State: TAMIL NADU

Agriculture Contingency Plan for District: VILUPPURAM

1.0 District Agriculture profile				
1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Region / Sub Region (ICAR)	Eastern Ghat, hot semi arid ecosystem (8.3)		
	Agro-Climatic Region (Planning Commission)	East Coast Plains And Hills Region (11.4)		
	Agro Climatic Zone (NARP)	North East Zone (TN-1)		
	List all the districts or part thereof falling under the NARP Zone	Chengalput, North Arcot, South Arcot excluding Chidambaram and Kattumannarkovil, Ariyalur and Perambalur Tiruchirappalli		
	Geographic coordinates of district	Latitude	Longitude	Altitude
		11^0 56'21.84"N	79° 29'51.23" E	53.6m above MSL
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Oilseeds Research Station (ORS), Eraiyanoor Village (Post), Tindivanam – 604 002.		
	Mention the KVK located in the district	ICAR-KVK, Tindivanam – 604 002.		
1.2	**Rainfall**	Average (mm)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep):	426	1st week of June	1st week of October
	NE Monsoon(Oct-Dec):	566	2nd week of October	2nd Week of December
	Winter (Jan- Feb)	49	-	-
	Summer (Mar-May)	74	-	-
	Annual	1115	-	-

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 (‘000 ha)	722.2	71.7	136.0	4.2	9.9	6.2	56.7	84.8	17.5

1. 4	**Major Soils**	Area (‘000 ha)	Percent (%) of total
	Red – (Deep to Very Deep)	487.3	07.6
	Red – (Very Shallow to Moderate)	1775.3	27.8
	Black – (Deep to Very Deep)	2540.1	39.7
	Black - (Very Shallow to Moderate)	1588.5	24.8

1.5	**Agricultural land use**	Area (‘000 ha)	Cropping intensity %
	Net sown area	322.4	111.3
	Area sown more than once	36.6	
	Gross cropped area	359.0	

(* Gross cropped area is varying due to Urbanization)

1.6	**Irrigation**	Area (‘000ha)		
	Net irrigated area	229.5		
	Gross irrigated area	257.4		
	Rainfed area	92.9		
	Sources of Irrigation	Number	Area (‘000ha)	% area
	Canals	196	2.1	0.9
	Tanks	2,085	54.0	23.7
	Open wells	1,47,332	141.5	
	Bore wells	0	48.8	21.4
	Lift irrigation schemes			
	Other sources		0.036	-
	Total		246.52	100.0
	Pumpsets			
	Micro-irrigation			
	Groundwater availability and use	No. of blocks	% area	Quality of water
	Over exploited	13	61.9	Data not available
	Critical	4	19.05	
	Semi- critical	3	14.3	
	Safe	1	04.7	
	Wastewater availability and use	Data not available		

Area under major field crops & horticulture etc.

1.7	**Major Field Crops cultivated**	Area ('000ha)					
		Kharif		***Rabi***		**Summer**	**Total**
		Irrigated	***Rainfed***	***Irrigated***	***Rainfed***		
	Paddy	25.5	-	118.9	-		144.4
	Sugarcane	Planted : 27.0 ; Ratoon : 26.0					53.0
	Groundnut	3.8	29.3	16.9	1.2	-	51.3
	Blackgram	0.6	4.4	0.9	10.8	-	16.9
	Bajra	0.2	11.4	0.08	0.8	-	12.6
	Maize	3.1	2.4	0.4	0.08	-	6.0
	Horticulture crops - Fruits	**Total area**					
	Mango	1.8					
	Water Melon	0.8					
	Banana	0.7					
	Guava	0.7					
	Sapota	0.016					
	Horticultural crops - Vegetables	**Total area**					
	Brinjal	0.4					
	Chilly	0.3					
	Onion	0.2					
	Tomato	0.08					
	Other Vegetables	1.02					

	Horticultural crops – Tuber crops	**Total area**
	Tapioca	3.4
	Turmeric / Ginger	1.3
	Plantation crops	**Total area**
	Casuarina	15.4
	Cashew	5.0
	Coconut	1.9
	Bamboo	0.08
	Tamarind	0.02
	Flower crops	**Total area**
	Crossandra	0.06
	Mullai	0.03
	Mary Gold	0.03
	Other flowers	0.16
	Total fodder crop area	--
	Grazing land	--
	Sericulture etc	--

1.8	**Livestock**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Non descriptive Cattle (local low yielding)	168.7	255.5	424.2
	Crossbred cattle	138.0	303.3	441.4
	Non descriptive Buffaloes (local low yielding)			
	Graded Buffaloes	9.3	23.7	33.0
	Goat			495.2
	Sheep			365.3
	Others (Pig, Horse, Dog etc..)			38.6
	Commercial dairy farms (Number)			26

1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**
	Commercial		772090
	Backyard		

1.10	**Fisheries** (Data source: Chief Planning Officer)						
	A. Capture						
	i) Marine (Data Source: Fisheries Department)	**No. of fishermen**	**Boats**		**Nets**		**Storage facilities (Ice plants etc.)**
			Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	
	ii) Inland (Data Source:	**No. Farmer owned ponds**		**No. of Reservoirs**		**No. of village tanks**	

	Fisheries Department)			
	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)			

1.11	**Production and Productivity of major crops** (Average of last 3 years: 2006, 07, 08)	**Kharif**		**Rabi**		**Summer**		**Total**	
		Production (tonnes)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)
	Paddy							4,80,329	3,303
	Sugarcane							57,87,278	102
	Groundnut							1,32,891	2,449
	Blackgram							9,868	521
	Bajra							17,242	1,533
Others	Maize							12,739	3,663

(Total production and productivity is only available)

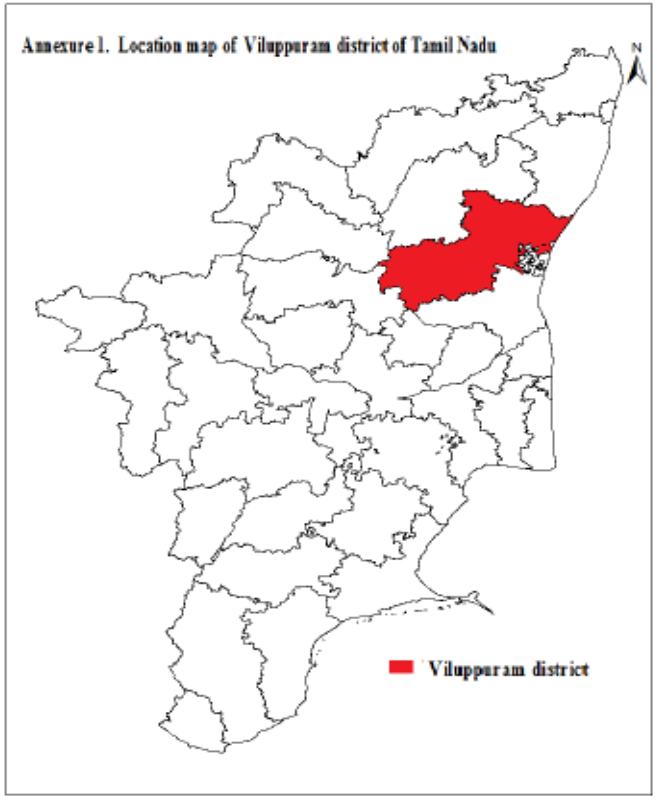
1.12	**Sowing window for 5 major crops**	Paddy	Sugarcane	Groundnut	Pulses (Blackgram)	Bajra
	Kharif Rainfed	-	-	1st week of November. – end of December.	Inter crops	1st week of June – end of July
	Kharif Irrigated	1st week of April –end of May, 1st week of August. –end of September., & 1st week of December. – end of January.	-	-		-
	Rabi- Rainfed	-	-	-	-	-
	Rabi-Irrigated	-	December. - January, - Early Season February. –March. – Mid. Season & April – May – Late Season	-	-	-

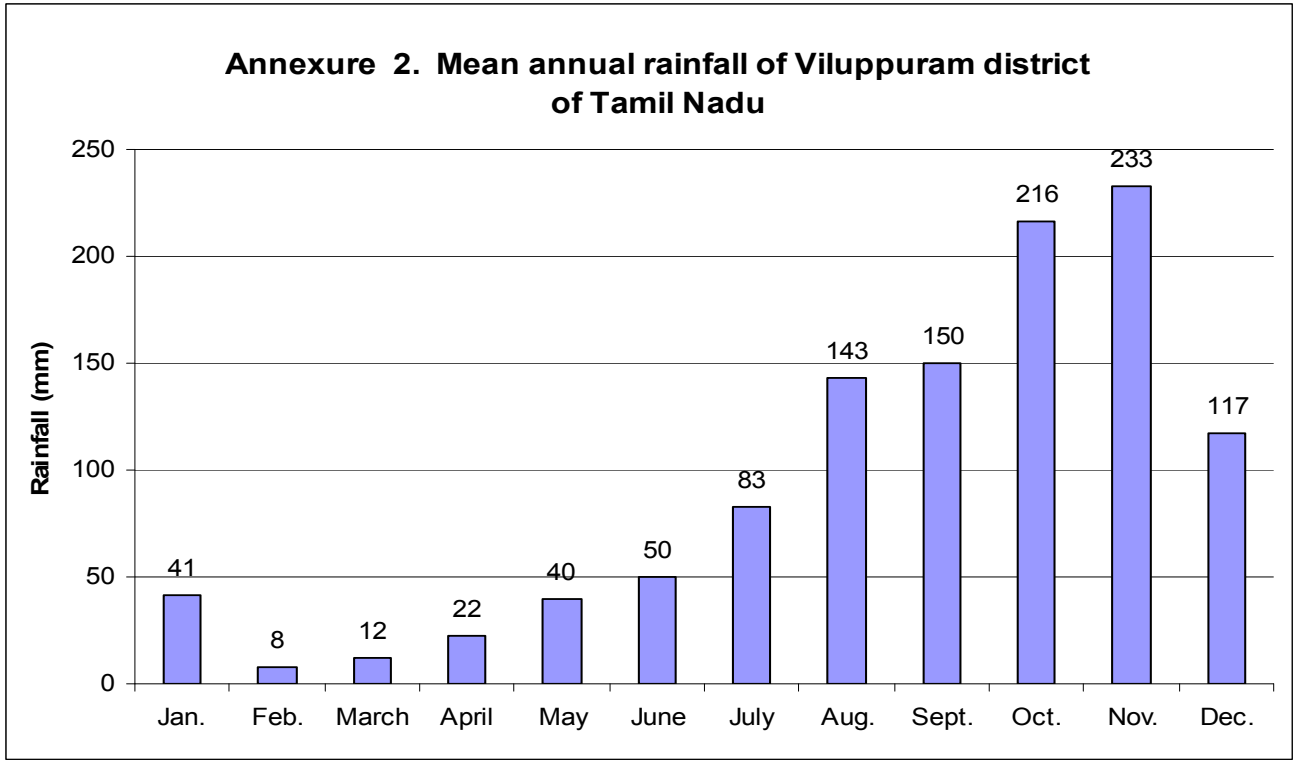
1.13	**What is the major contingency the district is prone to? (Tick mark and mention years if known during the last 10 year period)**	Regular	Occasional	None
	Drought	√	-	-
	Flood	√	-	√
	Cyclone	-	-	√
	Hail storm	-	-	√
	High intense storms	-	-	√
	Heat wave	-	-	√

	Cold wave	-	-	√
	High wind	-	-	√
	Frost	-	-	√
	Sea water intrusion	-	-	√
	Pests and diseases	-	-	√

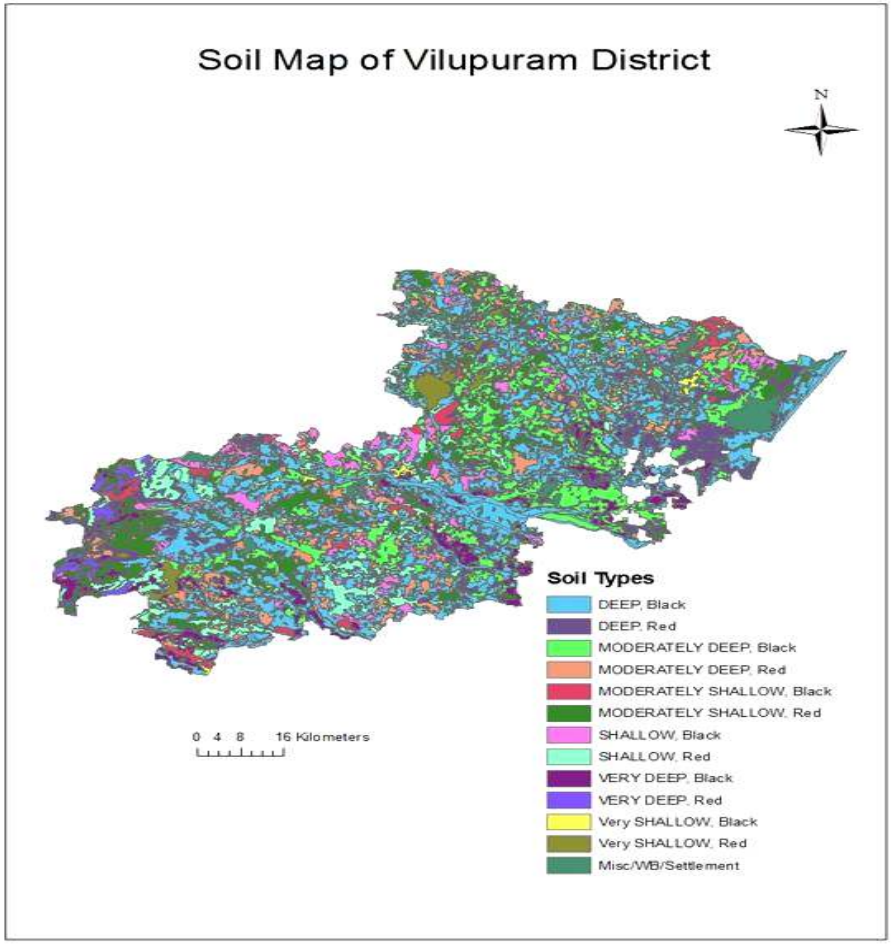
1.14	**Include Digital maps of the district for**	Location map of district within State as Annexure I	Enclosed: Yes / No
		Mean annual rainfall as Annexure 2	Enclosed: Yes / No
		Soil map as Annexure 3	Enclosed: Yes / No

Annexure 1. Location map of Viluppuram district and the blocks




Annexure 2. Mean annual rainfall of Viluppuram district of Tamil Nadu
Rainfall (mm)
250
200
150
100
50
0
41
8
12
22
40
50
83
143
150
216
233
117
Jan.
Feb.
March
April
May
June
July
Aug.
Sept.
Oct.
Nov.
Dec.

Annexure 3. Soil map of Viluppuram district of Tamil Nadu



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 3rd week)	Red and Red loamy soils	Groundnut – Blackgram and Pearl millet - Gingelly	No Change	1. Normal sowing will be taken up. 2. Mechanical sowing with tractor drawn seed drills.	Awareness through mass media like Television, Newspaper and Radio -

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 weeks (July 1st week)	Red and Red loamy soils	Groundnut – Blackgram and Pearl millet - Gingelly	1) Raising Short duration varieties Groundnut - TMV (Gn) 13, VRI 2 & TMV 7 Blackgram – VBN 4 & VBN 5 and Gingelly - TMV 6 & TMV 3	1.Spray 0.5 % KCl spray during flowering and pod development stage 2.Mechanical sowing with tractor drawn seed drills. 3. Intercropping 4. Thinning 5. Mulching 6.Soil and moisture conservation practices for Rabi sowing 7. Spray anti-transpirants.	Awareness through mass media like Television, Newspaper and Radio
Delay by 6 weeks (July 3rs week)	Red and Red loamy soils	Groundnut – Blackgram and Pearl millet - Gingelly	1) Raising Blackgram – VBN 4 & VBN 5 and Gingelly – TMV 6 & TMV 3	1. Mechanical sowing with tractor drawn seed drills. 2. Intercropping 3. Thinning	Awareness through mass media like Television, Newspaper and Radio

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
			2) Raising Fodder sorghum or other crops or Grasses	4. Mulching 5. Soil and moisture conservation practices for Rabi sowing 6. Spray anti-transpirants.	

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 8 weeks (August 1st week)	Red and Red loamy soils	Groundnut – Blackgram and Pearl millet - Gingelly	1) Raising Green Manure crops like Daincha, Sunhemp and Kolingi 2) Raising Fodder sorghum or other crops or Grasses	1. Mulching 2. Soil and moisture conservation practices for Rabi sowing	Awareness through mass media like Television, Newspaper and Radio

2.1.1 Rainfed situation – Rabi Season

Condition			Suggested Contingency measures		
Early season drought (Normal onset, followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.)	**Major Farming situation**	**Crop/cropping system**	**Crop management**	**Soil management**	**Remarks on Implementation**
	Red and Red loamy soils	Groundnut – Blackgram Pearl millet - Gingelly	No change	Inter cultivation Conservation Furrow thinning	Awareness through mass media like Television, Newspaper and Radio

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	**Major Farming situation**	**Crop/cropping system**	**Crop management**	**Soil management**	**Remarks on Implementation**
At vegetative stage	Red and Red loamy soils	Groundnut – Blackgram Pearl millet - Gingelly	No Change	1. Inter cultivation 2. Conservation Furrow 3.Thinning	Awareness through mass media like Television, Newspaper and Radio
At reproductive stage					

Condition			Suggested Contingency measures		
Terminal drought	**Major Farming situation**	**Crop/cropping system**	**Crop management**	**Rabi Crop planning**	**Remarks on Implementation**
	Red and Red loamy soils	Groundnut – Blackgram and Pearl millet - Gingelly	Supplementary Irrigation through mobile sprinkler or rain gun	Timely raising of rabi crops	Awareness through mass media like Television, Newspaper and Radio

2.1.2 Irrigated situation

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delayed/ limited release of water in canals due to low rainfall	Clay and clayey loam soils	Paddy – Paddy Paddy - Sugarcane	1) Short duration ADT 42 & ADT 39 2) Raising Pulses particularly Blackgram –VBN 4 & VBN 5 3) Sugarcane – Decline in Area of cultivation and raising pulses particularly Blackgram - VBN 4 & VBN 5	Paddy: 1. Raise Rice crop in semi dry condition 2. Spray Cycocel @ 1000 ppm 3. Foliar spray of Kaolin 3 % or KCl 1 %. 4. Split application of K ie. 50 % at basal and 25 % each at tillering and panicle initiation stage. Sugarcane: 1. Soaks setts in ethereal 200 ppm or lime solution for an hour 2. Spray Potash and Urea each at 2.5 % during stress period at 15 days interval 3. Spray Kaolin General: a) Skip row irrigation b) Microirrigation c) Limited area irrigation d) Mulching	Awareness through mass media like Television, Newspaper and Radio

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Non release of water in canals under delayed onset of	Clay and clayey loam soils	Paddy – Paddy	Raising Pulses particularly Blackgram - VBN 4 & VBN 5	Spray 2 % DAP at the time of flowering and second spray 15 days after first spray &	Awareness through mass media like Television, Newspaper and Radio

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
monsoon in catchment		Paddy - Sugarcane		2. Spray NAA 40 PPM twice (First appearance of flowering and after a fortnight)	

Condition			Suggested Contingency measures		
	Major Farming situation	**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	Clay and clayey loam soils	Paddy – Paddy Paddy - Sugarcane	Raising Green Manure crops like Daincha, Sunhemp and Kolingi	In situ residue mulching	In tie up with the Dept. of Agriculture and Dept. of Agricultural Engineering

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Insufficient groundwater recharge due to low rainfall	Clayey loam soils	Paddy – Paddy Paddy - Sugarcane	Raising Green Manure crops like Daincha, Sunhemp and Kolingi	In situ residue mulching	In tie up with the Dept. of Agriculture and Dept. of Agricultural Engineering

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**
Paddy	Proper Drainage	Proper Drainage	Proper Drainage	i) Mechanical dryer can be used
Sugarcane	-do-	-do-	-do-	-
Groundnut	-do-	-do-	1. Proper Drainage and 2. Spray with 5 % Prosopis pod extract to induce dormancy	-
Blackgram	-do-	-do-	-do-	-
Cumbu	-do-	-do-	-do-	-

Heavy rainfall with high speed winds in a short span				
Outbreak of pests and diseases due to unseasonal rains				
Paddy	-	Blast and Bacterial Leaf Blight Control measures: (Blast: Edifenphos 1500 ml ha^{-1}) Bacterial Leaf Blight: Streptomycin sulphate + Tetracycline (300g) + Copper oxychloride – 1.25 kg ha^{-1})		Does Not Arise -
Sugarcane	-	-	-	-
Groundnut	-	-	-	
Blackgram	-	-	Root rot : Carbendazim drenching @ 1 g litre.	Does Not Arise
Cumbu	-	-	-	-
Horticulture				
Tapioka and other vegetables	**Aphids and Yellow Mosaic Virus**			Does Not Arise

	Control measures: Spray with Neem oil @ 2ml litre^{-1} or Methyl Dematon 25 EC @ 2ml litre^{-1} or Dimethoate @ 2ml litre^{-1}		
Banana -	**Wilt (Macro phomina)** **Preventive measures:** Apply 40gms Carbofuran either on Corm or on Pit. **Control measures:** **1. Sucker Treatments** Dip the corm with Carbendazim (0.1 %) for 5 minutes or treat the corm in clay slurry treatment (or) Dip the corm with Emissan (0.1 %) for 5 minutes **2. Pseudostem Treatments** Inject the Carbendazim (0.1 %) to Pseudostem at 45 angle to a depth of 10 Cm		Does Not Arise
Chilli	-	**Preventive measures:** Two times spraying with Mancozeb (0.2 %), ie one during flowering stage and second at 15 days interval after flowering	Does Not Arise

2.3 Floods

Condition	**Suggested contingency measure**			
Transient water logging/ partial inundation	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
1. Paddy	Provision of proper Drainage	Provision of proper Drainage	Provision of proper Drainage	1) Mechanical dryer can be used
2. Sugarcane	-do-	-do-	-do-	-do-
3. Groundnut	-do-	-do-	-do-	1) Mechanical dryer can be used (or) 2) Spray with 5 % Prosopis pod extract to induce dormancy
4. Blackgram	-do-	-do-	-do-	-do-

5. Cumbu	-do-	-do-	-do-	-do-
Continuous submergence for more than 2 days	-	-	-	-
Sea water inundation	-	-	-	-

2.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm /Cyclone

2.5 Contingent strategies for Livestock, Poultry & Fisheries: Not Applicable

2.5.1 Livestock

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
Drought			
Feed and fodder availability	1. Dry fodder production, hay making and creation of fodder banks at village levels based on the livestock population 2. Ensiling and enrichment of fodder grasses and sugarcane tops 3. Creation of fodder models for draught with Guinea grass, stylo, desmanthus, kolukkattai grass etc. 4. Conservation of green and dry fodder through chaffing 5. Creation of tree fodder models with Subabul, Glyricidia, Agathi, etc.	1. Chaffing of green and dry fodder to conserve fodder. 2. Use of unconventional and locally available cheap feed ingredients for feeding livestock. 3. Enrichment of dry fodder with urea Salt and molasses. 4. Continuous supplementation of Minerals to prevent infertility. 5. Use of foggers and sprinklers on the sheds, sprinkling of water on the body to reduce the heat load. 6. Advising the farmers to feed Concentrates during cooler	1. Mineral supplementation for heifers and cows. 2. Use of salt licks for goats calves etc. 3. Feeding ad libidum green fodder including legumes.

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<td>parts of the day.
7. Advising farmers not to graze during hotter parts of the day
8. Snail control measures in the Water bodies.</td>
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<td>Drinking water</td>
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<td>1. Water treatment with Sanitizers</td>
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<tr>
<td>Health and disease management

Diseases recorded were
Foot and mouth disease, Anthrax in livestock and
Ranikhet disease in poultry</td>
<td>1. Sheep pox vaccination in endemic areas
2. anthrax vaccination in endemic areas
3. FMD vaccination for all livestock
RDVK vaccines for desi chicken
4. Control of ectoparasites

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<tr><th>S .no</th><th>Name of the animals/ species</th><th>Vaccines to be given for immunization</th></tr>
<tr><td>1</td><td>Cattle & buffalo</td><td>FMD& Anthrax vaccine as per endemic</td></tr>
<tr><td>2</td><td>Sheep & goat</td><td>Goat pox vaccine ,anthrax vaccine as per endemic</td></tr>
<tr><td>3</td><td>pig</td><td>FMD,
Swine fever & anthrax vaccine as per endemic</td></tr>
<tr><td>4</td><td>poultry</td><td>Mareks disease vaccine RDV,FPV,IBRV&IBDV</td></tr>
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<td>1. Treatment and control of diseases in the event of outbreak or disease manifestation.
2. Nutritional supplementation
3. Summer management of livestock</td>
<td>1. Nutritional supplementation
2. Breeding management</td>
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<tr><td>Feed and fodder availability</td><td>----</td><td></td><td></td></tr>
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<tr><td>4</td><td>Dogs</td><td>Rabies vaccine</td></tr>
<tr><td>5</td><td>Poultry</td><td>Mercks disease vaccine RDV,FPV,IBRV&IBDV</td></tr>
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<tr><td>Cyclone</td><td>---------</td><td></td><td></td></tr>
<tr><td>Feed and fodder availability</td><td rowspan="3">-</td><td rowspan="3">-</td><td rowspan="3">-</td></tr>
<tr><td>Drinking water</td></tr>
<tr><td>Health and disease management</td></tr>
<tr><td>Heat wave and cold wave</td><td>---------</td><td></td><td></td></tr>
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Shelter/environment management			
Health and disease management			

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	1. Procurement and storage of feed ingredients	1. Nutritional supplementation of poultry	1. Nutritional supplementation of poultry	--
Drinking water		1. Water sanitation		--
Health and disease management	1. Vaccination against Ranikhet disease 2. Deworming of poultry 3. Provision of foggers and sprinklers to reduce heat load 4. Supplementation of vitamins and minerals	1. Prevention and control of Coccidiosis in poultry 2. Summer management of poultry- use of foggers and sprinklers 3. Continuous supply of cool potable water 4. Supplementation of vitamins and minerals 5. Feeding during cooler parts of the day 6. Mixing water in the concentrate mash and feeding	1. Nutritional supplementation of poultry	--
Floods	----			
Shortage of feed ingredients				
Drinking water				
Health and disease management				
Cyclone	----			

Shortage of feed ingredients				
Drinking water				
Health and disease management				
Heat wave and cold wave	-----			
Shelter/environment management				
Health and disease management				

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
1) Drought			
A. *Capture*			
Marine	Not applicable	Not applicable	Not applicable
Inland			
(i) Shallow water depth due to insufficient rains/inflow	i. Rainwater harvesting ii. Deepening/ Desilting of existing water bodies iii. Removal of debris and strengthening of pond embankments through turfing	**i.** Shallow areas of derelict water bodies can be used for raising table sized fishes using stunted fish seeds and the culture can be done in enclosures (pens). Pens of 0.1 to 0.2ha are ideal for easy operation and economical. **ii.** Indian major carps and freshwater prawns are ideal species for culture. **iii.** Temporarily raising the height of the enclosures maybe done to prevent loss of stock in the event of sudden rise in water level due to sudden onset of rain or flooding.	**i.** Due to severe water shortage farmers have to harvest fish in large quantities to avoid loss due to mortality. Leading to difficulties in marketing the fish farmers can be trained on the frozen storage techniques and in preparing value added products (ready to eat and processed products) **ii**. Adoption of short term culture of species wherein culture of species having rapid initial growth can be stocked. Eg. minor carps like silver barb *(Puntius gonionotus)* and fringe lipped carp (*Labeo fimbriatus)* can be undertaken. **iii.** Culture of minor carp like *Amblypharyngodon mola* can be done in shallow ponds and this being an auto breeder it spawns two or three times in a year which also ensure auto stocking.

(ii) Changes in water quality	i. Strictly implement in avoiding the use of plastics and other non-biodegradable material along the river belts (intervention and polluting by human is a common factor) ii. Avoid entry of pollutants like industrial effluents, run off from agricultural land into rivers	Reduced water volume in the pond/ local water bodies lowers its buffering capacity hence every precaution has to be taken while adopting use of manures and fertilizers to avoid onset of algal blooms and eutrophication	
(iii) Any other	--	i. Stunting of major carp fingerlings and stocking in grow out ponds as they grow faster (three times more growth than the non stunted fingerlings) ii. Ornamental fish rearing utilizing gold fishes, koi carp or live bearers like mollies and guppies can be done in summer. This ensures money flow to the farmers. ***** subsidy to farmers for inputs like feed,seed.***	
B. Aquaculture/ Mariculture	**Before the event**	**During the event**	**After the event**
(i) Shallow water in ponds due to insufficient rains/inflow	i. Water depth should be at least 1m for initiating fish culture. ii. Adopt low stocking density to reduce culture duration and culture should be done only after ensuring water availability for minimum period of 3 months. iii. In low tidal amplitude areas which receives north-east monsoon it is advised not to go for summer crop because of high temperatures which will lead to stress of culturable species.	i. Farmers can be advised to take up integrated farming (poultry, piggery, duckery and animal husbandry with crops) to cut down cost on expensive inputs like feed and manure. ii. Avoid fertilization and manuring on supplementary basis. iii. Air breathing fish culture to be practised (Cat fish farming)	i. Prepare pond for the next crop after early harvest ii. Always keep a constant check on the onset of algal blooms which will cause mass mortality of fishes iii. Harvest fish broodstock if any and shift to deeper safer areas like cement systems in indoor units to utilize for breeding on onset of monsoon

(ii) Impact of silt load build up in ponds / change in water quality	i. Rainwater harvesting ii. Deepening/ Desilting of existing water bodies iii. Removal of debris	i. Feeding should be minimum to avoid organic loading	i. On onset of sudden heavy rains heavy mortality will result so feeding should be controlled to avoid waste accumulation on pond bottom soil.
(iii) Any other	i. The physico-chemical quality of water has to be monitored regularly for its suitability for fish culture.	i. Concept of Re-circulatory system can be adopted as additional water is not required thereby curtailing need for water exchange. ii. Use of aerators to overcome thermal stratification and build up of ammonia during high temperatures will help break the thermal stratification ** ***subsidy can be provided to farmers for the aerators*** iii. Partial harvesting to reduce biomass thereby competition for space and food is reduced. iv. Reduced stocking densities	i. Train the farmers to breed fish in captivity and produce required amount of seed either through hormonal treatment and environment manipulation. ii. Use of cryopreserved milt supplied from research units to aid breeding and ensure healthy stock (in collaboration with TANUVAS)
2) Floods	**Before the event**	**During the event**	**After the event**
A. Capture			
Marine	i. Train fisher folk on hygienic handling of fishes, short and long term preservation techniques and on preparation and packaging of value added fish products – as a small scale village activity ii. Establish cold chain facilities iii. Ensure strengthening of coastal belt by planting and maintaining the mangrove ecosystems ** *mangrove wetlands mitigate the adverse impact of storms, cyclones Tsunami in coastal areas and coastal erosion* ** *mangroves are ideal breeding ,nursery and feeding grounds for a number of commercially important prawns, fishes and other shell*	i. Avoid fishing in deeper waters to avoid loss to gear, craft and human lives.	i. Loss incurred should be reported will be assessed by the State Fisheries Department officials and reimbursed.

	fishes. iv. Ecologically sensitive areas to be earmarked such as mangroves, corals and estuaries to avoid overfishing v. Commercial exploitation of coral reefs and large scale removal of mangrove vegetation to be surveyed as this leads to dwindling fish harvests		
Inland			
(i) Average compensation paid due to loss of human life	--- NA---	--- NA---	As per the norms of the State Government and implemented by the State Fisheries Department
(ii) No. of boats / nets/damaged	---NA---	---NA---	
(iii) No. of houses damaged	---NA---	---NA---	
(iv) Loss of stock	Sell the available fish stock as much as possible	Installation of gill net and using cast net for fishing the stock escapement through flooding	Onset of toxic gases in the system hence immediate stocking of fishes should not be carried out.
(v) Changes in water quality	Strengthening of bunds and embankments either through turfing and terracing to avoid water overflow or entry of waters from outside.	** Water should not be used for domestic purposes	Onset of toxic gases in the system hence immediate stocking of fishes should not be carried out.
(vi) Health and diseases	Water quality management to be followed thoroughly by weekly sampling to monitor water quality parameters		Ulcers and pox diseases in fishes will occur hence the fish stock has to be discarded or buried.
B. Aquaculture/ Mariculture in ponds	**Before the event**	**During the event**	**After the event**
(i) Inundation with flood water	i. Avoid culture of fishes requiring longer duration of culture. ii. Initiating fish culture in advance in areas frequently prone to flooding.	Immediately harvest the stocked fishes	--
(ii) Water exchange and changes in water quality	i. Strengthening of bunds and embankments either through turfing and terrracing	--	Application of lime to stabilize pH.

(iii) Health and diseases	i. Water quality management to be followed thoroughly by weekly sampling to monitor water quality parameters	--	Discard diseased stock and the following measures to be practiced: i. Drying up of confined water bodies ii. Let pond bottom to sun dry by cracking of soil to let out the release of obnoxious gases and other pests iii. Application of lime to balance soil pH.
(iv) Loss of stock and inputs (feed, chemicals etc)	The stock (feed and medicines) have to be stored separately in rooms designed for the purpose with air circulation facilities and they have to be stored on raised platforms to avoid loss	--	Discard stock if affected by water as they will lead to fungal borne infections in the fish stock.
(v) Infrastructure damage (pumps, aerators, huts etc)	i. Initiating fish culture in advance in areas frequently prone to flooding to prevent damage to the infrastructure	--	** As on date there has been no measure to give subsidy to the inland fish farmers for loss of fish stock or infrastructure hence the farmers are suffering a heavy loss. ** Therefore suggestions can be made to the Government to assess the impact of damage and the rate of compensation can be decided by the officials
(vi) Any other	** Special emphasis can be made to the Government for compensation to the practicing inland fish farmers as there is no help from the Government as given to the fisher folk suffering damages due to cyclone. The practicing inland/marine fish farmers should register with the State Fisheries Department to avail the formulated compensation		
3. Cyclone / Tsunami	**Before the event**	**During the event**	**After the event**
A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives	**As per the existing government norms compensation is given to the fisherfolk whenever there is loss due to the impact of cyclones/tsunami		
(ii) Avg. no. of boats / nets/damaged	**As per the existing government norms compensation is given to the fisherfolk whenever there is loss due to the impact of cyclones/tsunami		
(iii) Avg. no. of houses damaged	**As per the existing government norms compensation is given to the fisherfolk whenever there is loss due to the impact of cyclones/tsunami		
Inland	**Cyclone / Tsunami**		
B. Aquaculture/ Mariculture	**Before the event**	**During the event**	**After the event**
(i) Overflow / flooding of ponds	i. Planting trees like casuarinas along coastal belt to avoid coastal erosion and inundation of sea	--	

	waters.		
(ii) Changes in water quality (fresh water / brackish water ratio)	i. Stocking fishes which can tolerate wide salinity changes eg. Milkfish, pearl spot etc.	--	Application of lime to stabilize pH.
(iii) Health and diseases	i. Water quality management to be followed thoroughly by weekly sampling to monitor water quality parameters	--	Discard diseased stock and the following measures to be practiced: i. Drying up of confined water bodies ii. Let pond bottom to sun dry by cracking of soil to let out the release of obnoxious gases and other pests iii. Application of lime to balance soil pH.
(iv) Loss of stock and inputs (feed, chemicals etc)	i.The stock (feed and medicines) have to be stored separately in rooms designed for the purpose with air circulation facilities and they have to be stored on raised platforms to avoid loss	--	Discard stock if affected by water as they will lead to fungal borne infections in the fish stock.
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)	Initiating fish culture in advance in areas frequently prone to flooding to prevent damage to the infrastructure	--	** Special emphasis can be made to the Government for compensation to the practicing inland fish farmers as there is no help from the Government as given to the fisher folk suffering damages due to cyclone. The practicing inland/marine fish farmers should register with the State Fisheries Department to avail the formulated compensation
(vi) Any other	Training programmes for stakeholders including resource users, planners and policy makers on coastal regulations, shoreline protection and environmental awareness.		
4. ****Heat wave and cold wave	**Before the event**	**During the event**	**After the event**
A. Capture			
Marine			i. To conduct studies on the ecological changes to assess the density and diversity of phyto and zooplankton and other benthic macro fauna (collaborative work with State Universities-TANUVAS)
Inland			
B. Aquaculture	**Before the event**	**During the event**	**After the event**
(i) Changes in pond			

environment (water quality)			
(ii) Health and Disease management			
(iii) Any other	i. Conservation of our coral reefs (natural treasures) as they are the most diversified and complex marine ecosystems ii. Conserve seagrass beds by imposing strict measures on trawling, removal for commercial purposes.		

[a] based on forewarning wherever available

****** Government should take strict action against any violations along the coast through increased surveillance***

**** The impact of heat wave and cold wave is not applicable to these districts, especially Tamil Nadu.