

State: TAMIL NADU

Agriculture Contingency Plan for District: DHARMAPURI

1.0 District Agriculture profile				
1.1	Agro-Climatic/Ecological Zone			
	Agro Ecological Region / Sub Region (ICAR)	Tamil Nadu uplands and plains, hot moist semiarid eco-subregion (8.3)		
	Agro-Climatic Region (Planning Commission)	Southern Plateau And Hills Region (X)		
	Agro Climatic Zone (NARP)	High Altitude And Hilly Zone, western zone (TN-7, TN-3)		
	List all the districts or part thereof falling under the NARP Zone	Dharmapuri excluding hilly areas, Salem, excluding Thiruchengodu, Perambalur taluk of Tiruchirapalli district		
	Geographic coordinates of district	Latitude	Longitude	Altitude
		12°07'49.42"N	78°09'25.10"E	507m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	-		
Mention the KVK located in the district	ICAR - KVK, Papparapatty, Dharmapuri – 636701			
1.2	Rainfall	Average (mm)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep):	361.0	June 1 st week	Sep 4 th week
	NE Monsoon(Oct-Dec):	316.7	Oct 1 st week	Dec 3 rd week
	Winter (Jan- Feb)	18.5		
	Summer (Mar-May)	156.9		
	Annual	853.1		

Source: Indian Meteorological Department, Chennai-6.

1.3	Land use pattern of the district (latest statistics)	Geographical area	Forest area	Land under non-agricultural use	Perma-nent pastures	Culti-vable wasteland	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	Area ('000 ha)	449.8	164.2	51.4	6.2	3.8	2.9	15.8	43.1	4.0

1.4	Major Soils	Area (' 000 ha)	Percent (%) of total
	Deep black soils	71.1	15.8
	Deep red soils	101.5	22.6
	Miscellaneous soils	23.0	5.1
	Moderately deep black soils	39.8	8.9
	Moderately deep red soils	38.0	8.5
	Moderately shallow black soils	16.4	3.7
	Moderately shallow red soils	38.5	8.6
	Shallow black soils	9.4	2.1
	Shallow red soils	21.2	4.7
	Very deep black soils	63.2	14.1
	Very shallow red soils	22.3	5

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	159.0	117.7
	Area sown more than once	28.1	
	Gross cropped area	187.1	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	65.7		
	Gross irrigated area	77.7		
	Rainfed area	93.4		
	Sources of Irrigation	Number	Area ('000 ha)	% area (to net irrigated area)
	Canals		1.0	1.5
	Tanks	1005	3.3	5.0
	Open wells	75673		
	Bore wells	788	0.8	1.2
	Lift irrigation schemes		51.3	70.8
	Other sources		-	
	Total		56.6	100.0
	Pumpsets		46.9	
	Micro-irrigation			
	Groundwater availability and use	No. of blocks	% area	Quality of water

Over exploited	8	100	Salinity level: 63 % good, 20% moderate and 17% poor Residual Sodium Carbonate: 87% good, 8% moderate and 5% poor Sodium Adsorption Ratio: 100 % good
Critical	-	-	
Semi- critical	-	-	
Safe	-	-	
Wastewater availability and use	Data not available		
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%			

Area under major field crops & horticulture etc.

1.7	Major Field Crops cultivated	Area ('000 ha)					
		<i>Kharif</i>		<i>Rabi</i>		Summer	Total
		<i>Irrigated</i>	<i>Rainfed</i>	<i>Irrigated</i>	<i>Rainfed</i>		
1	Paddy	3.9	-	14.6	0.2	-	18.8
2	Sugarcane	11.0	-	6.2	-	-	17.3
3	Sorghum	0.1	17.0	0.0	0.0	-	17.2
4	Finger millet	1.0	14.5	1.4	0.1	-	17.0
5	Little millet	-	11.9	-	0.0	-	11.9
	Horticulture crops - Fruits	Total area ('000 ha)					
1.	Mango	13.2					
2.	Banana	1.1					
3.	Tamarind	1.3					

	Horticultural crops - Vegetables	Total area ('000 ha)
1.	Tomato	4.4
2.	Tapioca	23.6
3.	Brinjal	0.9
4.	Onion	1.1
	Horticultural crops - Flowers	Total area ('000 ha)
	Tuberose, Nerium, Chrysanthemum	1.3
	Plantation crops	Total area ('000 ha)
	Coconut	9.7

	Fodder crops	Total area ('000 ha)
	Total fodder crop area	0.4
	Grazing land	-
	Sericulture etc	0.4
	Others (Specify)	-

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	50.0	120.1	170.2
	Crossbred cattle	32.5	249.5	282.1
	Non descriptive Buffaloes (local low yielding)	8.4	56.2	64.7
	Graded Buffaloes			
	Goat			188.0
	Sheep			297.9
	Others (Camel, Pig, Yak etc.)			3.0
1.9	Poultry	No .of farms	Total No. of birds ('000)	
	Commercial	348	745.0 layers	
	Backyard	180	1800.0	

1.10 Fisheries

	A. Capture						
	i. Marine (Data Source: Fisheries Department)	No. of fishermen	Boats		Nets		Storage facilities (Ice plants etc.)
		2442	Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	1

						Gill Net : 1687 Cast Net: 79 Dragnet : 153 Other nets: 21 ----- Total 1940 -----	
	ii. Inland (Data Source: Fisheries Department)	No. Farmers owned ponds 20		No. of Reservoirs 6		No. of village tanks 25 (1052 ha)	
	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)	803.3					
	Others						

Production and Productivity of major crops

1.11	Production and Productivity of major crops	Kharif		Rabi		Summer		Total	
		Production ('000 t)	Productivity (kg/ha)						
1	Paddy	-	-	-	-	-	-	423.9	2,426
2	Sorghum	-	-	-	-	-	-	62.3	649
3	Finger millet	-	-	-	-	-	-	302.4	1,346
4	Sugarcane	-	-	-	-	-	-	1863.1	1,08,000
5	Little millet	-	-	-	-	-	-	20.6	369

Major Horticultural crops

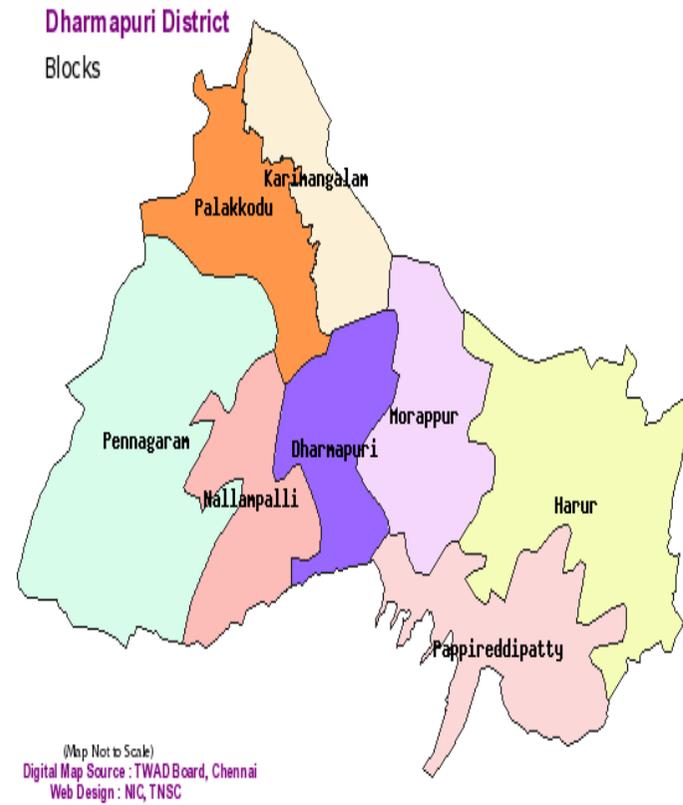
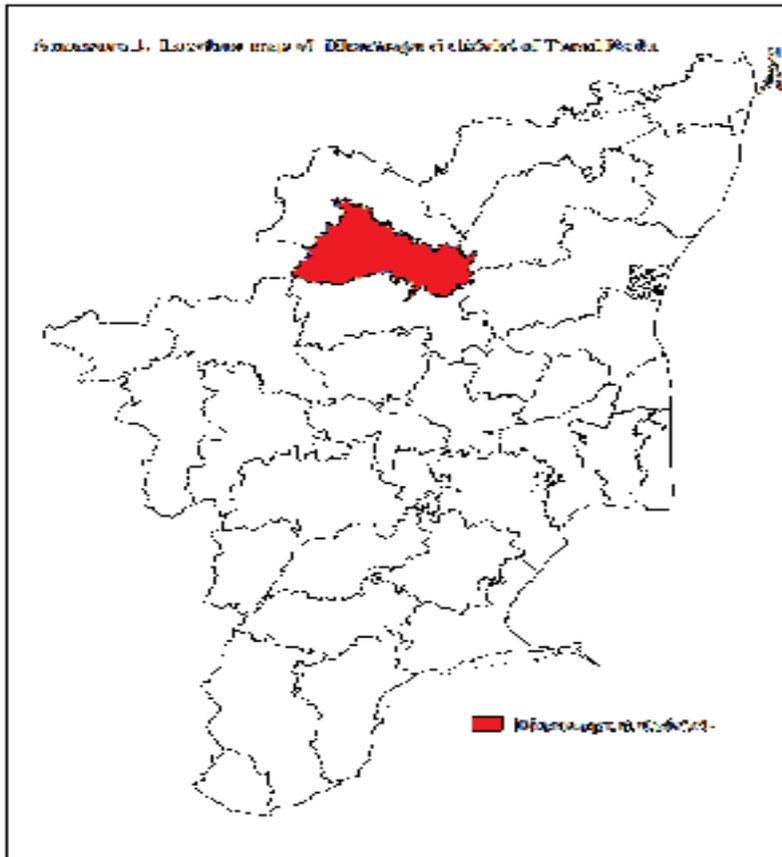
1	Mango							962.2	7290
2	Banana							404.3	35,375
3	Tamarind							46.9	3,449
4	Tomato							582.0	13,198
5	Tapioca							481.1	20,336

1.12	Sowing window for 5 major crops (start and end of sowing period)	Paddy	Sorghum	Finger millet	Sugarcane	Little millet	Tapioca
	Khariif- Rainfed	--	1 st week of June – 4 th week of July	1 st week of June – 4 th week of July		1 st week of July – 2 nd week of August	1 st week of April to 1 st week of May
	Khariif-Irrigated	1 st week of June – 4 th week of June (Early samba) 2 nd week of Aug – 2 nd week of Sep (Samba)	-	--	1 st week of April to 1 st week of May	--	Throughout the year
	Rabi- Rainfed	--	1 st week of September to 2 nd week of October	1 st week of September to 2 nd week of October		1 st week of September to 2 nd week of October	
	Rabi-Irrigated	--	-	1 st week of December to 2 nd week of January	2 nd week of Dec- 2 nd week of Jan	--	

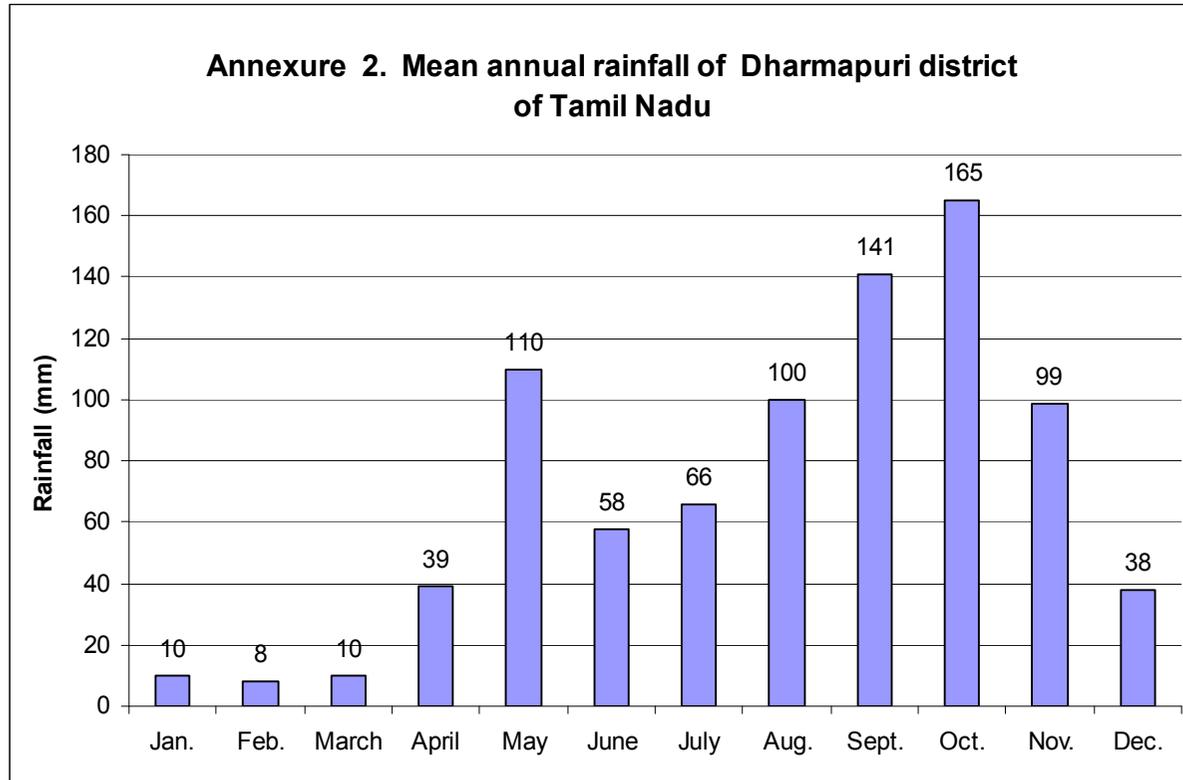
1.13	What is the major contingency the district is prone to? (Tick mark and mention years if known during the last 10 year period)	Regular	Occasional	None
	Drought	✓		
	Flood			✓
	Cyclone			✓
	High intense storms			✓
	Heat wave			✓
	Cold wave			✓
	Frost			✓
	Sea water intrusion			
	Pests and diseases (specify) Paddy: Leaf folder & Brown leaf spot Sugarcane: Root grub Tapioca: Phomopsis leaf fall & Mealy bug	✓		

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 III	Enclosed: Yes
		Soil map as Annexure 3	Enclosed: Yes

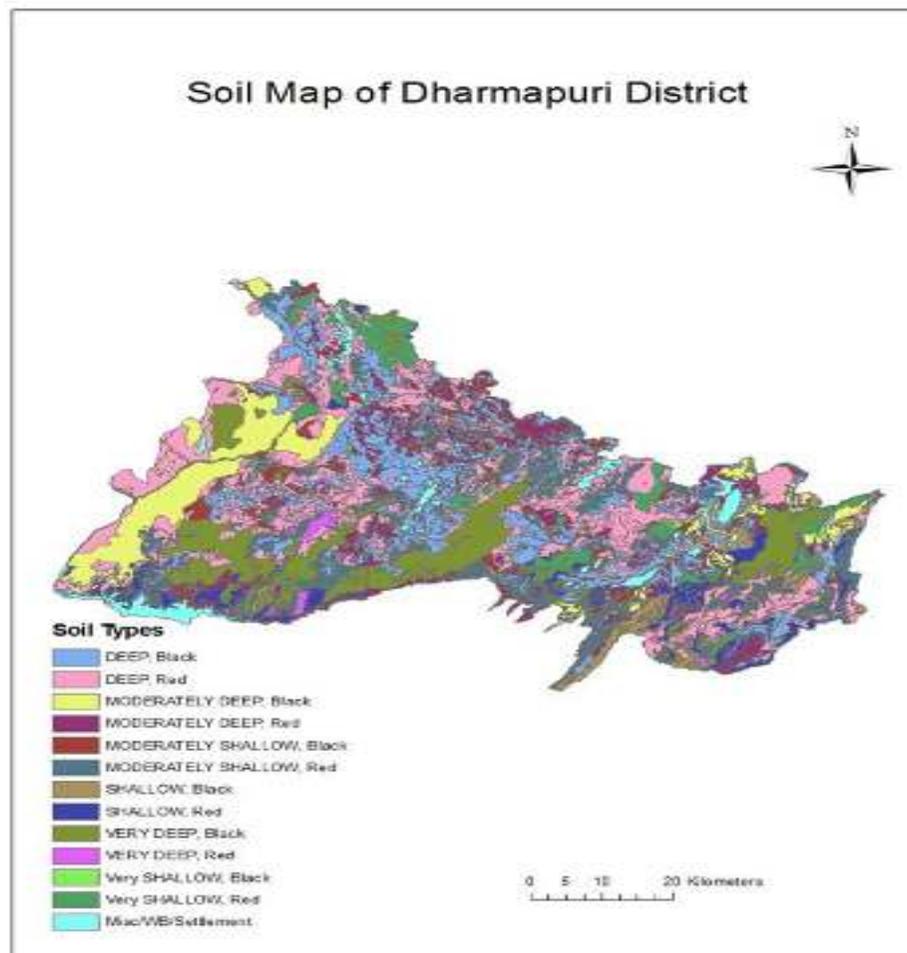
Annexure 1. Location map of Dharmapuri district and the blocks



Annexure 2. Mean annual rainfall of Dharmapuri district of Tamil Nadu



Annexure 3. Soil map of Dharmapuri district of Tamil Nadu



2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Kharif

Condition	Kharif season		Suggested Contingency measures		
Early season drought	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 2 weeks (June 3 rd week)	Red and Black soils	Sorghum	No change	-	-
		Finger millet			
		Little millet			
		Tapioca			
Delay by 4 weeks (July 1 st week)	Red and Black soils	Sorghum	Sorghum + Black gram or green gram or Cowpea	Seed hardening (Soak the seeds in 2% potassium dihydrogen phosphate for 10 hours)	
		Finger millet	No change	Seed hardening: <ol style="list-style-type: none"> 1. Soak seeds in water for 6 hours. Use one litre water for every kg seed for soaking. 2. Drain the water and keep the seeds in wet cloth bag tightly tied for two days. 3. At this stage, the seeds will show initial signs of germination. 4. Remove seeds from the wet cloth bag and dry them in shade on a dry cloth for 2 days. 	

				5. Use the above hardened seeds for sowing.	
		Sugarcane	No change	--	-
		Little millet		--	
		Tapioca		Sett treatment with 0.5% KCl + FeSO ₄ + ZnSO ₄	

Condition	Kharif season		Suggested Contingency measures		
Early season drought	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 6 weeks (July 3 rd week)	Red and Black soils	Sorghum	Fodder sorghum		
		Finger millet	No change	Seedlings grown in nursery can be used	
		Little millet	No change/Fodder crop		
		Tapioca	No change	-	

Condition	Kharif season		Suggested Contingency measures		
Early season drought	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 8 weeks (Aug 1 st week)	Red and Black soils	Sorghum	Fallow/Fodder sorghum	-	-
		Finger millet	Fallow		
		Sugarcane	Fallow/Lablab or Vegetables like Tomato, Beans		
		Little millet	Fallow/ Fodder crop (Fodder Cowpea Co1)/Greens (Amaranthus/Chakrav arthikeerai)		
		Tapioca	Fallow/ Vegetables like Tomato, Brinjal, Bhendi		

Rabi

Condition	Rabi season		Suggested Contingency measures		
Early season drought	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 2 weeks	Red and Black soils	Sorghum	No change	-	-

Condition	Rabi season	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought	Major Farming situation				
(October 4 th week)		Finger millet			
		Little millet			
		Tapioca			

Condition	Rabi season	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought	Major Farming situation				
Delay by 4 weeks (November 2 nd week)	Red and Black soils	Sorghum	No change	Seed hardening (Soak the seeds in 2% potassium dihydrogen phosphate for 10 hours)	Department of Agriculture
		Finger millet		Seedlings can be used	
		Little millet			
		Tapioca		Sett treatment with 0.5% KCl + FeSO ₄ + ZnSO ₄	

Condition	Rabi season	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought Delay by 6 weeks (November 4 th week)	Red and Black soils	Sorghum	Fodder sorghum		-
		Finger millet	No change	Seedlings grown in nursery can be used	
		Little millet	No change		
		Tapioca	No change	-	

Condition	Rabi season	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought Delay by 8 weeks (December 2 nd week)	Red and Black soils	Sorghum	Fallow/Fodder Sorghum		-
		Finger millet	Fallow/ Fodder Cowpea		
		Little millet	Fallow		
		Tapioca	Fallow/ vegetables like Tomato, Brinjal, Bhendi	-	

Normal, mid season and terminal drought situations – both *Kharif* and *rabi* seasons

Condition	Kharif season	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil management	Remarks on Implementation
Early season drought	Major Farming situation	Normal Crop/cropping system	Crop management	Soil management	Remarks on Implementation
Normal onset, followed by 15-20 days dry spell after sowing leading to poor germination / crop stand etc.	Red and Black soils	Sorghum	Optimum population maintenance by • Gap filling • Thinning • Resowing In case of intercropping sequential sowing may be followed	• Forming ridges and furrows to conserve the expected rain • Blade harrowing • Soil mulching	
		Finger millet			
		Little millet			
		Tapioca			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil management	Remarks on Implementation
Mid season drought	Major Farming situation	Normal Crop/cropping system	Crop management	Soil management	Remarks on Implementation
long dry spell, consecutive 2 weeks rainless (>2.5 mm) period At vegetative stage	Red and Black soils	Sorghum	• Top dressing of fertilizer if sufficient rainfall after 3-5 weeks dry spell • Thinning of 35-50% population	Forming ridges and furrows to conserve the expected rain	
		Finger millet			
		Little millet			

			<ul style="list-style-type: none"> • Antitranspirant spray • Life saving irrigation from rain water harvest ponds, • Weeding and Weed mulching • Harvesting partly to leave ratoon • Harvesting for fodder 		
		Tapioca	Reduction of green leaves	Providing life irrigation Forming ridges and furrows for <i>in situ</i> rainwater conservation	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil management	Remarks on Implementation
long dry spell, consecutive 2 weeks rainless (>2.5 mm) period At reproductive stage	Red and Black soils	Sorghum	Harvesting partly to leave ratoon	Forming ridges and furrows to conserve rainwater	
		Finger millet	Harvesting for fodder		
		Little millet	Harvesting for fodder		
		Tapioca	Reduction of green leaves	Life saving irrigation	

Condition			Suggested Contingency measures		
Terminal drought	Major Farming situation	Normal Crop/cropping system	Crop management	Soil management	Remarks on Implementation
	Red and Black soils	Sorghum	Harvest at physiological maturity to avoid damage by grain sucking insect	Forming ridges and furrows to conserve the expected rainwater	
		Finger millet	-do-		
		Little millet	Harvest at physiological maturity		
		Tapioca	Harvest at physiological maturity	Forming ridges and furrows to conserve the expected rainwater	

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/ limited release of water in canals due to low rainfall	Red & black soils	Paddy	No change	Prefer short duration varieties: ADT 49	
		Sugarcane		Direct seeding using seed drum	
		Tapioca		Trash mulching Alternate furrow irrigation Protective irrigation	

Condition	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Suggested Contingency measures	
				Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment	Red & black soils	Paddy	Finger millet / groundnut	Deep ploughing	
		Sugarcane	Tapioca / Maize		
		Tapioca	Finger millet / Pulses		

Condition	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Suggested Contingency measures	
				Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Irrigated Red & black soils	Paddy	Fallow	Sow pulses (Blackgram, VBN1, VBN2, VBN3, VBN(Bg)4); Green Gram CO4, CO6, Paiyur1, VBN1, VBN(Gg)2 /or Green manure(Sunhemp)	-
		Sugarcane	Fallow		-
		Tapioca			-

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				
Paddy	Drain excess water	Drain excess water	Drain excess water	-
Sugarcane	-do-	-do-	-do-	-do-

Horticulture				
Tapioca	-do-	-do-	-do-	-do-
Heavy rainfall with high speed winds in a short span	Not applicable for Dharmapuri district			
Outbreak of pests and diseases due to unseasonal rains				
Paddy Leaf folder	Cartap hydrochloride 2gm/lt or Profenophos 2ml/lt			-
Paddy Leaf spot	Carbendazim 2gm/lt			-
Sugarcane Root grub	Set up light traps to attract the adults Methyl parathion 2.5Kg/ac soil application	Don't allow the field to dry Set up light traps to attract the adults		-
Tapioca	Phomopsis wilt - COC 0.2%	Phomopsis wilt - COC 0.2%	Tuber rot – Drain excess water	-

2.3 Floods

Condition	Suggested contingency measures			
Transient water logging/ partial inundation	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
	Not applicable for Dharmapuri district			

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

Extreme event type	Suggested contingency measure ^r			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave	Not applicable for Dharmapuri district			

2.5 Contingent strategies for Livestock, Poultry & Fisheries:

2.5.1 Livestock:

	Suggested contingency measures		
	Before the event	During the event	After the event
Drought			
Feed and fodder availability	<ol style="list-style-type: none"> 1. Curbing the sale of crop reduces from the district 2. Encouraging the farmers to cultivate short term fodder crops like sunhump (<i>Crotalaria junctia</i>) where ever irrigation is available. 3. The District Animal Husbandry Department to estimate the dry fodder requirement and prepare the ground work for storage and distribution of the fodder bales to be received from the fodder grid of DLF, Hosur 4. Informing the requirement of fodder crops to be mobilized from the fodder grid of the District Livestock Farm, Hosur in Krishnagiri District during the expected drought season. 	<ol style="list-style-type: none"> 1. Banning the sale of crop residues from the district. 2. Creating awareness on feeding chaffed and Sodium Chloride sprinkled crop residues. 3. Creating awareness on supplementing crop residues with Green Tree Fodder on / and available green grass. 4. Cultivating short – term (28-30days) green fodder like sun hemp (<i>Crotalaria junctia</i>). 5. Encouraging supplementing of mineral 	<ol style="list-style-type: none"> 1. The forest land should be integrated with <i>Cenchrus ciliaris</i> and measures to be taken to harvest the grass hay, bale and store. This will form the fodder grid and to be mobilized when ever there is drought. 2. Raising <i>Stylosanthes hamata</i> on the bunds of partially wet paddy fields. 3. Storing crop residues after sprinkling 2% sodium chloride solution. 4. The livestock holders be supplied with quality seeds of fodder sorghum Co29, African Tall Maize, well before monsoon (June-July) and motivating them to cultivate 20% of their land holding in dry land. 5. The technique of over – seeding the

	<p>5. Informing the existing feed mixing units within the district and the stockiest to ensure enough quantity of compounded feed.</p> <p>6. Conducting awareness camp among livestock holders on judicious utilization of crops residues, feed and fodder during drought.</p> <p>7. Motivating the sugarcane farmers to convert green sugarcane tops into silage by the end of February.</p> <p>8. Keeping enough stock of mineral mixture.</p> <p>9. Motivating the livestock holders to feed mineral mixture to their livestock.</p> <p>10. Popularizing chaff-cutters</p>	<p>mixture.</p> <p>6. Awareness on supplementing yeast culture (3g / d) to milch cows.</p> <p>7. Feeding wet brewery waste grain where ever available.</p> <p>8. The Deputy Director, Fodder Development should ensure enough stock of Fodder hay Bales from District Livestock Farm, Hosur and arranging to sell at nominal price.</p> <p>9. Feeding of Sugar cane top silage @ not more than 10kg per cow per day.</p>	<p>dryland sorghum on cultivation with Stylosanthes hamata be popularized.</p> <p>6. The vacant area in Veterinary hospitals be cultivated with fodder crops for seed production to reduce demand on fodder seeds and supply to farmers.</p> <p>7. The fodder seeds produced at District Livestock Farm, Hosur be supplied to Veterinary Hospitals in Krishnagiri and Dharmapuri districts before monsoon.</p> <p>8. The fodder grid being created at the District Livestock Farm, Hosur should ensure enough stock of compressed and baled hay of fodder crops.</p> <p>9. Those farmers who do not have land in irrigation should be advised to breed their cows during July - August - September, so that the peak milk production does not coincide with peak summer (May, June, July) or the dry period coincide with summer.</p> <p>10. Should be encouraged to plant enough fodder trees.</p> <p>11. In each panchayat the pasture land should be converted into multi tier silvipasture system.</p> <p>12. Motivating the farmers on fodder seed production and having buyback arrangement of fodder seeds from the farmers.</p>
Drinking water	1. Construction of community water troughs at villages.	<p>1. Making arrangements to fill up the community water troughs on daily basis.</p> <p>2. Discouraging provision of fermented water.</p>	Nil

Health and disease management	1. Develop and disseminate public education materials on the care of animal in emergencies, disasters and evacuations that emphasize and encourage self-reliance among owners.	1. Provide care for injured and diseased animals 2. An important problem that has to be faced during disaster management of animals is the disposal of dead animals. This poses acute problems during floods and cyclone, as the number of animals dying would be enormous. Most states have fallen animal management programs and carcass utilization program. Admittedly, one administrative group does not uniformly handle these.	1. Livestock face many epidemic diseases after a flood. The major diseases of animals in the flood affected areas are anthrax, diarrhea, malnutrition, foot and mouth disease etc.. and provide necessary steps to rectify the above problems.
Floods	-	-	-
Feed and fodder availability	-	-	-
Drinking water	-	-	-
Health and disease management	-	-	-
Cyclone			
Feed and fodder availability	1. Providing temporary sheds particularly to small ruminates and other unsheltered livestock. 2. Conserving the crop residues from wetting during cyclone rain. 3. Since the fodder intake during cyclonic period is less, enough supplemental compounded feed should be kept in stock.	1. Feeding unchopped crop residues to the young pasture grazing cows. 2. Cultivating fodder crops in rainfed land.	Nil
Drinking water	1. Install a hand pump and obtain enough large containers to water your animals for at least a week	1. Water from contaminated sources can be treated by using commercially available halogen-releasing tablets; freshly released halogen is supposed to kill unwanted bacteria and other microbiological elements present in water. These water purifying tablets are available on the	1. During and after disaster times, livestock should not drink water of ditches and of polluted cultivable water bodies. After ebbing of flood water, newly grown grass should not be fed, but some rainfall would decrease the toxicity of the grass.

		<p>market at affordable costs</p> <ol style="list-style-type: none"> 2. Provide drinking water to livestock and poultry, as needed. 3. Install a hand pump and obtain enough large containers to water your animals for at least a week 	<ol style="list-style-type: none"> 2. Awareness camps on infection through water spread to be conducted.
Health and disease management	<ol style="list-style-type: none"> 1. Develop and disseminate public education materials on the care of animal in emergencies, disasters and evacuations that emphasize and encourage self-reliance among owners. 	<ol style="list-style-type: none"> 1. Provide care for injured and diseased animals 2. An important problem that has to be faced during disaster management of animals is the disposal of dead animals. This poses acute problems during floods and cyclone, as the number of animals dying would be enormous. Most states have fallen animal management programs and carcass utilization program. Admittedly, one administrative group does not uniformly handle these. 	<ol style="list-style-type: none"> 1. Livestock face many epidemic diseases after a flood. The major diseases of animals in the flood affected areas are anthrax, diarrhea, malnutrition, foot and mouth disease etc.. and provide necessary steps to rectify the above problems.
Heat wave and cold wave			
Shelter/environment management	-	-	-
Health and disease management	<ol style="list-style-type: none"> 1. Daily check up the health status of the animals. 2. Vaccinate the animals periodically. 3. Educate the farmers on disease management during the heat wave and cold wave situation. 	<ol style="list-style-type: none"> 1. Care must be take to reduce the environmental stress. 2. Get advice from the technical persons about the management of stressful environment. 	<ol style="list-style-type: none"> 1. Provide the animals with supplemental feeding to regain the body condition which lost during the stressful time.

2.5.2 Poultry:

	Suggested contingency measures		
	Before the event	During the event	After the event
Drought			
Feed and fodder availability	<ol style="list-style-type: none"> 1. Forecasting the forthcoming drought and informing the feed manufacture to increase production and keeping enough stock. 2).Creating awareness on the following, <ol style="list-style-type: none"> a.Feeding in early morning and night b).Training water troughs and providing water in the after noon c).Filling the over tank with water in the after noon. d).Wetting the feed with water. e).Increasing the height of deep liter. f).Reducing the number of birds per shed. g).Providing ceiling fan @ one per 1000 sq.ft. h).Avoiding vaccination and debeaking. i).Providing Vitamin C and B complex in water. j).Waste from coir factories and thatches is spread on roof. k).Reducing energy density of ration and increasing lysine, Methionine and Vitamin C in ration. l).Adding Potassium chloride and Sodium bi carbonate in the ration @ 38 g per tone of feed. m).Storing the feed only for short duration to avoid loss of Vitamins. n).Planning to avoid laying period starting 	<ol style="list-style-type: none"> 1. Mobilizing the ingredients from adjacent districts. 	<ol style="list-style-type: none"> 1. Preparing the road map for increasing the feed ingredients production. 2. Ensuring enough stock of ingredients in future.

	<p>from 15 April – 15 June.</p> <p>o).Avoiding having stock of layers between 21 to 36 week age.</p> <p>p).Avoiding purchase of chicks between October and January.</p>		
Drinking water	<ol style="list-style-type: none"> 1. Construction of check dams and water reservoirs. 2. Construction of rain harvesting structures. 3. Practice proper water conserving management systems. 	<ol style="list-style-type: none"> 1. Birds water requirements may double during hot weather. If birds do not meet their water needs, they may refuse to eat, experience lowered production, and become sick. 	<ol style="list-style-type: none"> 1. Educate the farmers about the judicious usage of water for animals and how to save the water. 2. Tree planting to be implemented to a major extent. 3. Repair work in the water channels and water resources to be carried out.
Health and disease management	<ol style="list-style-type: none"> 1. State should organize a disaster management group in the Department dealing with Animal Husbandry and veterinary service with specially trained staff, epidemiological data & communication facilities. 2. The required field staff should be kept in constant readiness throughout the vulnerable months of the year. During lean period, the team should undertake preparedness and relief exercise to test their efficacy and preparedness 	<ol style="list-style-type: none"> 1. Bring the Birds to the protection camps organized by the Animal Husbandry department and get suitable ideas about the draught management practices. 	<ol style="list-style-type: none"> 1. Segregate the ailing birds and fed them with suitable ration to overcome the post draught effect.
Floods	-	-	-
Cyclone			
Feed and fodder availability	<ol style="list-style-type: none"> 1. If the potential risk for the livestock/poultry is deemed very high, minimize loss by selling before the cyclone, keep the money in a bank and start afresh after the cyclone. 2. Be ready at any time to overcome the natural disaster. 	<ol style="list-style-type: none"> 1. Transfer the birds from the low lying area to the elevated grounds or a common shelter. 2. Dead birds should be disposed in proper way to in order to prevent the disease transmission. 	<ol style="list-style-type: none"> 1. Before housing the birds to the original shed, shed should be sanitized. 2. The feed fed to the birds should be check for ant contamination.
Drinking water	<ol style="list-style-type: none"> 1. Collect and store enough potable water for birds during flood 	<ol style="list-style-type: none"> 1. Water from contaminated sources can be treated by using commercially available 	<ol style="list-style-type: none"> 1. During flood and post flood times, poultry should not be provide with

		<p>halogen-releasing tablets; freshly released halogen is supposed to kill unwanted bacteria and other microbiological elements present in water. These water purifying tablets are available on the market at affordable costs</p> <ol style="list-style-type: none"> 2. Provide drinking water to livestock and poultry, as needed. 3. Install a hand pump and obtain enough large containers to water your poultry for at least a week 	<p>the drink water of ditches and of polluted cultivable water bodies. After ebbing of flood water, newly grown grass should not be fed, but some rainfall would decrease the toxicity of the grass.</p> <ol style="list-style-type: none"> 2. Awareness' camps on infection through water spread to be conducted.
Health and disease management	<ol style="list-style-type: none"> 1. Maintain the block with proper vaccination 2. Essential drugs should be keeping in hand using during the disaster. 	<ol style="list-style-type: none"> 1. Disease affected birds and ailing birds should be separated and treated or culled and dispose it properly. 2. Tent or temporary shed should free from rodents and predators. 	<ol style="list-style-type: none"> 1. Provide the birds with adequate feed and water which is free from contamination. 2. Feed the birds with supplemental minerals in order to the bring the birds to its normal productive life.
Heat wave and cold wave			
Shelter/environment management	<ol style="list-style-type: none"> 1. Construct the Poultry shed depending upon the geographical location of the particular place, type of Birds (Layer/Broiler), number of birds etc... 2. Grow trees around the shelter which will prevent or reduce the direct heat wave in to the shed. 	<ol style="list-style-type: none"> 1. During the heat and cold wave temporary structure should be provided to save the poultry and keep the bird with normal productivity. 2. Take necessary alteration in the feed provided to the birds depending upon the adverse climatic factor. 3. Providing the animals with ad libitum of water during the heat wave and provide them with anti stress drugs. 	<ol style="list-style-type: none"> 1. Providing the poultry with standard veterinary check up after the adverse climatic condition. 2. Ailing birds should be segregated and provide them with necessary care.
Health and disease management	<ol style="list-style-type: none"> 1. Routine health check up should be done. 2. Keep an eye on the productive performance of the birds. 3. Vaccinate the birds periodically. 4. Educate the farmers on disease management during the heat wave and cold wave situation. 	<ol style="list-style-type: none"> 1. Care must be taking to reduce the environmental stress. 2. Get advice from the technical persons about the management of stressful environment. 	<ol style="list-style-type: none"> 1. Provide the birds with supplemental feeding to regain the body condition and return to the normal production which lost during the stressful time.

2.5.3 Fisheries

	Suggested contingency measures		
	Before the event	During the event	After the event
1) Drought			
A. Capture			
Marine	Negligible changes	Negligible changes	Negligible changes
Inland			
(i) Shallow water depth due to insufficient rains/inflow	<ul style="list-style-type: none"> • Harvesting large individuals • Move and enclose • Stacked into pens or in smaller/confined areas 	<ul style="list-style-type: none"> • Harvesting large individuals • Disposable of unwanted excess stock • Stocking of desirable/special individuals in brood stock ponds 	<ul style="list-style-type: none"> • Proper nutrition and management of water bodies to improve remaining stock
(ii) Changes in water quality	Negligible changes in water quality	Negligible changes in water quality	Negligible changes in water quality
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	<ul style="list-style-type: none"> • Harvesting of the stock 	<ul style="list-style-type: none"> • Harvesting of the stock • Transferring of smaller fishes to artificial ponds (if available) for tiding over the drought 	<ul style="list-style-type: none"> • Steps to improve the quality of stocked fishes, via supplementary feed/fertilizer water quality management
(ii) Impact of salt load build up in ponds / change in water quality	<ul style="list-style-type: none"> • Harvesting of the stock 	<ul style="list-style-type: none"> • Harvesting of the stock • Transferring of smaller fishes to artificial ponds (if available) for tiding over the drought with water from other source (less hardness) 	<ul style="list-style-type: none"> • Steps to improve the quality of stocked fishes, via feed/fertilizer water quality management
2) Floods			
A. Capture			
Marine	Proper bunds and strengthening of existing structures to prevent flooding Ensure proper draining works to divert flood water	Netting and strengthening of weaker beach structures to prevent escaping of fishes	Improve the shore structures and beaches
Inland	<ul style="list-style-type: none"> • Proper fencing to prevent escaping of fishes • Increasing bund height and improve bund strength 	<ul style="list-style-type: none"> • In extreme conditions, controlled draining of flooded ponds • Thinning of stock by harvesting of larger individuals 	<ul style="list-style-type: none"> • Repair damaged bunds • Collect and preserve existing stock

	<ul style="list-style-type: none"> • Improve land drainage to allow easy and quick flow of flood waters 		
(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	<ul style="list-style-type: none"> • Negligible changes 	<ul style="list-style-type: none"> • Flood water can bring parasites, and increased turbidity – repair/correct drainage to improve quick drainage of flood waters 	<ul style="list-style-type: none"> • Turbid waters may be flushed off with fresh bore well/well water
(vi) Health and diseases	--	--	--
B. Aquaculture			
(i) Inundation with flood water	<ul style="list-style-type: none"> • Proper fencing to prevent escaping of fishes • Increasing bund height and improve bund strength • Improve land drainage to allow easy and quick flow of flood waters 	<ul style="list-style-type: none"> • In extreme conditions, controlled draining of flooded ponds • Thinning of stock by harvesting of larger individuals 	<ul style="list-style-type: none"> • Repair damaged bunds • Collect and preserve existing stock
(ii) Water continuation and changes in water quality	<ul style="list-style-type: none"> • Negligible changes 	<ul style="list-style-type: none"> • Water can become turbid due to flood waters, reduce stock to prevent mortality 	<ul style="list-style-type: none"> • Flushing of pond water with bore- well water to improve water quality
(iii) Health and diseases	--	--	--
(iv) Loss of stock and inputs (feed, chemicals etc)	<ul style="list-style-type: none"> • Negligible changes 	<ul style="list-style-type: none"> • Harvesting of stock • Shift reserve of brood stock to ponds at elevated levels 	<ul style="list-style-type: none"> • Selling remaining stock and inundated equipment immediately to minimize losses
(v) Infrastructure damage (pumps, aerators, huts etc)	<ul style="list-style-type: none"> • Dismantling of pumps, aerators and other equipment and shifting to safer zones 	<ul style="list-style-type: none"> • Salvaging of inundated pumps, aerators and other equipment and shifting to safer zones 	<ul style="list-style-type: none"> • Selling remaining stock and inundated equipment immediately to minimize losses