

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 to Temperate 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	
			27°9' to 27°25' N	88°27' to 88°56' E	300-5000 mts above MSL	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTS		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	1 st week of June	4 th week of September	
	NE Monsoon (Oct-Dec)	306	25	3 rd week of October	1 st week of December	
	Winter (Jan-March)	121	15	1 st week of January	4 th week of March	
	Summer (Apr-May)	559	35	2 nd week of April	4 th 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)						
		<i>Kharif</i>			<i>Rabi</i>			Summer
		Irrigated	Rainfed	Total	Irrigated	Rainfed	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	2 nd week of February to 4 th week of April	4 th week of June to 4 th 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			

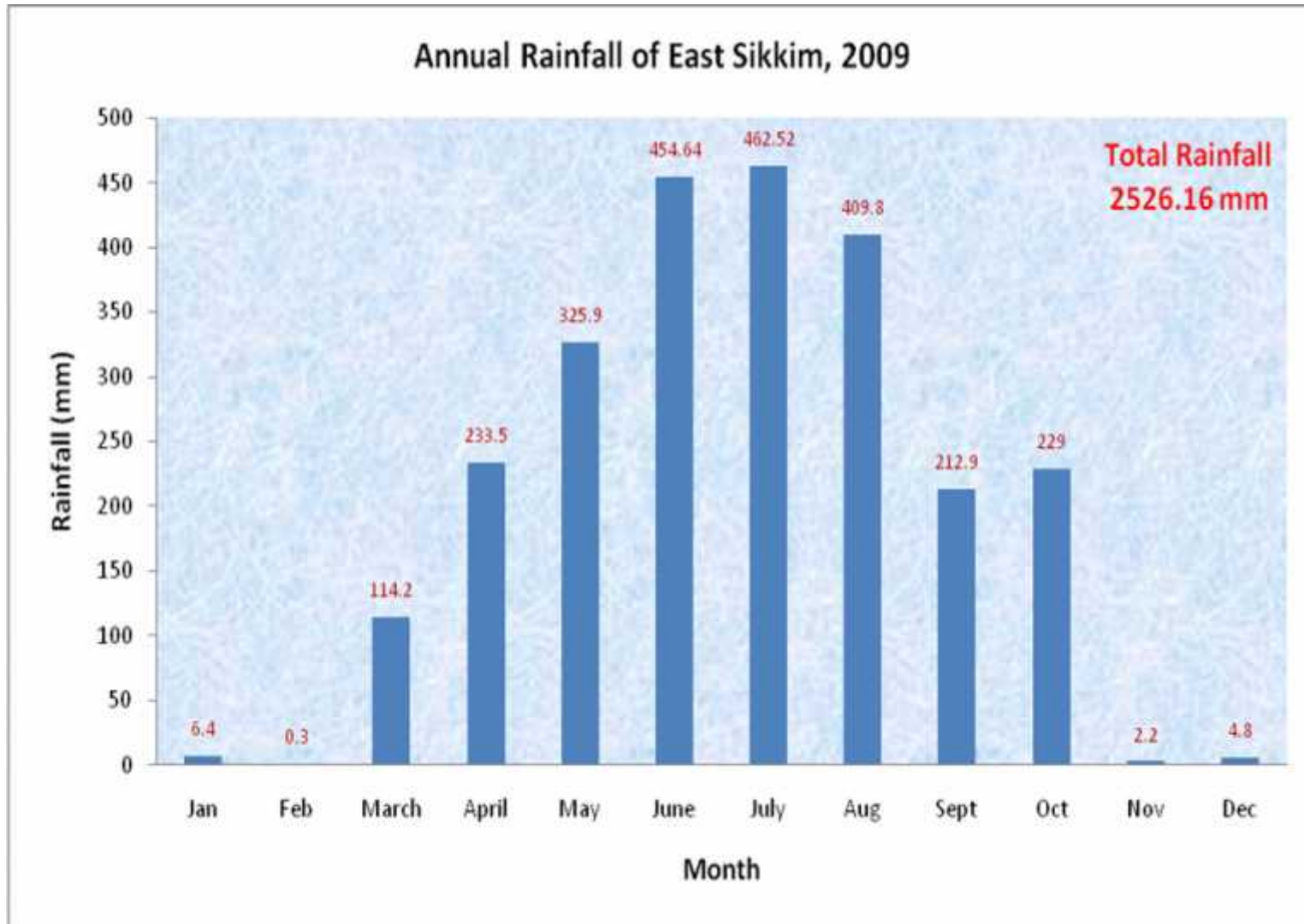
1.14	Include Digital maps of the district for	Location map of district within State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure II	Enclosed: Yes
		Soil map as Annexure III	Enclosed: Yes

Annexure I

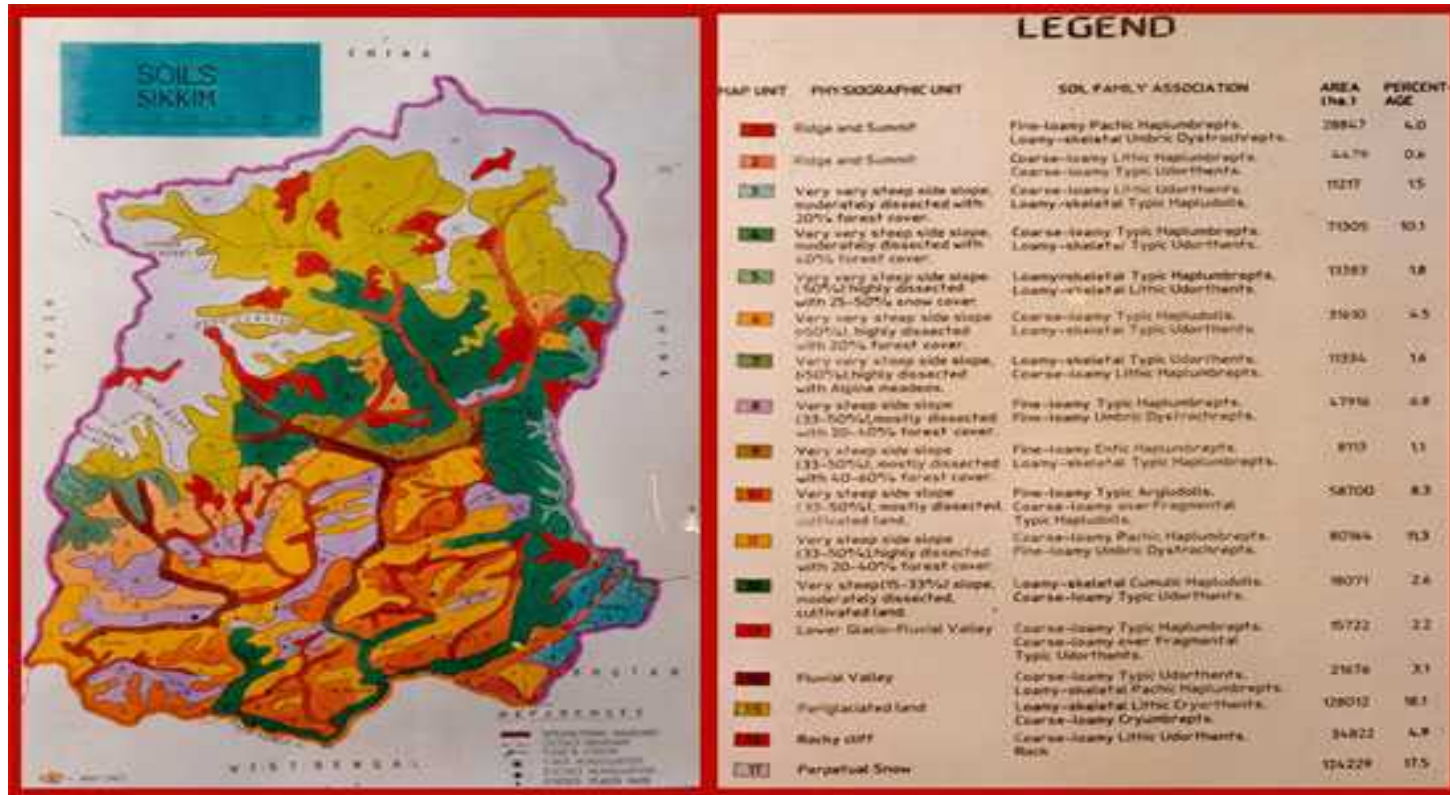


 **KVK ICAR**

Annexure II



Annexure III



2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Delay by 2 weeks 3 rd 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 Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Change in crop / cropping system ^c including variety	Agronomic measures	Remarks on Implementation
Delay by 4 weeks 1 st 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.	
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Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset) Delay by 6 weeks 1 st 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 <i>In-situ</i> soil moisture conservation measures SRI/ ICM method of paddy cultivation (spacing 20x20 cm) Frequent intercultural operation for moisture conservation	Supply of seeds through ICAR, NSC, ATMA, SAUs

			<p>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, Bonville, 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</p>	<p>Crops should be mulched with green leaves</p> <p>Short duration crops (80-90 days) should be selected</p> <p>Soil acidity management</p>	
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Condition	Major Farming situation	Normal Crop / Cropping system ^b	Suggested Contingency measures		
			Change in crop / cropping system ^c including variety	Agronomic measures ^d	Remarks on Implementation ^e
Early season drought (delayed onset)					
Delay by 8 weeks 3rd Week of August	Rainfed	Maize based cropping system 1. Maize - rice/soybean - potato/vegetables/	<p>Agronomical crops</p> <p>Maize: HQPM-I, RCM 1- 1, RCM 1-2, RCM 1-3, Madhuri, Vivek Maize Hybrid 15, Vivek Hybrid 9, Vivek</p>	<p>Wider spacing (60 X 30) cm for maize</p> <p>Thinning to</p>	Supply of seeds through ICAR, NSC, ATMA, SAUs

		<p>wheat/mustard</p> <p>2. Maize - Maize + French Beans (Local)/vegetables</p> <p>3. Ginger + Maize</p> <p>4. Maize - Finger Millet/ Rice Bean (Relay) + vegetable</p> <p>5. Rice - Wheat/Barley/ Mustard/Vegetables</p> <p>6. Perennials crops –Mandarin orange, other fruits, L. cardamom</p> <p>7. Ginger</p> <p>8. Turmeric</p>	<p>Maize Hybrid 23, Vivek Sankul Makka 11.</p> <p>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.</p> <p>Millets: VL Mandua 324, VL Mandua 315, Indaf 5, 8,9; VL-101,149, Muskey,</p> <p>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.</p> <p>Horticultural crops</p> <p>Potato: Kufri Jyoti, K. Chandramukhi, Kufri Badshah</p> <p>Cabbage: Pusa Mukta, Green Ball, Bahar, Green Express, BC-76</p> <p>Cauliflower: Pusa Kartik Shanker, Suwashini, Girija, Barkha, Excel-16, Pusa Sukti, Dania Kalimpong.</p> <p>Knol-Khol : Pusa Virat, Winner,</p> <p>Tomato: Avinash, Anup, Romeo, All Rounder, Rockey, Rupali, Kashi Vishesh</p> <p>Broccoli: Everest, Aishwarya, Palam Samridhi, Pusa KTS-1, Puspa.</p> <p>Pea : Arkel, Arka Ajit, Vivek Matar 9, Vivek Matar 8, Bonvelle, Azad.</p> <p>Cowpea: Kashi Kanchan, Pusa Komal.</p> <p>Carrot: Pusa Asita, Pusa Pudhira.</p> <p>Okra: VL Bhindi 1, Kashi Mangali, Kashi Vibhuti, Kashi Pragati, Kashi</p>	<p>retain one seedling at 30 cm</p> <p>Intercropping of pulses with maize</p> <p><i>In-situ</i> soil moisture conservation measures</p> <p>Early sowing of winter vegetables/field crops</p> <p>SRI/ ICM method of paddy cultivation (spacing 20x20 cm)</p> <p>Frequent intercultural operation for moisture conservation</p> <p>Crops should be mulched with green leaves</p> <p>Short duration crops (80-90 days) should be selected</p>	
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			<p>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, Golsay, Varlangey</p>	Soil acidity management	
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Condition	Major Farming situation	Normal Crop / Cropping system ^b	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measues	Remarks on Implementation
<p>Early season drought (Normal onset)</p>					
<p>Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.</p>	Rainfed	<p>Maize based cropping system</p> <ol style="list-style-type: none"> 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 	<p>1. Thinning and gap filling the existing crop. 2. Re sowing. Maize : C-1415, C-1837 Soyabean : PK-1042 Paddy : PD-10, ULD-61</p>	<p>Furrow application of FYM</p> <p>Mulching with green/dry leaves & grasses</p> <p>Wider spacing (60 X 30) cm for maize, followed with intercropping</p> <p><i>In-situ</i> soil moisture conservation measures</p>	<p>Supply of seeds through ICAR, NSC, ATMA, SAUs</p>

		6.Perennials crops –Mandarin orange, other fruits, L. cardamom 7.Ginger 8.Turmeric		Frequent intercultural operation for moisture conservation Cover cropping with main crops should be followed	
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Condition	Major Farming situation	Normal Crop / Cropping system ^b	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures ^d	Remarks on Implementation ^e
Mid season drought (Long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)					
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 <i>In-situ</i> soil moisture conservation measures Frequent intercultural operation for moisture conservation	Supply of seeds through ICAR, NSC, ATMA, SAUs

Condition	Major Farming situation	Normal Crop / Cropping system ^b	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures ^d	Remarks on Implementation ^e
Mid season drought (long dry spell)					
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 <i>In-situ</i> soil moisture conservation measures Frequent intercultural operation for moisture 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 <i>In-situ</i> 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 moisture conservation	physiological maturity if needed.	
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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			
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Continuous high rainfall in a short span leading to				

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				
<i>Rabi</i> vegetables	Ridge planting, proper drainage	Provide drainage	Drain out and harvest the crop at optimum stage.	Store at optimum temperature and packed properly
<i>Kharif</i> 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		
Turmeric				
Other spices				
Heavy rainfall with high speed winds in a short span²	Vegetative stage^k	Flowering stage^l	Crop maturity stage^m	Post harvestⁿ
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	Ridge planting, proper drainage	Provide drainage	Drain out, Harvesting at physiological maturity stage	Dry and store in air tight condition
Rapeseed & Mustard				
Soybean				
Horticultural crops				
Mandarin	Provide drainage	Application of PGRs, (Auxin) and boron to enhance fruit set	Drain out and harvest the crop at maturity.	
Other fruits				
<i>Rabi</i> vegetables	Ridge planting, proper drainage	Proper drainage	Drain out and harvest the crop at optimum stage.	Store at optimum temperature and packed properly
<i>Kharif</i> 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				
Outbreak of pests and diseases due to unseasonal rains	Vegetative stage^k	Flowering stage^l	Crop maturity stage^m	Post harvestⁿ
Agronomical crops				
Maize	Disease resistant varieties, Need based plant protection IPDM	Need based plant protection IPDM		Safe storage against storage pest and diseases
Rice				
Wheat				
Finger-Millet				
Urd				
Rapeseed & Mustard				
Soybean				

Horticultural crops				
Mandarin	Need based plant protection IPDM	Need based plant protection IPDM		Safe storage against storage pest and diseases
Other fruits				
<i>Rabi</i> vegetables	<ul style="list-style-type: none"> • Disease resistant varieties, • Need based plant protection IPDM, • Crop rotation 	<ul style="list-style-type: none"> • Bio control agents, • Need based plant protection IPDM 	Harvest the crops at maturity stage	Safe storage against storage pest and diseases
<i>Kharif</i> vegetables				
Off season vegetables				
Cardamom				
Ginger				
Turmeric				
Other spices				

2.3 Floods- Not applicable

Condition	Suggested contingency measure ^o			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation ¹				
Continuous submergence for more than 2 days ²				
Sea water intrusion ³				

2.4 Extreme events: Cold wave/mild frost/ occasional 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	Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised.	<ul style="list-style-type: none"> 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
Rice				
Wheat				
Finger-Millet				
Urd				
Rapeseed & Mustard				
Soybean				
Horticultural crops				
Mandarin	Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised.	<ul style="list-style-type: none"> 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
Other fruits				
Rabi vegetables				
Khariif vegetables				
Off season vegetables				
Cardamom				
Ginger				
Turmeric				
Other spices				
Frost				
Agronomical crops				
Maize	<ul style="list-style-type: none"> Frost resistant varieties, Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised. 			
Rice				
Wheat				
Finger-Millet				
Urd				
Rapeseed & Mustard				
Soybean				
Horticultural crops				
Mandarin	Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised.			
Other fruits				

<i>Rabi</i> vegetables	<ul style="list-style-type: none"> • Frost resistant varieties, • Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised. 	<ul style="list-style-type: none"> • 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
<i>Kharif</i> vegetables				
Off season vegetables				
Cardamom				
Ginger				
Turmeric				
Other spices				
Hailstorm				
Agronomical crops				
Maize	Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised.	<ul style="list-style-type: none"> • 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
Rice				
Wheat				
Finger-Millet				
Urd				
Rapeseed & Mustard				
Soybean				

Horticultural crops				
Mandarin	Nursery should be raised inside well covered structure and about 50 percent more seedlings should be raised.	<ul style="list-style-type: none"> • 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
Other fruits				
<i>Rabi</i> vegetables				
<i>Kharif</i> vegetables				
Off season vegetables				
Cardamom				
Ginger				
Turmeric				
Other spices				
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	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Availing insurance • Culling of unproductive livestock
Drinking water	<ul style="list-style-type: none"> • Rain water harvesting • Store water in the tank for drinking purpose 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Insurance. • Establishment of feed serve banks 	<ul style="list-style-type: none"> • Utilizing locally available feed ingredients. • Utilizing feed from feed serve 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Create scientific brooding facilities for chicks • Keep in stock, dried locally available litter materials like saw dust, paddy husk, etc 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Urgent vaccination and quarantine of 		

	vaccines	affected birds • Supplementation of vitamins		
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^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			