State: KERALA

Agriculture Contingency Plan for District: KOLLAM

1.0 District Agriculture profile					
1.1	**Agro-Climatic/Ecological Zone**				
	Agro Ecological Sub Region (ICAR)	Western Ghats And Coastal Plain, Hot Humid Zone (19.2)			
	Agro-Climatic Region (Planning Commission)	West Coast Plains And Ghat Region (XII)			
	Agro Climatic Zone (NARP)	Southern zone			
	List all the districts or part thereof falling under the NARP Zone	Thiruvananthapuram, Kollam, Pathanamthitta			
	Geographic coordinates of district	Latitude	Longitude	Altitude	
		8° 54' 53.717" N	76° 37' 15.79" E	Sea level	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Regional Agricultural Research Station (Southern Zone), Vellayani			
	Mention the KVK located in the district	Krishi Vigyan Kendra. Sadanandapuram, Kottarakkara, Kollam, Kerala-*691 550*			
1.2	**Rainfall**	Normal RF(mm) 2007-08	Normal Rainy days (number)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep):	1395.3		Last week of May	
	NE Monsoon(Oct-Dec):	599.8			
	Winter (Jan- March)	265.9		-	-
	Summer (Apr-May)	258.4		-	-
	Annual	2494.8		-	-

1.3	**Land use pattern of the district** (latest statistics)	Geographical 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 (Lakh ha)	248788	81438	23568	958	115		228	4646	

1. 4	**Major Soils (common names like shallow red soils etc.,)**	**Area ('000 ha)**	**Percent (%) of total**
	Laterite soils	199082 ha	81.4
	Sandy soils	13907 ha	5.6
	Sandy loams	4233 ha	1.7
	Others	*27658 ha*	
	Problem soils	1730 ha	11.3
	Others (specify):		
1.5	**Agricultural land use**	Area ('000 ha)	Cropping intensity %
	Net sown area	128342 ha	133
	Area sown more than once	42559 ha	
	Gross cropped area	170901 ha	

1.6	**Irrigation**	Area ('000 ha) 2007-08			
	Net irrigated area	4477 ha			
	Gross irrigated area	5207 ha			
	Rainfed area	110657 ha			
	Sources of Irrigation	Number	Area ('000 ha)		Percentage of total irrigated area
			Govt.	Pvt.	
	Canals		974	255	
	Tanks		23	356	
	Open wells		4	1983	
	Bore wells		4		
	Lift irrigation				

	Micro-irrigation		26		
	Other sources				
	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 of district		
	Over exploited	3 blocks	7.45		
	Critical	-	-		
	Semi- critical	2 blocks	12.47		
	Safe	8 blocks	80.08		
	Wastewater availability and use				
	Ground water quality				
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%					

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

1.7	**Major Field Crops cultivated**	**Area ('000 ha)**		**2007-08**			
		Kharif		***Rabi***		**Summer**	**Total**
		Irrigated	***Rainfed***	***Irrigated***	***Rainfed***		
	Rice	**-**	1046	1260	1173	60	3538

	Horticulture crops - Fruits	**Total area (ha)**
	Banana and Plantain	6368
	Jack	6595
	Mango	5084
	Horticultural crops - Vegetables	**Total area (ha)**
	Amaranthus	1580
	Bittergourd	107
	Green chillies	190
	Medicinal and Aromatic crops	**Total area**
		79

	Plantation crops	**Total area (ha)**
	Cashew	3274
	Coconut	58575
	Tea	1250
	Rubber	35760
	Pepper	8988
	Fodder crops	**Total area**
	Total fodder crop area	
	Grazing land	
	Sericulture etc	
	Others (Specify)	110657

1.8	**Livestock**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Non descriptive Cattle (local low yielding)	1040	7018	8058
	Crossbred cattle	10762	136257	147019
	Non descriptive Buffaloes (local low yielding)			2821
	Graded Buffaloes			NA
	Goat			108965
	Sheep			90
	Others (Camel, Pig, Yak etc.) pig/rabbit			986
	Commercial dairy farms (Number)			
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
	Commercial – Improved		324454	
	Backyard- Desi		31387	

1.10 **Fisheries** (Data source: Chief Planning Officer)

A. Capture

i) Marine (Data Source: Fisheries Department)	**No. of fishermen**	**Boats**		**Nets**		**Storage facilities (Ice plants etc.)**
		Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	

	ii) Inland (Data Source: Fisheries Department)	**No. Farmer owned ponds**		**No. of Reservoirs**		**No. of village tanks**	
	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						

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**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks June	Laterite soils	**Rice Based Cropping system** - Rice as major crop	No Change, prefer short duration varieties Suggested sequence- Rice- Rice, Rice- Rice- Vegetables, Rice- Pulses	Direct seeding of medium/short duration photo insensitive varieties instead of photo sensitive long duration varieties Foliar spray of 2% DAP + 1% KCl (MOP) during critical stages of flowering and grain formation	No Scheme required can be met from the funds allotted for the district

		Coconut based cropping system- Coconut as major crop	Coconut+Vegetables, Coconut+Pepper, Coconut+Banana+ Vegetables, Coconut + Tapioca	Micro irrigation method Manuring from 5th year onwards, apply 50 kg of FYM or compost or green manure. 1.3 kg urea (560 g N), 2.0 kg super phosphate (320 g P_2O_5) and 2.0 kg muriate of potash (1200 g K2O) in two equal splits during June – July and December – January 3. Mix 50 g of *Azospirillum*, 50 g of Phosphobacteria (or) 100 g *Azophos* and 50 g of VAM in sufficient quantity of compost or FYM and apply near feeding roots once in 6 months/ palm starting from planting	Schemes for micro irrigation from SHM, RKVY
		Intercropping	Banana+ Amaranthus, Banana +Bhendi, Banana + tubers	1.Irrigation basins 2.Mulching with coconut husks/leaves	Schemes from SHM and RKVY for implementing micro irrigation
		Vegetables- Major vegetables such as Bittergourd, Snake gourd, Amaranthus, Bhendi, Cowpea	No Change	Irrigation in early stages, Drip and sprinkler irrigation	
		Spices – Pepper	No Change	1.Mulching and protection of young plants using coconut fronds 2.Use of biofertilizers *viz.,* Azospirillum and Pseudomonas	Funding from Spices board , NHM
		Homesteads Banana Coconut Vegetables Tubers	No Change	**1.** Planting with onset of monsoons **2.** Irrigation **3.** Organic manure application**,** Mulching the soil with dried leaves **4.** To coconut Mix 50 g of *Azospirillum*, 50 g of Phosphobacteria (or) 100 g *Azophos* and 50 g of VAM in	Schemes under ATMA

				sufficient quantity of compost or FYM and apply near feeding roots once in 6 months / palm starting from planting	
		Fruit crops – Mango , Jack, Cashew	No Change	Life saving irrigation, Mulching, pruning	Schemes from NREGS , RKVY, SHM
		Plantation crops- Rubber	No Change	Life saving irrigation, White washing the basins, silt pits, cover crops	
	Sandy soils	Rice	Rice- Rice-oil seeds, Rice- Rice- Vegetables, Rice- Vegetables- Fallow	1.Use short / Medium duration duration varieties 2.Mechanised sowing 3. Timely manuring 4. Split application of fertilizers	Schemes from RKVY (Paddy Mission)
		Coconut	No Change	1.Mulching with coconut husks/leaves/coir pith 2.Burial of coconut husk or coir pith Manuring from 5th year onwards, apply 50 kg of FYM or compost or green manure. 1.3 kg urea (560 g N), 2.0 kg super phosphate (320 g P_2O_5) and 2.0 kg muriate of potash (1200 g K_2O) in two equal splits during June – July and December – January 4.Pitcher irrigation	Projects from SHM & NHM
		Banana	Delayed planting with the onset of monsoon	Organic mulching, Micro irrigation	Schemes from SHM and NHM
		Upland rice	No Change	Irrigation and weed management	
		Spices- pepper	No Change	Mulching, Micro irrigation techniques,	Schemes from Central Govt. ICAR
		Rubber	No Change	Mulching, organic manuring, silt pits, split application of fertilizers	

		Vegetables	Delayed planting	Life saving irrigation, Drip and sprinkler irrigation	Schemes from SHM and NHM
	Sandy Loam soils	Rice	Suggested sequence- Rice- Rice, Rice- Rice- Vegetables, Rice- Vegetables- Fallow	Direct sowing of medium and short duration varieties, Spraying 3% Kaolin spray at critical stages of moisture stress , Mulching, Use of Biofertilizers, Irrigate after the disappearance of water, Split application of fertilizers	
		Banana	Banana+ Amaranthus, Banana + Bhendi, Banana+ bush cowpea	Organic manuring, micro irrigation, Husk burial, Less exploitation of ground water	Department of Agriculture
		Coconut	Coconut+ Vegetables, Coconut+ Pepper, Coconut + Banana+ vegetables	Husk burial, Pitcher irrigation for young plants, Mulching, Proper manuring	Financial support from CDB and SHM
		Vegetables	No Change	Use of vermicompost and coir pith compost as a source of nutrients, Mulching basins	ATMA
		Pepper	No Change	Organic manuring, Mulching, Shade to young plants	Schemes from the Central Govt.
		Cashew		Organic mulching, pruning	
		Rubber	No Change	White washing the basal portion of trunk/main stem and Growing of cover crops.	Schemes from the central Govt.
	Problem soils	Rubber	No Change	Give life saving irrigation, White washing the basins,	
		Other tree crops	No Change	Pruning and mulching	

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4weeks July	Laterite soil	**Rice Based Cropping system** - Rice as major crop	No Change prefer short duration varieties Suggested sequence- Rice- Rice, Rice- Rice- Vegetables	Direct seeding of short duration photoinsensitive varieties instead of photo sensitive long duration varieties, In transplanting areas more number of	No Scheme required can be met from the funds allotted for the district

				seedlings/ hill, closer spacing Foliar spray of 2% DAP + 1% KCl (MOP) during critical stages of flowering and grain formation, 50 % more of recommended K 3% Kaolin spray at critical stages of moisture stress	
		Coconut based cropping system- 1.Coconut as major crop	Coconut +Vegetables, Coconut+ Pepper, Coconut+ Banana-Vegetables/tubers	Pitcher irrigation method Mulching and husk burial	Schemes for microirrigation from SHM, RKVY
		Intercrop, Banana	Banana + Vegetables	1.Mulching with coconut husks/leaves/coir pith 2.Drip irrigation 3.Manuring using organic manures	Schemes from SHM or RKVY for implementing micro irrigation
		Vegetables- Major vegetables such as Bittergourd, Snake gourd, Amaranthus, Bhindi, Cowpea	Delayed sowing with the onset of monsoons	Use short duration varieties Life saving irrigation, Drip irrigation in pandal crops, mulching, Pseudomonas application	ATMA and SHM
		Spices – Pepper	No Change	1. Irrigation 2.Mulching and protection of young plants 3.Use of biofertilizers *viz.,* Azospirillum or phosphobacteria @ 10 packets / ha along with 25 kg of soil or FYM and use Trichoderma	Funding from Spices board , NHM
		Homestead- Tubers – Tapioca, yams and	No Change	1. Irrigation	Schemes from NHM and SHM

		amorphophallus		2.Mulching and protection of young plants 3.Use of biofertilizers *viz.,* Azospirillum or phosphobacteria @ 10 packets / ha along with 25 kg of soil or FYM and use Trichoderma	
		2. Fruit crops – Mango , Jack, Cashew	No Change	Life saving irrigation, Mulching and pruning	Schemes from RKVY, SHM
		3. Plantation crops- Rubber	No Change	Life saving irrigation, White washing the basins	
	Sandy soils (Low lands)	Rice	Suggested sequence- Rice- Rice, Rice- Vegetables- Fallow. Rice- Rice- Vegetables, in areas where irrigation is assured during summer	1.Direct sowing of short / Medium duration varieties 2.Avoid overcrowding / mantaining optimum population/ 3. Irrigate after the disappearance of standing water	Schemes from RKVY (Paddy Mission)
		Coconut	No Change	Delay the application on nutritional inputs Drip irrigation, Organic manuring, mulching, husk burial, growing of GM Crops in the basins	Projects from SHM & NHM
		Banana	No Change Delayed planting with the onset of monsoon	Organic mulching, Micro irrigation, Amaranthus sowing in basins, Tissue culture plantains for uniform bunch emergence	Schemes from SHM and NHM
		Spices- pepper	No Change	Mulching, Micro irrigation techniques	Schemes from Central Govt. ICAR
		Rubber	No Change	Mulching, organic manuring,rain pits, split application of fertilizers	Schemes from Central Govt.
		Vegetables	Delayed planting	Short duration varieties,	Schemes from SHM

				irrigation if possible, Drip irrigation Protected cultivation.	and NHM
	Sandy Loam soils	Rice	Suggested sequence- Rice- Rice, Rice- Vegetables	Direct sowing of short duration, Use of drought tolerant varieties , Zero tillage or minimal tillage Spraying 3% Kaoline spray at critical stages of moisture stress , Use of Biofertilizers, Irrigate after the disappearance of water	Scheme from RKVY (Paddy Mission)
		Banana	Sole crop of banana	Organic manuring, micro irrigation, Husks for mulching, Timely application of fertilizers	
		Coconut	Coconut+ Vegetables, Coconut+Pepper, Coconut+Banana + Vegetables	Husk burial, Pitcher irrigation for young plants, Mulching	Scheme from SHM and CDB
		Vegetables	No Change except for the delayed planting	Irrigation, mulching and emphasis on organic manure application	
		Pepper	No Change	Organic manuring , Mulching, Providing shade to young plants , Spraying of anti transpirants such as Kaolin	Schemes from Central Govt., SHM
		Cashew		Mulching, Organic manuring, pruning to prevent evaporation loss	Directorate of cashew
		Rubber	No Change	White washing the basins and Growing of cover crops.	Scheme from Central Govt.
	Problem soils	Rubber	No Change	Give life saving irrigation, Cover cropping, liming	
		Other tree crops	No Change	Mulching, organic manuring, Pruning for better flushing	Schemes from SHM

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 6 weeks	Laterite soils	Not Applicable			
	Sandy soils				
	Sandy Loam soils (Lowlands)				
	Problem soils				

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 8 weeks August	Laterite soil	Not Applicable			
	Sandy Loam				
	Problem soils				

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.	Laterite soils	Rice	For rice – Life saving irrigation after the disappearance of irrigation water, Higher seed rate, Gap filling For Vegetables drip irrigation systems,	1. Fertigation of fertilizers in basins 2. Spraying of anti transpirant in rice 3. Application of N & K fertilizer	Schemes from RKVY
		Banana			
		Coconut			
		Vegetables			
		Pepper			
		Cashew			
		Rubber			

	Sandy clay loam soils (Lowlands)	Rice Banana Coconut Vegetables Pepper Cashew Rubber	For rice – Life saving irrigation after the disappearance of irrigation water For Vegetables drip or sprinkler irrigation systems	1. Apply bulky organic manures, Split application of N & K fertilizer 2. Spraying of anti transpirants in rice Foliar spray of 2% calcium nitrate for membrane integrity Foliar spray of 2% DAP + 1% KCl (MOP)	Schemes from RKVY

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.	Laterite soils	Rice Banana Coconut Vegetables Pepper Cashew	For rice – Life saving irrigation after the disappearance of irrigation water, Higher seed rate, Gap filling For Vegetables drip irrigation systems,	1. Fertigation of fertilizers in basins 2. Spraying of anti transpirants in rice 3. Application of N & K fertilizer	Schemes from RKVY
		Rubber			
	Sandy clay loam soils (Lowlands)	Rice Banana Coconut Vegetables Pepper Cashew Rubber	For rice – Life saving irrigation after the disappearance of irrigation water For Vegetables drip or sprinkler irrigation systems	1.Apply bulky organic manures , Split application of N & K fertilizer 2. Spraying of anti transpirants in rice 3. Foliar spray of 2% calcium nitrate for membrane integrity 4. Foliar spray of 2% DAP + 1% KCl (MOP)	Schemes from RKVY

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	Laterite soils	Rice	For rice weed population should be arrested, Seed hardening to tackle the intermittent drought. Spraying of anti transpirant like Kaolin	Split application of N & K fertilizers, need based irrigation, Use of biofertilizers in Rice Conservation of Rain water in rain pits in case of garden land, Improvement of sub surface drainage system.	
		Banana			
		Coconut			
		Vegetables			
		Pepper			
		Cashew			
	Sandy soils	Rice	Improve the Bulk density of the soil by organic manure addition, thereby water holding capacity. (Soil compaction techniques in paddy fields) For crops other than rice, mulching, intercropping, pitcher irrigation techniques are to be followed. Sprinkler and Drip irrigation can be adopted for vegetables	Rain water harvesting and conservation, Mulching and organic manure addition.	Project from SHM and NHM For micro irrigation
		Banana			
		Coconut			
		Vegetables			
		Pepper			
		Rubber			
		Cashew			
	Sandy loam	Rice			
		Banana			
		Coconut			
		Vegetables			
		Pepper			
		Rubber			
		Cashew			
	Problem soils	Rubber	Organic manure addition, Spraying anti transparent	Cover crops such as Calapagonium can be grown	
		Vegetables			

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	Laterite soil Sandy Loam (Lowlands) Sandy soils	Rice Banana Coconut Vegetables Pepper Rubber Cashew	Improve the Bulk density of the soil by organic manure addition, thereby water holding capacity. (Soil compaction techniques in paddy fields) For crops other than rice, mulching, intercropping, pitcher irrigation techniques are to be followed.	Irrigate after the disappearance of the ponded water in the case of rice. For other crops addition of organic manure, Mulching, Husk burial, micro irrigation systems, rain water harvesting	Schemes from NREGS, SHM and RKVY
	Problem soils	Rubber	White washing the basins	Cover cropping and mulching	
		Vegetables	Life irrigation, Spraying of antievaporants	Split application of	

Condition			Suggested Contingency measures		
Terminal drought	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Rabi Crop planning**	**Remarks on Implementation**
	Laterite soil Sandy Loam (Lowlands) Sandy soils	Rice Banana Coconut Vegetables Pepper Rubber Cashew	Suppress weed growth, Spraying 3% KNO3 or 3% solution of Urea and MOP in 3:2 proportion at boot leaf stage if root damage already occurred. For other crops routine draught management aspects are to be followed	Use of short duration varieties, Delayed sowing. Use of Draught tolerant varieties, Harvesting at physiological maturity, termination of irrigation before two weeks of harvest	Breeding programmes for SD varieties
	Problem soils	Rubber	White washing the basins	Mulching and cover cropping	
		Vegetables	Life saving irrigation	Organic manure addition	

2.1.2 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	Laterite Sandy clay loam Sandy soils	**1.Rice Based Cropping system** - Rice as major crop **11.Vegetables**- Major vegetables such as Bittergourd, Snake gourd, Amaranthus, Bhindi, Cowpea	Rice(SD) - Rice, Rice- Rice-Vegetables,- Fallow Major vegetables such as Bittergourd, Snake gourd, Amaranthus, Bhindi, Cowpea	Mulching. Organic manure addition, Life giving irrigation from other sources Life saving irrigation, Delayed planting, Micro irrigation methods from the available sources	Paddy mission (RKVY) Project on Microirrigation systems

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	Laterite Sandy clay loam Sandy soils	**Rice Based Cropping system** - Rice as major crop	Mono cropping of rice or Rice (SD) followed by Rice or Rice- Vegetables	Mulching. Organic manure addition, Strip cropping, Life giving irrigation from other sources, Rain water harvesting	Project from RKVY
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	Laterite Sandy clay loam Sandy soils	**Rice Based Cropping system** - Rice as major crop	Monocropping of rice	Prefer short duration varieties, Direct sowing,	Project from RKVY

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	Laterite Sandy clay loam Sandy soils	**Rice Based Cropping system** - Rice as major crop	Rice (SD) – Rice or Rice - Vegetables	Rain water harvesting, Desilting of tanks, Rain pits ,	NREGS

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	Laterite Sandy clay loam Sandy soils	**Rice Based Cropping system** - Rice as major crop	Rice (SD) – Rice or Rice - Vegetables	Artificial tanks using silpaulin, rain water pits,Check dams	NREGS/ RKVY

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

Condition	Suggested contingency measure			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Rice	Drainage	Drainage		
Coconut	Cover cropping			
Rubber	Silt pits, Contour cultivation			
Horticulture				
Heavy rainfall with high speed winds in a short span				
Banana	Rejuvenation of pandals	Strong propping, drainage, Soil and water		

		conservation methods		
Horticulture				
Outbreak of pests and diseases due to unseasonal rains				
	Immediate control measures to prevent rapid spread, Avoid overcrowding, Split application of fertilisers especially Nitrogen			
Horticulture				

Condition	**Suggested contingency measure**			
Outbreak of pests and diseases due to unseasonal rains	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Rice	Proper phyto sanitation, Proper monitoring and surveillance of pest & diseases, Proper drainage, Cultivation of tolerant/resistant varieties, Application of bio-control agents like *Pseudomonas,* Use of disease free seeds and seed treatment with bio control agents		Harvest the crop at physiological maturity.	Improve storage facility
Horticulture				
Pepper	Proper phytosanitation. Use disease free planting materials, Minimising shade which helps in preventing build up of the pest population in the field, Prune the runner shoots before the onset of monsoon. Application of bio-control agents.			
Banana	Proper phytosanitation. Use of pest and disease free suckers, proper drainage			
Arecanut	Collect and destroy all fallen and infected nuts. Provide drainage facilities. Prophylactic spray of 1% Bordeaux mixture with stickers once before the onset of south west monsoon followed by second and third applications at 40-45 days interval.			

2.3 Floods

Condition	**Suggested contingency measure**			
Transient water logging/ partial inundation	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Rice	Ensure drainage, crop insurance, clear all drainage channels			Sophisticated structure must be made available for artificial drying
Vegetables				
Banana				
Coconut				
Horticulture				
Continuous submergence for more than 2 days				
Rice	Use Vytilla variety that can utilized water logging			Koottumundakan system
Horticulture				
	Has to be with SD varieties	Give utmost importance to drainage		
Sea water intrusion				

1.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm /Cyclone- Until date district does not have reports on the incidence of the above.

Extreme event type	**Suggested contingency measure**			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Heat Wave				
Rice	**Until date district does not have reports on the incidence of the above**			
Horticulture				
Banana				
Coconut				
Pepper				
Cashew				

Vegetables				
Cold wave				
Horticulture				
Frost				
Horticulture				
Hailstorm				
Horticulture				
Cyclone				
Horticulture				

Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
Drought			
Availability of food and fodder	Concentrate feed, Hay and silage	Processing and storage of fodder , hay	Cultivating fodder crops
Availability of water	Ensure the availability of good quality water without contamination	Provide clean water in required quantity; Purifying methods	
Flood			
Availability of food and fodder	Concentrate feed, Hay and silage		
Availability of water	Ensure the availability of good quality water without contamination	Provide clean water in required quantity;	Purification and storage
Cyclone			
Feed and fodder availability	Ensure preservation and storage of fodder, straw , concentrate feed	Adequate feeding , ensure the quality of feed	Replanting of high yielding fodder slips.

Drinking water	Ensure availblity of drinking water	Prevention of endemic diseases	Vaccination and medication
Health and disease management	Vaccination	Aviod spared and over crowding	Vaccination against sporadic diseases
Heat wave and cold wave			
Shelter/environment management	Construction of better shelters	Prevent thermal stress	Proper bedding overcrowding etc
Health and disease management	Create awareness among farmers about adverse effect of bad weather	Vaccination and medication	Reduction in density to avoid spread

2.5.2 Poultry

	Suggested contingency measures			**Convergence/linkages with ongoing programs, if any**
	Before the event	**During the event**	**After the event**	
Drought				
Shortage of feed ingredients	Collection and preservation of feed	Feeding with nutritionally balanced feed	Storage and processing of fodder	
Drinking water	Provide pure drinking water		Construction of storage tank	
Health and disease management	Vaccination, provide stress free environment	Stock density should be low	Maintain proper number	
Floods				
Shortage of feed ingredients	Correct storage of feed stuffs to avoid fungal infestation,	Feeding with nutritionally balanced feed	Disinfection	
Drinking water	Avoid contamination of water	Provide clean drinking water round	Construction of storage tank	
Health and disease management	Vaccination medication	Aviod over		

		crowding		
Cyclone				
Shortage of feed ingredients	Supply of concentrate feed	Avoid feeding fungal infected feed, treatment if required	Disposal of damaged feed, testing of feed for quality	
Drinking water	Ensure availability of uncontaminated wayer		Disinfection of water bodies, provide adequate drainage	
Health and disease management	Avoid possibilities of disease outbreak,	Vaccination and medication	Proper sanitation	
Heat wave and cold wave				
Shelter/environment management	Maintenance of housing condition	Maintenance of over population	Proper bedding	
Health and disease management	Awareness programmes	Reduction of stock density	Proper vaccination	

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			
B. Aquaculture			

(i) Shallow water in ponds due to insufficient rains/inflow			
(ii) Impact of salt load build up in ponds / change in water quality			
2) Floods			
A. Capture			
Marine			
Inland			
(i) Average compensation paid due to loss of human life			
(ii) No. of boats / nets/damaged			
(iii) No.of houses damaged			
(iv) Loss of stock			
(v) Changes in water quality			
(vi) Health and diseases			
B. Aquaculture			
(i) Inundation with flood water			
(ii) Water continuation and changes in water quality			
(iii) Health and diseases			
(iv) Loss of stock and inputs (feed, chemicals etc)			
3. Cyclone / Tsunami			
A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives		Rs 5 lakh / person	

(ii) Avg. no. of boats / nets/damaged			
(iii) Avg. no. of houses damaged			
Inland			
B. Aquaculture			
(i) Overflow / flooding of ponds		Salination of pond systems affe4cting freshwater fish stock and fish kill	Assessment of loss and compensation. Loss of fish stock to be compensated by sedd msupply ands support ofor building stock
(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)			
4. Heat wave and cold wave			
A. Capture		Fish availability will be affected fish shoal can move to deeper waters. Tropical fish close to their upper tolerance limit so fish availability will be affected	Rehabilitation of the coastal fishers. Alternate livelihood enterprises.
Marine			
Inland		Rivers can go dry affecting fish gernplasm and stock will affect livejood of inland fishers	Rehabilitation of the fishers affected
B. Aquaculture		Perennial pond can become seasonal. Cropping intensity will be reduced. The productivity will be affected	Facilities for water storage. Deepening of ponds to store more water .Annual desilting should become necessary

(i) Changes in pond environment (water quality)	Develop and popularize temperature tolerant eurythermal species for culture systems. Develop water storage systems and water reservoirs to tide over adversity. Insurance cover against drought	Low DO. Warming of waters. Fish kill in summer. Breeding of fishes will be affected. Seed availability will be affected. Severe shortage for fish seeds possible	Supply of fish seeds from other places might become necessary. Can upset the inland fish production programme as fish spawning and seed production is affected. Compensationg clamity.
(ii) Health and Disease management		Disease outbreak especially parasitic diseases possible. DO decline and recurrent fish mortality.	Rehabilitation package. Fresh stocking support. Replacement with Healthy seeds