

**State: KERALA**

**Agriculture Contingency Plan for District: KANNUR**

1.0 District Agriculture profile					
<b>1.1</b>	<b>Agro-Climatic/Ecological Zone</b>	Northern Zone			
	Agro Ecological Sub Region (ICAR)	Konkan, Karnataka and Kerala Coastal plain, hot humid to perhumid eco-subregion (19.3)			
	Agro-Climatic Region (Planning Commission)	West coast plains and ghat region (XII)			
	Agro Climatic Zone (NARP)	Northern Zone (KE-1)			
	List all the districts or part thereof falling under the NARP Zone	Kannur, Kasargod and Kozhikode			
	Geographic coordinates of district	Latitude	Longitude	Altitude	
		11° 52' 0" N	75° 21' 55" E	344 m	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	RARS Pilicode, Kasaragod Pin-670 353 PRS, Panniyur, Kanhirangad Pin-670142			
	Mention the KVK located in the district	Krishi Vigyan Kendra, Panniyur, Kanhirangad, Kannur, Pin- 670142			
<b>1.2</b>	<b>Rainfall</b>	Normal RF(mm)	Normal Rainy days (number)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep)(average)	686	105	June first week	September second week
	NE Monsoon(Oct-Dec): average	200	20	October First week	November second week
	Winter (Jan- March) average	3.3	2	-	-
	Summer (Apr-May) average	176	10	-	-
	Annual	3698.	127	-	-

1.3	Land use pattern of the district (latest statistics)	Geographical Area ('000 HA)	Forest area ('000 ha)	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)	296.6	18.9	21.7	0.011	4.6	1.1	9.9	3.5	

1.4	Major Soils (common names like shallow red soils etc.,)	Area ('000 ha)	Percent (%) of total
	1. Red Laterite soils	217.7	75
	2. Alluvial Soil	8.9	2
	3. forest soil	18.9	7
	4. Hydromorphic saline	11.7	6
	5. Riverine alluvium	32.9	10
	Others (specify):		
1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	228.9	108
	Area sown more than once	10.1	
	Gross cropped area	247.0	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	49.5		
	Gross irrigated area	19.9		
	Rainfed area	199.6		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		1.3	6.6
	Tanks	-	1.7	8.9
	Open wells	-	8.3	41.8

Bore wells	-	5.0	0.01
Lift irrigation	-	0.2	1.2
Micro-irrigation		0.7	3.5
Other sources	-	7.4	37.0
Total Irrigated Area		24.6	
Pump sets		295.9	
No. of Tractors	60		
<b>Groundwater availability and use* (Data source: State/Central Ground water Department /Board)</b>	No. of blocks/ Tehsils	(% area)	
Over exploited	-		
Critical	-		
Semi- critical	-		
Safe	-		
Wastewater availability and use	-		
Ground water quality		623.13cm-	

\*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%

### 1.7 Area under major field crops & horticulture etc. (2006-07)

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>		
	Coconut			-	-	-	96.5
	Rubber			-	-	-	62.1
	Cashew			-	-	-	42.0
	Arecanut			-	-	-	13.4
	Pepper			-	-	-	12.3
	Paddy		5.362		5.964		11.326

Banana	-	-	-	-	5.4
<b>Horticulture crops - Fruits</b>	<b>Total area</b>				
Jack	-				
Mango	12.0				
Banana	-				
Plantain	3.5				
Pineapple	0.27				
<b>Horticultural crops - Vegetables</b>	<b>Total area</b>				
Turmeric	0.15				
ginger	0.15				
tapoica	2.60				
Food crops	115.7				
Bitterguard	-				
<b>Medicinal and Aromatic crops</b>	<b>Total area</b>				
Nil	Nil				
Sesamum	1				

<b>Plantation crops</b>	<b>Total area</b>				
Rubber	62.11				
Cashew	42.0				
coco	0.18				
<b>Fodder crops</b>	<b>Total area</b>				
Fodder grass	-				
<b>Total fodder crop area</b>					
<b>Grazing land</b>					
<b>Sericulture etc</b>					

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)			
	Non descriptive Cattle (local low yielding)	-	22.0	22.0			
	Crossbred cattle	-	112.7	112.7			
	Non descriptive Buffaloes (local low yielding)	-	0.995	0.995			
	Graded Buffaloes						
	Goat			90.17			
	Sheep			0.664			
	Others (Camel, Pig, Yak etc.)			0.259			
	Commercial dairy farms (Number)						
1.9	Poultry	No. of farms	Total No. of birds ('000)				
	Commercial		151.764				
	Backyard		23.701				
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)	
		Marine: 6024	273	169	T Net-128	Shore Seine-32	18
	Inland: 1813			G Net- 11	Stake Net-577		
	ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds		No. of Reservoirs		No. of village tanks	
		1500				1200	
	B. Culture						
		Water Spread Area (ha)	Yield (t/ha)	Production ('000 tons)			
	i) Brackish water (Data Source: MPEDA/ Fisheries Department)	300	0.7 t/ha	210			

	ii) <b>Fresh water</b> (Data Source: Fisheries Department)	80	3.0 t/ha	240
	<b>Others</b>			

**1.11 Production and Productivity of major crops** (Average of last 5 years: 2004, 05, 06, 07, 08)

1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder ('000 tons)
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	
<b>Major Field crops (Crops to be identified based on total acreage)</b>										
	Paddy							20.8	1.7	
	Ginger							0.5	3.1	
	Coconut							0.6	6.2	
	Coco							0.08	0.35	
	Pepper	1.5	0.24					4.7	0.18	
	Cashew								0.92	
<b>Major Horticultural crops (Crops to be identified based on total acreage)</b>										
	Banana	2.0	4.0	5.0	7.0	0.70	0.25	2.29	8.86	
	Coconut	0.44	7.8					0.64	6.26	
	Plantain	12.2	5.8					16.22	4.74	
	Pineapple							1.60		
	Pappaya									
	Mango							88.88		
	Arecanut							14.74		

1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Paddy	Coconut	Arecanut	Vegetable
	Kharif- Rainfed	June 1 <sup>st</sup> -Sept.30	June 1 <sup>st</sup> -Sept.30	June 1 <sup>st</sup> - Nov.30	June 1 <sup>st</sup> -Sept.30
	Kharif-Irrigated	-	-	-	-
	Rabi- Rainfed	Oct.- Jan.30	-	-	Oct.- Jan.30
	Rabi-Irrigated	-	-	-	-

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			
	Heat wave			
	Cold wave			
	Frost		√	
	Sea water intrusion			
	Pests and diseases (specify) BPH, Leaf roller, Mite, Bud rot, Mahali	√		

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

## 2.0 Strategies for weather related contingencies

### 2.1 Drought

#### 2.1.1 Rainfed situation

<b>Condition</b>	<b>Major Farming situation</b>	<b>Normal Crop/cropping system</b>	<b>Change in crop/cropping system</b>	<b>Suggested Contingency measures</b>	
				<b>Agronomic measures</b>	<b>Remarks on Implementation</b>
<b>Early season drought (delayed onset)</b>					
<b>Delay by 2 weeks (June 3<sup>rd</sup> Week)</b>	Sandy clay loam Clay loam Sandy loam	Rice-Rice Rice-Vegetables Rice -Pulse Arecanut + Pepper Coconut + Pepper Rice -Pulse Coconut + Banana Arecanut + Banana + Pepper Coconut + Pepper	Rice-Rice Rice-Vegetables Rice -pulse	<ul style="list-style-type: none"> <li>• Direct seeding for the first crop</li> <li>• Prefer short duration varieties</li> <li>• Prepare mat nursery and adopt community nursery</li> <li>• Adopt closer spacing and increase the number of seedlings to 3-4 numbers/hill and give additional N @5 kg/ha</li> <li>• Spray of B and K increases drought tolerance.</li> <li>• Apply silica</li> <li>• Mulching</li> <li>• organic manuring</li> <li>• Sprinkler Irrigation/micro irrigation/supplemental irrigation.</li> </ul>	Capacity building of padasekhara samithy. Micro Irrigation Scheme and RKVY  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 4 weeks (July first Week)	Sandy clay loam Clay loam Sandy loam soils	Rice-Rice Rice-Vegetables Rice -Pulse Arecanut + Pepper Coconut + Pepper Rice -Pulse Coconut + Banana Arecanut + Banana + Pepper Coconut + Pepper	Rice-Rice Rice-Vegetables Rice -pulse	<ul style="list-style-type: none"> <li>• Direct seeding for the first crop</li> <li>• Prefer short duration varieties</li> <li>• Prepare mat nursery and adopt community nursery</li> <li>• Adopt closer spacing and increase the number of seedlings to 3-4 numbers/hill and give additional N @5 kg/ha</li> <li>• Spray of B and K increases drought tolerance</li> <li>• Apply silica mulching</li> <li>• organic manuring</li> <li>• Sprinkler Irrigation/micro irrigation/supplemental irrigation.</li> <li>• Wet seeding of short duration varieties</li> <li>• Adopt single crop of long duration variety</li> </ul>	Capacity building of padasekhara samithy. Micro Irrigation Scheme and RKVY 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 6weeks (July third Week)	Sandy clay loam Clay loam Sandy loam			Not Applicable	

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 8 weeks (August first Week)	Sandy clay loam Clay loam Sandy loam soils	Not Applicable			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Early season drought (Normal onset)					
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Sandy clay loam Clay loam Sandy loam soils	Rice-Rice Rice-Vegetables Rice -pulse	<ul style="list-style-type: none"> <li>• If transplanting is delayed, adopt closer spacing, increase the number of seedlings to 3-4 numbers/hill and give additional N @5Kg/ha</li> <li>• Practice appropriate seed hardening techniques.</li> <li>• Under semidry situation, wherein sowing is already over, practice thinning of crop stand, reduce plant population and use the biomass as mulch and do interculture using dry land weeder.</li> <li>• Life saving irrigation with available water.</li> <li>• Supply the fertilizer nutrients through foliar application</li> <li>• Seed treatment with micronutrients.</li> </ul>	Application of P and K as basal, Reduce N dose, Apply bulky organic manures. Application of soil ameliorants .	Capacity building of padasekhara samithy. RKVY SHM

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 measure	Remarks on Implementation
At vegetative stage	Sandy clay loam Clay loam Sandy loam	Rice-Rice Rice-Vegetables Rice- Sesamum Pepper + arecanut	<ul style="list-style-type: none"> <li>• Suppresses weed growth, Make Shelterbelts, spraying potassium chloride, thinning of 33–50% population anti-transpirant spray. mulching</li> </ul>	<ul style="list-style-type: none"> <li>• Irrigate at 1 to 4 days after disappearance of ponded water,</li> <li>• Insitu rainwater conservation,</li> <li>• Application of P and K as basal,</li> <li>• Reduce N dose,</li> <li>• Apply bulky organic manures.</li> <li>• Collection and conservation of rain water,</li> <li>• Intermittent flooding, maintaining the soil in sub-saturated condition,</li> <li>• Alternate drying and wetting.</li> </ul>	
			<ul style="list-style-type: none"> <li>• Suppresses weed growth,</li> <li>• Make Shelterbelts Establishment of leguminous cover crop,</li> <li>• Shading the young plants, white washing the main stem,</li> <li>• Antitranspirant spray</li> </ul>	<ul style="list-style-type: none"> <li>• Zero tillage,</li> <li>• Mulching,</li> <li>• Sub-surface storing of ground water,</li> <li>• Less exploitation of ground water,</li> <li>• Drip irrigation,</li> <li>• Terracing,</li> <li>• Husk burial,</li> <li>• leaf cutting.</li> </ul>	

<b>At flowering/ fruiting stage</b>	Sandy clay loam Clay loam Sandy loam	Rice-Rice Rice-Vegetables Rice- Sesamum Pepper + arecanut	Formation of Shelterbelts. Antitranspirant spray	<ul style="list-style-type: none"> <li>• Irrigate at 1 to 4 days after disappearance of ponded water,</li> <li>• Insitu rainwater conservation,</li> <li>• Collection and conservation of rain water,</li> <li>• Intermittent flooding,</li> <li>• maintaining the soil in sub-saturated condition,</li> <li>• alternate drying and wetting.</li> </ul>	
			<ul style="list-style-type: none"> <li>• Sprinkler irrigation (especially for pepper),</li> <li>• Suppresses weed growth,</li> <li>• Formation of Shelterbelts, Antitranspirant spray</li> </ul>	<ul style="list-style-type: none"> <li>• Mulching,</li> <li>• Sub-surface storing of ground water,</li> <li>• Less exploitation of ground water,</li> <li>• Drip irrigation,</li> <li>• Terracing,</li> </ul>	
<b>Terminal drought</b>	Sandy clay loam Clay loam Sandy loam	Rice-Rice Rice-Vegetables Rice- Sesamum Pepper + arecanut	<ul style="list-style-type: none"> <li>• Terminate the irrigation 14 to 17 days before harvest,</li> <li>• Harvesting at physiological maturity,</li> </ul>	<ul style="list-style-type: none"> <li>• Maintaining the soil in sub-saturated condition,</li> <li>• Alternate drying and wetting.</li> </ul>	
			<ul style="list-style-type: none"> <li>• Establishment of leguminous cover crop,</li> <li>• Shading,</li> <li>• Pruning of coffee,</li> <li>• Antitranspirant spray</li> </ul>	<ul style="list-style-type: none"> <li>• Sub-surface storing of ground water,</li> <li>• Less exploitation of ground water,</li> <li>• Drip irrigation,</li> <li>• Terracing,</li> <li>• Husk burial,</li> <li>• Leaf cutting.</li> </ul>	

## 2.1.2 Irrigated situation

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	Sandy clay loam Clay loam Sandy loam	Rice-Rice	Rice (SD)-Rice (SD)	<ul style="list-style-type: none"> <li>Mulching,</li> <li>Strip cropping,</li> <li>Selection of suitable cropping systems</li> </ul>	NREGS Seed village program for SD varieties.
		Rice-Vegetables	Rice(SD)-Vegetables		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall	Sandy clay loam Clay loam Sandy loam	Rice-Rice	Rice (SD)-Rice	<ul style="list-style-type: none"> <li>Mulching,</li> <li>Strip cropping,</li> <li>Selection of suitable cropping systems,</li> <li>Reduce the area under cultivation,</li> <li>Increase spacing</li> </ul>	NREGS, RKVY Seed village program for SD varieties. Capacity building of padasekhara samithy.
		Rice-Vegetables	Rice(SD)-Pulses		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed	Sandy clay loam Clay loam Sandy loam	Rice-Rice	Rice (single crop)/Pulses	<ul style="list-style-type: none"> <li>Rain water harvesting,</li> <li>Direct sowing,</li> </ul>	NREGS, RKVY

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
onset of monsoon in catchment		Rice-Vegetables		<ul style="list-style-type: none"> <li>• Delayed sowing</li> </ul>	

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	Sandy clay loam Clay loam Sandy loam	Rice-Rice	Rice-Rice	<ul style="list-style-type: none"> <li>• Check dams,</li> <li>• Percolation pits,</li> <li>• Rain water harvesting,</li> <li>• Water conservation measures</li> </ul>	NREGS, RKVY
		Rice-Vegetables	Rice-Vegetables		

**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	Improve drainage facility	Improve drainage facility	<ul style="list-style-type: none"> <li>• Improve drainage facility,</li> <li>• Cultivation of varieties having seed dormancy,</li> <li>• Harvest the crop at physiological maturity.</li> </ul>	Improve storage facility/godowns
<b>Horticulture</b>				
Coconut	Improve drainage facility, Cover crops, Strip cropping with fodder grasses, Collection and conservation of rainwater.			Improve storage facility/godowns
Pepper				

Banana				
Arecanut				
<b>Heavy rainfall with high speed winds in a short span</b>				
Rice	Shelter belts, alley cropping, Improve drainage facility			Improve storage facility/godowns
<b>Horticulture</b>				
Coconut	Propping of banana plants, Improve drainage facility, shelter belts, lopping of pepper standards			Improve storage facility/godowns
Pepper				
Banana				
Arecanut				

Condition	Suggested contingency measure			
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
<b>Outbreak of pests and diseases due to unseasonal rains</b>				
Rice	Cultivation of resistant varieties, Application of bio-control agents, Use of disease free seeds, Proper seed treatment with biocontrol agents, Balanced application of fertilizers, Phyto-sanitation		Harvest the crop at physiological maturity.	Improve storage facility
<b>Horticulture</b>				
Coconut	Crown clearing to control the fungus. Provide proper drainage and spray 1 % BM before the onset of monsoon. Apply soil ameliorants and adopt soil test based nutrient management.			
Pepper	Remove and burn all infected plant debris and dead vines along with root system to reduce the build up of the inoculum in the field. Prune the runner shoots or tie back to vines before the onset of monsoon. Prune off the leaves and shoots of vines to a height of 2 feet from the soil. Application of bio-control agents. Apply soil ameliorants and adopt soil test based nutrient			

	management.	
Banana	Remove and destroy severely infected and completely dried leaves, Use disease free healthy planting material. Avoid any sort of root injury through intercultural operations or by nematode infestation, Provide better drainage, Apply soil ameliorants and adopt soil test based nutrient management.	
Arecanut	Grow cover crops in the garden and apply <i>in situ</i> . Avoid water stagnation in the garden by providing 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. Collect and destroy all fallen and infected nuts. Apply soil ameliorants and adopt soil test based nutrient management.	

### 2.3 Floods

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
Rice	River embankments, Improve drainage facility, scientific and proper land utilization, cultivation flood tolerant varieties, Crop insurance			Harvest the crop at physiological maturity, Cultivation of varieties having seed dormancy
<b>Horticulture</b>				
Coconut.	Timely cleaning, de-silting and deepening of natural water reservoir and drainage channels, Construction and protection of all the flood protection embankments, ring bunds and other bunds. Dams and levees can also be constructed which can be used as temporarily storing space which reduces the chances of lower plains getting flooded.			
Pepper				
Banana				
Arecanut				
<b>Continuous submergence for more than 2 days</b>				
Rice	Cultivation flood tolerant varieties(especially used in deep water rice cultivation) Crop insurance			Improve drainage facility,
<b>Horticulture</b>				
Coffee	Timely cleaning, de-silting and deepening of natural water reservoir and drainage channels, Construction and protection of			



Pepper	all the flood protection embankments, ring bunds and other bunds. Dams and levees can also be constructed which can be used as temporarily storing space which reduces the chances of lower plains getting flooded.
Banana	
Arecanut	

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

Condition	Suggested contingency measures
Heatwave	NA
Coldwave	NA
Frost	NA
Hailstorm	NA
Cyclone	NA

## 2.5 Contingent strategies for Livestock, Poultry

### 2.5.1 Livestock

	BEFORE THE EVENT	DURING THE EVENT	AFTER THE EVENT
DROUGHT LIVESTOCK	<ol style="list-style-type: none"> <li>1. Cultivation of drought resistant fodder varieties like Andropogon and Guinea grass in the fodder plots</li> <li>2. Preservation of fodder available as silage or hay for feeding during the drought</li> <li>3. Identification of tree fodders in the locality which can be utilized for drought season</li> <li>4. Identification of unconventional feed and fodder resources in the locality which can be used in the</li> </ol>	<ol style="list-style-type: none"> <li>1. Feeding straw, hay and silage and at least one third of green fodder</li> <li>2. Feeding available tree fodders and other unconventional feed stuffs.</li> <li>3. Restrict grazing of animals to cool hours of the day</li> <li>4. Provide clean, cool drinking water adlibitum or at least four times daily.</li> <li>5. Improve the ventilation of existing animal sheds</li> <li>6. Spraying of water to large animals during hot hours of the day</li> <li>7. Spreading insulatory materials over the roof of the animal sheds</li> <li>8. Provide most of the feed and fodder during the cool</li> </ol>	<ol style="list-style-type: none"> <li>1. Flushing of all the stock</li> <li>2. Gradual switch over to normal diet</li> </ol>

	<p>drought</p> <p>5. Cultivating cereal fodder like maize and sorghum in the now available irrigated tract and preserving it as silage for the drought.</p> <p>6. Identification of fallow wet lands in the area and to go for grass cultivation as to get fodder even during the drought with existing moisture in the soil.</p> <p>7. Conservation and storage of water in rain harvesting facilities for the drought season.</p>	<p>hours of the day.</p> <p>9. Use the waste water from the sheds for irrigating the fodder plots</p> <p>10. Use the stored water for cooling the animal and washing and restrict the use of good potable water for drinking.</p>	
Health and disease management	Vaccination of animals Planting of trees should be done around the shed	Shed should be clean. Allow cool air to flow inside shed. Proper ventilation of shed.	Construction of sheds with proper ventilation-cleaning of shed everyday.

<b>Heat wave and cold wave</b>	When heat wave is more cold water spraying. When cold wave is more light full covering of shed.		
Shelter/environment management	Construction of sheds with proper ventilation. Planting trees around sheds.	And feed additives can be given	Dung should be removed from pits. Cleaning of surroundings.
Health and disease management	Vaccination providing adequate feed for animals	Mineral mixture and feed additives can be given	Proper feeding of animals

## 2.5.2 Poultry

	Before the event	During the event	After the event
Drought – poultry	<ol style="list-style-type: none"> <li>Preventive vaccinations against Raniket disease, Fowl pox and infectious bronchitis</li> <li>Deworming of all the birds</li> </ol>	<ol style="list-style-type: none"> <li>Provide clean cool drinking water at all times ad libitum</li> <li>Addition of anti-stress agents and antioxidants in the feed</li> <li>Protection from direct sunlight by curtains on the sides of sheds and otherwise ensuring maximum ventilation</li> <li>Insulating material spread over roof</li> <li>Supplementation of minerals and vitamins in the feed</li> </ol>	
Storage of feed ingredients	Storing of feed and ingredients	Provide kitchen waste and feed additives vitamin mineral mixtures	Cultivation of maize and other feed ingredients
Drinking water	Storage of clean drinking water	Provide cold clean water	Digging of bore wells for drinking water
Health and disease management	Vaccination of birds	Medicated water and Balanced feed should be given	Provide clean coops for shelter
<b>Floods</b>			
Storage of feed ingredients	Storing of feed and ingredients	Provide balanced feed	Cultivation of maize and fodder
Drinking water	Storage of clean drinking water	Provide clean water	Construction of tanks and wells
Health and disease management	Vaccination of birds	Provide medicated water and feed additives	Provide clean coops for shelter
<b>Cyclone</b>			
Storage of feed ingredients	Storing of feed and ingredients	Provide feed and clean water	Cultivation of maize and other fodder
Drinking water	Storage of water	Provide clean feed and water	Construction of wells

Health and disease management	Vaccination of birds	Medicated water and feed additives	Provide clean shelter
<b>Heat wave and cold wave</b>			
Shelter/environment management	Planting of trees around shed. Exhaust fan should be fitted on the hoof.	Put gunny bags dipped water in the direction of wind.	Provide proper ventilation
Health and disease management	Vaccination of birds. Provide water and feed	Close the door and ventilation when cold wind comes, during day and night	Provide clean coops and balanced feed
<b>Floods</b>			
Feed and fodder availability	Storage of feed and fodder in air tight containers fungal attack.	Feeding good quality feed and fodder with	Feed and fodder - dry in sunlight
Drinking water	Storage of clean drinking water	Provide hot water for drinking	Storage of clean water - digging of wells.
Health and disease management	Provide balanced feed and vaccination of animals at proper time.	Provide dry atmosphere for the sheds.	Mineral mixture feed additives should be given.
<b>Cyclone</b>			.
Feed and fodder availability	Storage of feed and fodder	Use the conserved fodder.	Provide balanced feed and fodder
Drinking water	Storage of water	Provide clean water for drinking	Construction of tanks for storing water