder availability	• Insurance of livestock. • Perennial fodder cultivation on sloppy area, terrace and waste land. • Hay and silage making by using excess fodder • Establishment of fodder banks. • Cultivation of tree fodders. • Cultivation of fodder in irrigated area	• Fodder trees for livestock • Utilizing fodder bank reserves • Hay and silage (preserved in Silo) • Concentrate feeding with locally available feed ingredients. • Transporting excess fodder from adjoining district	• Availing insurance • Culling of unproductive livestock
Drinking water	• Rain water harvesting • Store water in the tank for drinking purpose	• Using store water for drinking purpose	
Health and disease management	Veterinary preparedness with medicines and vaccines	Conducting animal health and vaccination camp at the affected area	Culling diseased and unproductive animals
Floods			
Feed and fodder availability			
Drinking water			
Health and disease management			
Cyclone			
Feed and fodder availability			
Drinking water			

Health and disease management			
Cold wave			
Shelter/environment management	• Construction of animal house preferably with wooden plank flooring with the provision of a well-protected half wall surrounding the house to protect the livestock from direct effect of cold. • While selecting site for construction of shed a site that allows good wind control is preferable. • Construction of creep area with heat source to prevent pre-weaning mortality of piglets	• Renovation of existing animal house. • Always keep floor of the house clean and dry. • During night time use gunny bag for covering the uncovered portion of the side wall • Providing creep area with heat source (100W bulb)	
Health and disease management	Veterinary preparedness with medicines and vaccines	• Balanced feeding. • Supplementation of vitamin and mineral mixtures. • Vaccination and animal health camp.	Culling of affected animals

[s] based on forewarning wherever available

2.5.2 Poultry

Drought	**Suggested contingency measures**			**Convergence/linkages with ongoing programs, if any**
	Before the event[a]	**During the event**	**After the event**	
Shortage of feed ingredients	• Insurance. • Establishment of feed serve banks	• Utilizing locally available feed ingredients. • Utilizing feed from feed serve	• Availing insurance • Strengthening feed serve banks	

		banks		
Drinking water	Rain water harvesting	Using preserved water		
Health and disease management	Veterinary preparedness with medicines and vaccines	• Mass vaccination • Vitamin supplementation	Culling affected birds	
Floods				
Shortage of feed ingredients				
Drinking water				
Health and disease management				
Cyclone				
Shortage of feed ingredients				
Drinking water				
Health and disease management				
Cold wave				
Shelter/environment management	• Create scientific brooding facilities for chicks • Keep in stock, dried locally available litter materials like saw dust, paddy husk, etc	• Improved brooding practices • Maintain brooding temperature through continuous electricity supply • For emergency Sigiri/ Bukhari can be used	Disposal of sick birds	
Health and disease management	Veterinary preparedness with medicines and	• Urgent vaccination and quarantine of		

	vaccines	affected birds • Supplementation of vitamins		

[a] based on forewarning wherever available

2.5.3 Fisheries/ Aquaculture: - Not applicable-

	Suggested contingency measures		
	Before the event[a]	**During the event**	**After the event**
1) Drought	**- Not applicable-**		
2) Floods			
A. Capture			
B. Aquaculture			
3. Cyclone / Tsunami			
4. Heat wave and cold wave			