

State: GUJARAT

Agriculture Contingency Plan for District: JAMNAGAR

1.0 District Agriculture profile					
1.1	Agro-Climatic/Ecological Zone				
	Agro Ecological Sub Region (ICAR)	Western Plain, Kachchh And Part Of Kathia(2.4)			
	Agro-Climatic Zone (Planning Commission)	Gujrat Plains & Hills Region (XIII)			
	Agro Climatic Zone (NARP)	North Saurashtra Zone, South Saurashtra Zone (GJ-6, GJ-7)			
	List all the districts or part thereof falling under the NARP Zone	Jamnagar, Rajkot, Surendranagar & Amreli			
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude	
		22°28'02.23"N	70°04'00.00"E	27.6m	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Pearlmillet Research Station, Junagadh Agricultural University, Jamnagar-361006			
	Mention the KVK located in the district	Krishi Vigyan Kendra, Air force Road, Junagadh Agricultural University, Jamnagar-361006			
1.2	Rainfall	Normal RF(mm)	Normal Rainy days (number)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June-Sep):	638	22	4 th Week of June	2 nd Week of September
	NE Monsoon(Oct-Dec):	-	-		
	Winter (Jan-Feb)	-	-		
	Summer (Mar-May)	-	-		
	Annual	638	22		

1.3	Land use pattern of the district (latest statistics)	Geographical area	Cultivable 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)	1412.5	875.7	45.0	154.4	76.3	32.2	36.6	155.5	35.5	1.3

1.4	Major Soils (common names like red sandy loam deep soils (etc.))	Area ('000 ha)	Percent (%) of total
	Medium black to Shallow black soils	516	59.0
	Mixed red and black soils	-	
	Coastal alluvial soils	299	34.1
	Others (specify):	-	

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	820	122.5
	Area sown more than once	185	
	Gross cropped area	1005	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	175		
	Gross irrigated area	185		
	Rainfed area	645		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		30	17.2
	Tanks	-	-	-
	Open wells	58287	67	38.3
	Bore wells	70112	77	44.0
	Lift irrigation schemes	-	-	-

Micro-irrigation			
Other sources, Ponds & Check dams		1	0.5
Total Irrigated Area		175	
Pump sets	76588		
No. of Tractors	6785		
Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)GW Development=60 safe
Over exploited	-	-	Saline (with sea water intrusion)
Critical	-	-	Saline
Semi- critical	3	19	Moderate saline
Safe	7	81	--
Wastewater availability and use	-	-	--
Ground water quality	Saline groundwater with higher TDS, Sea water intrusion problem in coastal aquifers		
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%			

(Source: Reports of Jamnagar District Panchayat, Jamnagar)

1.7	S. No.	Major field crops cultivated	Area ('000 ha)							
			<i>Kharif</i>			<i>Rabi</i>			Summer	Grand total
			Irrigated	Rainfed	Total	Irrigated	Rainfed	Total		
1	Groundnut	-	391	391	-	-	-	8.8	399	
2	Cotton	144	-	144	-	-	-	-	144	
3	Wheat	-	-	-	54	-	54	-	54	
4	Castor	-	12.5	12.5	-	-	-	-	12.5	
5	Pearl Millet	-	10.1	10.1	-	-	-	2.0	12.1	

	Others (specify)	Others Cumin	-	-	-	34	-	34	-	34.0
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(Source: Director of Agriculture, Dept. of Agriculture, Govt. of Gujarat)

S. No.	Horticulture crops - Fruits	Area ('000 ha)	
			Total
	Papaya		0.6
	Mango		0.5
	Ber		0.4
	Chiku		0.2
	Acidlime		0.2
	Others (specify)	Others	0.3

(Source: Deputy Director of Horticulture, Jamnagar)

	Horticulture crops - Vegetables	Total
	Garlic	7.7
	Onion	3.0
	Tomato	2.9
	Lady Finger	2.2
	Brinjal	1.5
Others (specify)	Other vegetables	4.1
	Medicinal and Aromatic crops	Total
	Pamarosa	0.02
	Citronella	0.005
	Guggl	0.002
Others (specify)		
	Plantation crops	Total
	Coconut	0.4
	Rayan (<i>Melinkara hexandra</i>)	0.03
	Cordia (Gonda)	0.03

		phalsa	0.01
		Badam	0.01
	Others (Specify)	Others	0.001
		Fodder crops	Total
		Sorghum	35.1
		Maize	10.1
		Lucerne	8.0
	Others (Specify)		
		Total fodder crop area	53.2
		Grazing land	89.7
		Sericulture etc	-
		Others (specify)	-

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	163	187	350
	Crossbred cattle	-	2	2
	Non descriptive Buffaloes (local low yielding)	2	255	257
	Graded Buffaloes	-	--	-
	Goat	20	155	173
	Sheep	63	145	208
	Others (Camel, Pig, Yak, dogs etc.)	6	8	14
1.9	Commercial dairy farms (Number)	2		
	Poultry	No. of farms	Total No. of birds ('000)	
	Commercial (Broiler)	23	85	
	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)	
		40904	2233	385	96645	31658	32
	ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds		No. of Reservoirs		No. of village tanks	
		nil		55		1	
	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)	17377.2		33.1		577.0	
	Others	-		-		-	

(Source: Reports of Jamnagar District Panchayat, Jamnagar Department of Agriculture, Fisheries and Animal husbandry, Govt. of Gujarat)

1.11 Production and Productivity of major crops 2004-09

1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder ('000 tons)
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	
Major Field crops (Crops to be identified based on total acreage)										
	Groundnut	635	1626	-	-	21.5	2442	656.5	1644	985
	Cotton	748.7	876	-	-	-	-	748.7	876	-
	Castor	26.9	2960	-	-	-	-	26.9	2960	-

	Wheat	-	-	117.1	3289	-	-	117.1	3289	117
	Pearl Millet	14.4	1402	-	-	4.5	2440	18.9	1562	28
Others	Others Cumin	-	-	13.9	577	-	-	13.9	577	-
Major Horticultural crops (Crops to be identified based on total acreage)										
	Papaya	27.2	46500	-	-	-	-	27.2	46500	-
	Mango	-	-	-	-	1.4	30900	1.4	30900	-
	Ber	-	-	1.74	5400	-	-	1.8	5400	-
	Chiku	-	-	-	-	2.2	9050	2.2	9050	-
	Acidlime	0.8	3990	-	-	-	-	0.8	3990	-
Others	Coconut	3.5	8300	-	-	-	-	3.5	8300	-
									nuts/ha/year	

1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Groundnut	Cotton	Wheat	Bajra (Pearl Millet)	Castor
	Kharif- Rainfed	June 4 th week to July 3 rd week	June 4 th week to July 3 rd week	-	June 4 th week to July 3 rd week	July 2 nd week to August 2 nd week
	Kharif-Irrigated	June 1 st week to June 3 rd week	May 4 th week to June 2 nd week	-	-	July 2 nd week to August 2 nd week
	Rabi- Rainfed	-	-	-	-	-
	Rabi-Irrigated	-	-	November 2 nd week to November 4 th week	-	-

1.13	What is the major contingency the district is prone to? (Tick mark)	Regular	Occasional	None
	Drought		√	
	Flood		√	
	Cyclone		√	
	Hail storm			√
	Heat wave		√	
	Cold wave			√
	Frost			√
	Sea water intrusion (Okha, Jodia)		√	
	Pests and disease outbreak (specify) Pests-Cotton: Aphid, Jasad, Thrips, Acidlime: White fly & Fruit fly Diseases-Mango: Powdery Mildew, Groundnut: Rust, Leaf spot, Tikka & Downy Mildew	√		
	Others (specify)	-	-	-

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

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
			Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 2 weeks 2 nd week of July	Medium Black & Shallow Black Soils	Groundnut	No change	Follow standard package of practices	-
		Bajra			-
		Castor			-
	Coastal Alluvial Soils	Bajra			-
		Castor			-

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 4 weeks 4 th week of July	Medium Black & Shallow Black Soils	Groundnut (Spreading & Semi spreading)	Bunch variety of Groundnut GG-2/GG-5/ GG-7/ Semi spreading variety of Groundnut G-20	Keep 45 cm and 60 cm row spacing for bunch and semi spreading groundnut, respectively. Other practices will be as such.	Seed sources: National Seed Corporation(NSC), Gujarat State Seed Corporation (GSSC), University, Gujarat State Cooperative Marketing Federation Ltd.(Gujcomasol)
		Bajra	Short duration variety GHB-538 & 719	-	
		Castor	No Change	-	
	Coastal Alluvial Soils	Bajra	Short duration variety GHB-538 & 719	-	
		Castor	No Change	-	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset) Delay by 6 weeks 2 nd week of August	Medium Black & Shallow Black Soils	Groundnut (Spreading & Semi spreading)	Greengram: Guj. Mag-4, K-85/ Sesame: Purva-1 / Sorghum: GFS-4&5, Gundhari, S-1049 / Castor : GAU-CH-1, GCH-6 / Pigeonpea: BDN-2 Cotton : G cot 13,15,21	Keep 45 cm and 60 cm row spacing for bunch and semi spreading groundnut, respectively. Other practices will be as such.	Seed sources: National Seed Corporation(NSC), Gujarat State Seed Corporation (GSSC), University, Gujarat State Cooperative Marketing Federation Ltd.(Gujcomasol) Linkage with Government schemes for supply of implements: Zero till seed drill, seed dressing equipments, sprayers & dusters.
		Bajra	-do-		
		Castor	Short duration variety of Castor GAUCH-1 & GCH-2		
	Coastal Alluvial Soils	Bajra	Greengram: Guj. Mag-4, K-85 / Sesame: Purva-1 / Sorghum:GFS-4&5, Gundhari, S-1049/ Castor : GAUCH-1, GCH-6 / Pigeonpea: BDN-2, Cotton : G cot 13,15,21		
		Castor	Short duration variety of castor GAUCH-1 & GCH-2		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset) Delay by 8 weeks (4 th week of August)	Medium & shallow Black Soils	Groundnut (Spreading & Semi spreading)	Sesame :Purva-1 / Sorghum : GFS-4&5, Gundhari, S-1049 / Castor: GAUCH-1, GCH-5	Keep 45 cm and 60 cm row spacing for bunch and semi spreading Groundnut, respectively. Other	Seed sources: National Seed Corporation(NSC), Gujarat State Seed Corporation

				practices will be as such.	(GSSC), University, Gujarat State Cooperative Marketing Federation Ltd.(Gujcomasol)
		Bajra	-do-		
		Castor	Short duration variety of Castor GAUCH-1 & GCH-2		
	Coastal Alluvial Soils	Bajra	Sesame:Purva-1/ Sorghum : GFS-4&5, Gundhari, S-1049/ Castor :GAUCH-1, GCH-5		Linkage with Government schemes for supply of implements: Zero till seed drill, seed dressing equipments, sprayers & dusters.
		Castor	Short duration variety of Castor GAUCH-1 & GCH-2		

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.	Medium & shallow Black Soils	Groundnut	Gap filling	Inter tilling to fill soil cracks, mulching with wheat straw or shredded cotton stalk or Mulching with Plastic film 25 micron, ~200 kg/ha.	Supply of plastic film through Govt. schemes. Cotton stock shredding machine which is available in Jasdan Village of Rajkot district to be supplied by Govt.
		Bajra	Thinning to maintain 12 cm plant to plant spacing	Interculturing to fill soil cracks, mulching with wheat straw or shredded cotton stalk	-do-
		Castor	No change	Normal	-

	Coastal Alluvial Soils	Bajra	Thinning to maintain 12 cm plant to plant spacing	Mulching with wheat straw or shredded cotton stalk.	Supply of plastic film through govt. schemes. Cotton stock shredding machine which available in Jasdan Village of Rajkot district to be supplied by Govt.
		Castor	No change	Normal	-

Condition			Suggested Contingency measures		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At vegetative stage	Medium & shallow Black Soils	Groundnut	Weeding/ Thinning Protection against sucking pests (To control Jassid spray methyle-o-demeton @ 10 ml / 10 lit. water or dimetheote @10 ml/ 10 lit water). Life saving irrigation if possible through well water.	Mulching with wheat straw or crushed cotton stalk Mulching (Plastic film 25 micron, ~200 kg/ha.) Inter tilling , Avoid top dressing of urea	Supply of plastic film and pesticides through Govt. schemes. Ensure electric supply for life saving irrigation by Electricity Supply Board of State
		Bajra	Weeding/ Thinning to maintain 12 cm plant to plant spacing	Inter tilling. Spray 1 % N through urea after relief of drought.	Supply of urea through Govt. schemes
		Castor	Weeding Protection against sucking pests_(To control Jassid & White fly spraying methyle-o-demeton @ 10 ml / 10 lit. water or dimetheote @10 ml/ 10 lit water)	Intertilling, Avoid top dressing of urea	
	Coastal alluvial Soils	Bajra	Weeding/ Thinning to maintain 12 cm plant to plant spacing	Intertilling	Supply of urea through Govt. schemes Ensure electric supply for life saving irrigation by

					Electricity Supply Board of State
		Castor	Weeding Protection against sucking pests_(To control Jassid & White fly spraying methyle-o-demeton @ 10 ml / 10 lit. water or dimetheote @10 ml/ 10 lit water)	Inter tilling , Avoid top dressing of urea	

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At flowering/ fruiting stage	Medium & shallow Black Soils	Groundnut	Supplemental irrigation if possible followed by weeding.	-	Ensure electric supply for life saving irrigation by Electricity Supply Board of State
		Bajra	Supplemental irrigation if possible. Harvest non flowering plants for fodder purpose if water is not available	-	-do -
		Castor	Weeding, Supplemental Irrigation if possible & Protection from thrips by spraying of methyle-o-demeton @ 10 ml / 10 lit. water or dimetheote @10 ml/ 10 lit water)	Avoid top dressing of urea	
	Coastal Alluvial Soils	Bajra	Supplemental Irrigation if possible. Harvest non flowering plants for fodder purpose if water is not available.	Inter tilling, Spray 1 % N through urea after relief of drought	Supply of urea through Govt. schemes
		Castor	Weeding, Supplemental Irrigation if possible & Protection from thrips by	Avoid top dressing of urea	

			spraying of methyle-o-demeton @ 10 ml / 10 lit. water or dimetheote @10 ml/ 10 lit water)		
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Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Terminal drought (Early withdrawal of monsoon)	Medium & shallow Black Soils	Groundnut	Harvest mature plants , thin out plant population, life saving irrigation if possible	-	Ensure electric supply for life saving irrigation by Electricity Supply Board of State
		Bajra	Supplemental irrigation if possible. Harvest non flowering plants for fodder purpose if water is not available.	-	
		Castor	Harvest mature spike, remove dry plants, life saving irrigation if possible	-	
	Costal Alluvial Soils	Bajra	Harvest mature plants, irrigation if possible	-	-do-
		Castor	Harvest mature spike, remove dry plants, life saving irrigation if possible	-	

2.1.2 Drought - 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	Medium & shallow Black Soils		NA		

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
	Costal Alluvial Soils				

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall	Medium & shallow Black Costal Alluvial Soils			NA	

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment	Medium & shallow Black Soils Costal Alluvial Soils			NA	

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Medium & shallow Black Soils Costal Alluvial Soils			NA	

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Medium & shallow Black Soils	Wheat	Wheat	Supply irrigation during night time to reduce transpiration.	Ensure electric supply for life saving irrigation by Electricity Supply Board of State.
			Gram :ICCC 4, Guj 1 &2 / Cumin : Guj 1,2,3 & 4 / Coriander : Guj 1 & 2 / Fenugreek: Guj 1/ Leafy vegetables / Carrot	Adoption of Sprinkler irrigation system.	Construction of Well recharge structures, Timely supply of MIS and seeds through Govt. schemes.
		Cotton	Cotton	Irrigation during night time to reduce transpiration	Ensure electric supply for life saving irrigation by Electricity Supply Board of State.
			Gram :ICCC 4, Guj 1 &2 / Cumin : Guj 1,2,3 & 4 / Coriander : Guj 1 & 2 / Fenugreek: Guj 1/ Leafy vegetables / Carrot	Adoption of drip irrigation system. Mulching of 50 μ , ~370 kg/ha. Reduce area of irrigation.	Construction of Well recharge structures, Timely supply of MIS and seeds through Govt. schemes.
	Costal Alluvial Soils	Wheat	Wheat	Supply irrigation during night time to reduce transpiration.	Ensure electric supply for life saving irrigation by Electricity Supply Board of State.
			Gram :ICCC 4, Guj 1 &2 / Cumin : Guj 1,2,3 & 4 / Coriander : Guj 1 & 2 / Fenugreek: Guj 1/ Leafy vegetables / Carrot	Adoption of Sprinkler irrigation system	Construction of Well recharge structures, Timely supply of MIS and seeds through govt. schemes.

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				
Wheat	-	-	Surface drainage (for management of water logging, lodging crop and black point in grain.) Spray Mancozeb 0.2%	Protect produce with plastic sheet (100 µm, UV stabilized colour plastic) or shift produces to farm shed and protection against pest/disease damage in storage etc, Preparation of quick drying techniques to separate good lot and bad lot.
Cotton	Surface drainage (for management of water logging, Apply Amonium Sulphate)		Surface drainage (for management of water logging) harvesting mature bolls	-do-
Castor	-	-	Surface drainage (for management of water logging) Harvesting at Physiological stage	-do-
Groundnut	-	-	Harvesting delay for spreading groundnut if possible. Harvesting is done Immediately in bunch Groundnut. Quick surface drainage, Open channel around field	-do-
Bajra	-	-	Harvest mature ear heads	-do-

Heavy rainfall with high speed winds in a short span	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Wheat	Surface drainage (to control water logging condition)	Surface drainage (to control water logging condition)	Surface drainage (for management of water logging, lodging crop and black point in grain, Spray Mancozeb 0.2%	Protect produce with plastic sheet (100 µm, UV stabilized colour plastic) or shift produces to farm shed and protection against pest/disease damage in storage etc, Preparation of quick drying techniques to separate good lot and bad lot.
Cotton	Surface drainage (for management of water logging. After drainage apply Ammonium sulphate.	Surface drainage (for management of water logging. After drainage apply Ammonium sulphate.	Surface drainage (for management of water logging) harvesting mature bolls	-do-
Castor	-	-	Surface drainage (for management of water logging) harvesting at physiological maturity	-do-
Groundnut	-	-	Harvesting delay for spreading groundnut if possible. Harvesting is done Immediately in bunch groundnut. Quick surface drainage, Open channel around field.	-do-
Bajra	-	-	Harvest mature ear heads	-do-

Outbreak of pests and diseases due to unseasonal rains	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Wheat	Spray Mancozeb 0.2% (To control leaf Blight & rust)	Spray Mancozeb 0.2% (To control leaf Blight & rust)	Spray mancozeb 0.2% to control black point in grain.	-
Cotton	-	Control cotton angular leaf spot by spray of Copper Oxy chloride 0.2 % & Streptocycline 100 ppm		-
Castor	-	-	-	-

Groundnut	Spray 0.005% hexaconazole for Rust & Tikka disease control.			-
Bajra	-	-	Spray Mancozeb 0.2% (To control rust)	-
Horticulture Crops				
Mango	Provision of drainage, fertilizer application, Control leaf blight under unusual rains with cloudy weather.	Spray 0.2% wettable sulphur or 0.005% hexaconazole for protection against powdery mildew after cessation of heavy rain.	Hang methyle euginol trap, one /acre for control of fruit fly.	-

2.3 Floods

Condition	Suggested contingency measures			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
Groundnut	NA	As a preventive step, open drainage channel.		-
Bajra	NA	-do-		-
Cotton	NA	-do-		-
Pulses	NA	-do-		-
Continuous submergence for more than 2 days				
Groundnut	As a preventive step open drainage channel followed by spray 0.05 % carbendazim for control of leaf spot.	As a preventive step open drainage channel followed by spray 1 % FeSO ₄ + 0.1 % citric acid for control yellowing, 0.0025%	As a preventive step open drainage channel followed by spray 1 % FeSO ₄ + 0.1 % citric acid for control yellowing, 0.0025%	-

		hexaconazole for rust & leaf spot management.	hexaconazole for rust & leaf spot management.	
Cotton	As a preventive step, open drainage channel and apply Ammonium sulphate.	As a preventive step, open drainage channel and apply Ammonium sulphate.	As a preventive step open drainage channel. Harvesting mature bolls.	
Bajra	As a preventive step, open drainage channel and spray mancozeb 0.2% (To control downy mildew)	As a preventive step, open drainage channel and spray mancozeb 0.2% (To control downy mildew)	As a preventive step open drainage channel and spray mancozeb 0.2% (To control rusts).	Harvest Mature ear heads
Pulses	As a preventive step open drainage channel and spray 0.05 % carbendazim for powdery mildew.	As a preventive step open drainage channel and spray 0.005% hexaconazole or 0.025 % carbendazim for leaf spot & powdery mildew.	As a preventive step open drainage channel and spray 0.005% hexaconazole or 0.025 % carbendazim for leaf spot & powdery mildew.	Picking of Mature pods.

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

Extreme event type	Suggested contingency measurer			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave	Light & frequent irrigation to all crops	Light & frequent irrigation to all crops	Light & frequent irrigation to all crops	-
Cold wave	NA			
Frost	NA			
Hailstorm	NA			
Cyclone				
Wheat	Quick Drainage	Quick Drainage	Quick drainage and spray mancozeb 0.2% to control black point in grain.	Shift produce to a safer place

Cumin/ Coriander	Quick Drainage	Quick Drainage	Quick Drainage	
Cotton	Earthing up , Quick Drainage	Earthing up, Quick Drainage	Earthing up, Quick Drainage	
Castor	Earthing up , Quick Drainage	Earthing up , Quick Drainage	Earthing up , Quick Drainage	
Groundnut	Quick Drainage	Quick Drainage	Quick Drainage	
Sea water intrusion	Quick Drainage & apply additional irrigation with good quality water	Quick Drainage & apply additional irrigation with good quality water	Quick Drainage & apply additional irrigation with good quality water	-

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event	During the event	After the event
<i>Drought</i>			
Feed and fodder availability	<p>As the district is occasionally prone to drought the following measures to be taken to ameliorate the fodder deficiency</p> <p>Collection of groundnut haulms, soya meal waste and groundnut cake for use as feed supplement during drought</p> <p>Avoid burning of wheat straw</p> <p>Establishment of fodder bank at village level with available dry fodder (groundnut haulms, wheat straw and sorghum/bajra</p>	<p>Harvest and use biomass of dried up crops (wheat/bajra/sorghum/maize/mungbean etc.) material as fodder</p> <p>Use of unconventional and locally available cheap feed ingredients especially soya meal waste and groundnut cake as supplement for livestock during drought</p> <p>Utilizing fodder from fodder bank reserves.</p> <p>Utilizing stored silage/hay.</p>	<p>Training/educating farmers for feed & fodder storage.</p> <p>Maintenance / repair of silo pits and feed/fodder stores.</p> <p>Encourage progressive farmers to grow multi cut fodder crops of sorghum/bajra/maize(UP chari, MP chari, HC-136, HD-2, GAIN T BAJRA, L-74,</p>

	<p>stover)</p> <p>Increase area under perennial fodder cultivation with high yielding Hybrid Napier varieties.</p> <p>Conservation of maize/bajra green fodder as silage</p> <p>Sowing of cereals (Sorghum/Bajra) and leguminous crops (Lucerne, Berseem, Horse gram, Cowpea) during early monsoon under dry land system for fodder production</p> <p>Encourage fodder production with Maize, Jowar, Bajra , Cowpea, Barseem, Lucerne etc.,</p> <p>Processing & storage of feed/fodder and roughages in the form of complete feed/blocks.</p>	<p>Transporting complete feed/fodder and dry roughages to the affected areas.</p> <p>Concentrate ingredients such as Grains, brans, chunnies & oilseed cakes, low grade grains etc. unfit for human consumption should be procured from Govt. Godowns for feeding as supplement for high productive animals during drought</p> <p>Continuous supplementation of mineral mixture to prevent infertility.</p> <p>Encourage mixing available kitchen waste with dry fodder while feeding to the milch animals</p>	<p>K-677, Ananad/African Tall etc.,</p> <p>Supply of quality fodder seed (multi cut sorghum/bajra/maize varieties) and fodder slips of Napier, guinea grass well before monsoon</p> <p>Replenish the feed and fodder banks</p>
Drinking water	<p>Adopt various water conservation methods at village level to improve the ground water level for adequate water supply.</p> <p>Identification of water resources</p> <p>Desilting of ponds</p> <p>Rain water harvesting and create water bodies/watering points (when water is scarce use only as drinking water for animals)</p> <p>Construction of drinking water tanks in herding places/village junctions/relief camp locations</p> <p>Community drinking water trough can be arranged in shandies /community grazing areas</p>	<p>Adequate supply of drinking water.</p> <p>Restrict wallowing of animals in water bodies/resources</p> <p>Add alum in stagnated water bodies</p>	<p>Watershed management practices shall be promoted to conserve the rainwater. Bleach (0.1%) drinking water / water sources</p> <p>Provide clean drinking water</p>
Health and disease management	<p>Procure and stock emergency medicines and vaccines for important endemic diseases of the area</p> <p>All the stock must be immunized for endemic diseases of the area</p>	<p>Carryout deworming to all animals entering into relief camps</p> <p>Identification and quarantine of sick animals</p> <p>Constitution of Rapid Action Veterinary Force</p>	<p>Keep close surveillance on disease outbreak.</p> <p>Undertake the vaccination depending on need</p>

	<p>Vaccination for HS & FMD</p> <p>Surveillance and disease monitoring network to be established at Joint Director (Animal Husbandry) office in the district</p> <p>Adequate refreshment training on draught management to be given to VAS, Jr.VAS, LI with regard to health & management measures</p> <p>Procure and stock multivitamins & area specific mineral mixture</p>	<p>Performing ring vaccination (8 km radius) in case of any outbreak</p> <p>Restricting movement of livestock in case of any epidemic</p> <p>Drainage of water from and around animal sheds, pasture areas.</p> <p>Tick control measures be undertaken to prevent tick borne diseases in animals</p> <p>Rescue of sick and injured animals and their treatment</p> <p>Organize with community, daily lifting of dung from relief camps</p>	<p>Keep the animal houses clean and spray disinfectants Farmers should be advised to breed their milch animals during July-September so that the peak milk production does not coincide with mid summer</p>
Floods			
Feed and fodder availability	<p>In case of early forewarning (EFW), harvest all the crops (wheat/bajra/sorghum//maize/mungbean etc.) that can be useful as feed/fodder in future (store properly)</p> <p>Keeping sufficient of dry fodder to transport to the flood affected villages</p> <p>Don't allow the animals for grazing if severe floods are forewarned</p> <p>Keep stock of bleaching powder and lime</p> <p>Carry out Butax spray for control of external parasites</p> <p>Identify the Clinical staff and trained paravets and indent for their services as per schedules</p> <p>Identify the volunteers who can serve in need of emergency</p> <p>Arrangement for transportation of animals from low lying area to safer places and also for rescue animal health</p>	<p>Transportation of animals to elevated areas</p> <p>Proper hygiene and sanitation of the animal shed</p> <p>In severe storms, un-tether or let loose the animals</p> <p>Use of unconventional and locally available cheap feed ingredients for feeding of livestock.</p> <p>Avoid soaked and mould infected feeds / fodders to livestock</p> <p>Emergency outlet establishment for required medicines or feed in each village</p> <p>Spraying of fly repellants in animal sheds</p> <p>Control of mosquitoes</p> <p>(1) Treatment of animals for enteritis etc. (2) Special care and treatment of young animals for enteric</p>	<p>Repair of animal shed</p> <p>Bring back the animals to the shed</p> <p>Cleaning and disinfection of the shed</p> <p>Bleach (0.1%) drinking water / water sources</p> <p>Encouraging farmers to cultivate short-term fodder crops like sunhemp, Lucerne, berseem, maize etc.,</p> <p>Deworming with broad spectrum dewormers</p> <p>Proper disposable of the</p>

	workers to get involve in rescue operations	diseases like calf scour, pneumonia	dead animals / carcasses by burning / deep burying (4-8 feet) with lime powder (1kg for small ruminants and 5kg for large ruminants) in pit Drying the harvested crop material and proper storage for use as fodder.
Cyclone	<p>In case of early forewarning (EFW), harvest all the crops (wheat/bajra/sorghum/maize/mungbean etc.) that can be useful as feed/fodder in future (store properly)</p> <p>Keeping sufficient of dry fodder to transport to the flood affected villages</p> <p>Don't allow the animals for grazing if severe floods are forewarned</p> <p>Keep stock of bleaching powder and lime</p> <p>Carry out Butax spray for control of external parasites</p> <p>Identify the Clinical staff and trained paravets and indent for their services as per schedules</p> <p>Identify the volunteers who can serve in need of emergency</p> <p>Arrangement for transportation of animals from low lying area to safer places and also for rescue animal health workers to get involve in rescue operations</p>	<p>Transportation of animals to elevated areas</p> <p>Proper hygiene and sanitation of the animal shed</p> <p>In severe storms, un-tether or let loose the animals</p> <p>Use of unconventional and locally available cheap feed ingredients for feeding of livestock.</p> <p>Avoid soaked and mould infected feeds / fodders to livestock</p> <p>Emergency outlet establishment for required medicines or feed in each village</p> <p>Spraying of fly repellants in animal sheds</p>	<p>Repair of animal shed</p> <p>Bring back the animals to the shed</p> <p>Cleaning and disinfection of the shed</p> <p>Bleach (0.1%) drinking water / water sources</p> <p>Encouraging farmers to cultivate</p> <p>short-term fodder crops like sunhemp, Lucerne, berseem, maize etc.,.</p> <p>Deworming with broad spectrum dewormers</p> <p>Proper disposable of the dead animals / carcasses by burning / deep burying (4-8 feet) with lime powder (1kg for small ruminants and 5kg for large ruminants) in pit</p>

			Drying the harvested crop material and proper storage for use as fodder.
Cold wave	Not applicable		
Heat wave	<p>Arrangement for protection from heat wave</p> <ul style="list-style-type: none"> i) Plantation around the shed ii) H₂O sprinklers / foggers in the shed iii) Application of white reflector paint on the roof iv) Thatched sheds should be provided as a shelter to animal to minimize heat stress 	<p>Allow the animals early in the morning or late in the evening for grazing during heat waves</p> <p>Feed green fodder/silage / concentrates during day time and roughages / hay during night time in case of heat waves</p> <p>Put on the foggers / sprinklers/fans during heat waves in case of high yielders (Jersey/HF crosses)</p> <p>In severe cases, vitamin 'C' and electrolytes should be added in H₂O during heat waves.</p>	<p>Feed the animals as per routine schedule</p> <p>Allow the animals for grazing (normal timings)</p>
Insurance	Encouraging insurance of livestock	Listing out the details of the dead animals	<p>Submission for insurance claim and availing insurance benefit</p> <p>Purchase of new productive animals</p>

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	Stored feed, conventional feed, Antibiotics and probiotics	Stored feed, conventional feed, Antibiotics and probiotics	Use conventional feed, vaccination for viral diseases –Marek's and Ranikhet diseases (MD &	Linkage Govt. schemes with public/NGOs at grass root levels.

			RD).	
Drinking water	Rain water harvesting	Give water for drinking only	Give sufficient water as per the bird's requirement	Linkage Govt. schemes with public/NGOs at grass root levels
Health and disease management	Vaccination for viral diseases –against MD & RD, cover birds under insurance.	Provide ventilation. Add more calcium with feed. Assure supply of electric power.	Routine practices are to be followed.. Culling affected birds disposal by burning.	Vaccination for viral diseases –against MD & RD
Floods				
Shortage of feed ingredients	Use conventional feed, ingredients.	Use stored feed, Antibiotics Pro biotics, and Assure supply of electric power.	Routine practices are to be followed.	Linkage Govt. schemes with public/NGOs at grass root levels.
Drinking water	-	Add bleaching powder to drinking water (1%).	Add bleaching powder to drinking water (1%).	Linkage Govt. schemes with public/NGOs at grass root levels
Health and disease management	Cover birds under insurance.	For suspected cases give antibiotic in the feed, prevent water logging surrounding sheds , Assure supply of electric power.	Dispose dead birds by burning.	Vaccination for viral diseases –against MD & RD
Cyclone				
Shortage of feed ingredients	Use stored feed ingredients.	Use stored feed & Use conventional feed, Antibiotics Pro biotic.	Routine practices are to be followed.	Use stored feed ingredients
Drinking water	-	Add bleaching powder to drinking water (1%).	Add bleaching powder to drinking water (1%).	-

Health and disease management	Cover birds under insurance.	For suspected cases give antibiotics.	Dispose dead birds by burning.	-
Heat wave and cold wave				
Heat wave				
Shelter/environment management	Arrangement of good ventilation by fitting fan and foggers	Operate fans , foggers, keep open ventilators in night and cool period.	Routine practices are to be followed.	
Health and disease management	Cover birds under insurance.	Viral vaccination add calcium in the poultry feed.	Routine practices are to be followed.	-
cold wave				
Shelter/environment management	NA			
Health and disease management	NA			

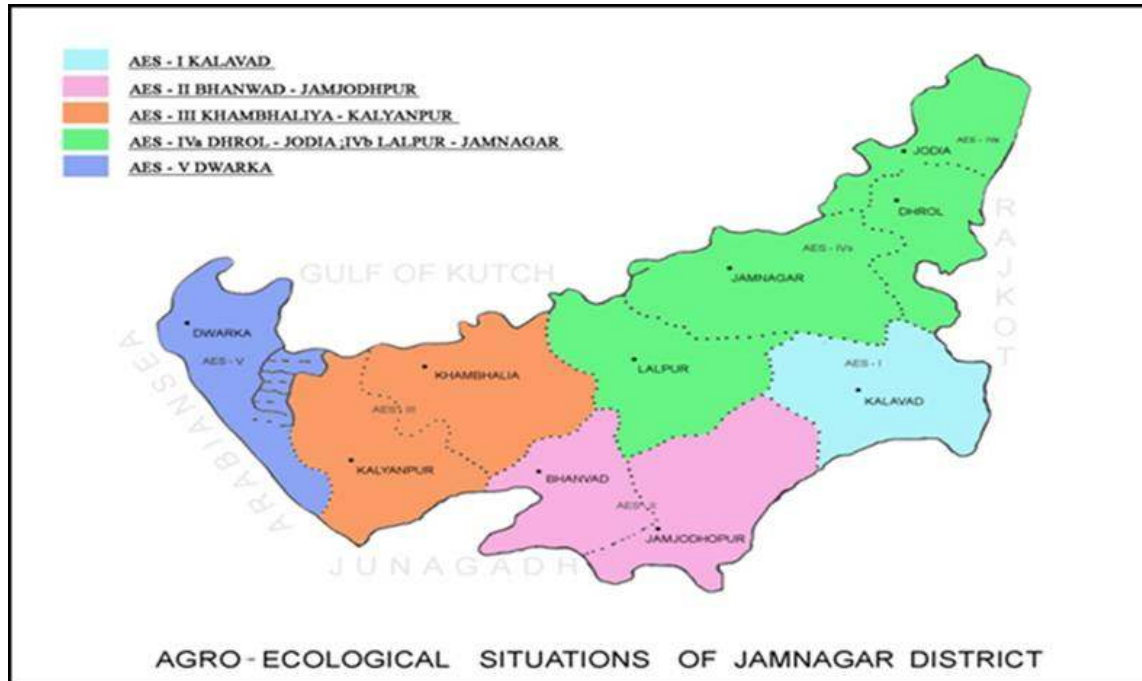
2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	During the event	After the event
1) Drought			
A. Capture			
Marine	NA		
Inland	NA		
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	Desilting/deepening of pond so that more water can be stored	Provision of additional bore wells use Euryhaline species	Maintaining pond water level at least 1 m depth.
(ii) Impact of salt load build up in ponds / change in water quality	Replenishment of water in pond with fresh water	30 % exchange of water	10 % exchange of water
(iii) Any other	-	-	-
2) Floods			
A. Capture			
Marine	NA		
Inland	NA		
B. Aquaculture			
(i) Inundation with flood water	Deepening of ponds, Repair, strengthening of dykes	Enhancement of dykes height by sand bags	-
(ii) Water contamination and changes in water quality	Use of calcium hydroxide @ 150 kg/ha	Infected fishes to be treated with KMnO ₄ 1 % as prophylactics	Lime treatment for oxidation
(iii) Health and diseases	Antibiotics fortified feeding as prophylactics	Disinfectants formalin treatments as prophylactics	-do-
(iv) Loss of stock and inputs (feed, chemicals etc)	Stock cover under insurance	-	

(v) Infrastructure damage (pumps, aerators, huts etc)	-	-	Repairs & maintenance of aqua structures to be given
(vi) Any other	-	-	-
3. Cyclone / Tsunami			
A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives	For warning systems to be installed. Insurance & communication instruments supplied to fisherman, Warning systems to be installed	Warning systems to be installed	Compensations to be paid for repair & maintenance of boats & gears on actual survey basis
(ii) Avg. no. of boats / nets/damaged			Compensation on assessment of actual losses & damage of boats & nets to be given
(iii) Avg. no. of houses damaged	-	-	Compensation on assessment of actual losses & damage of houses to be given
Inland	NA		
B. Aquaculture			
(i) Overflow / flooding of ponds	Strengthening of dykes	Enhancement of dykes height by sand bags	-
(ii) Changes in water quality (fresh water / brackish water ratio)	Maintain salinity by addition of fresh water up to 20-25 ppt.	Use euryhaline species	use Euryhaline species for culture
(iii) Health and diseases	Liming and formalin treatment	Disinfectants treatments	-
(iv) Loss of stock and inputs (feed, chemicals etc)	Stock cover under insurance	-	-
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)	-	-	Compensation on assessment of actual losses & damage of pumps, aerators, shelters/huts to be given
(vi) Any other	-	-	-

4. Heat wave and cold wave			
Heat wave			
A. Capture			
Marine	NA		
Inland	NA		
B. Aquaculture			
(i) Changes in pond environment (water quality)	Plantation of leafy trees on dyke , increase depth	To maintain Water level in pond , Use of fountain and peddle wheel aerator	Prophylactic measures
(ii) Health and Disease management	-	Bleaching powder 1 to 2 % , formalin treatment to prevent disease	KMnO ₄ 2 % to maintain oxygen level
(iii) Any other	-	-	-
cold wave			
A. Capture			
Marine	NA		
Inland	NA		
B. Aquaculture			
(i) Changes in pond environment (water quality)	-	To maintain Water level in pond ,	Prophylactic measures
(ii) Health and Disease management	-	Bleaching powder 1 to 2 % , formalin treatment to prevent disease	KMnO ₄ 2 % to maintain oxygen level
(iii) Any other	-	-	-

Annexure-I



Annexure-II

Mean annual rainfall of Jamnagar District:

No.	Year	Rainy days	Rainfall (mm)	No.	Year	Rainy days	Rainfall (mm)
1	1995-96	15	365	9	2003-04	32	1032
2	1996-97	18	545	10	2004-05	24	567
3	1997-98	22	545	11	2005-06	30	883
4	1998-99	20	391	12	2006-07	36	782
5	1999-00	13	185	13	2007-08	38	1529
6	2000-01	13	470	14	2008-09	20	662
7	2001-02	21	770	15	2009-10	21	570.5
8	2002-03	9	274	Average			638

Annexure-III

