

State: GUJARAT

Agriculture Contingency Plan for District: JUNAGADH

1.0 District Agriculture profile					
1.1	Agro-Climatic/Ecological Zone				
	Agro Ecological Sub Region (ICAR)	Arid western Plains (5.1)			
	Agro-Climatic Zone (Planning Commission)	Gujarat Plains & Hills Region (XIII)			
	Agro Climatic Zone (NARP)	South Saurashtra Zone (GJ.7)			
	List all the districts or part thereof falling under the NARP Zone	Junagadh, Porbandar, Part of Amreli and Part of Bhavnagar			
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude	
		21 ⁰ .31'.23.29" N	70 ⁰ .27'.17.90" E	86 m	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Directorate of Research Junagadh Agricultural University, Junagadh, Gujarat			
Mention the KVK located in the district	Krushi Vigyan Kendra, Ambuja Foundation, Ambuja Cement Plant, Kodinar (Dist. Junagadh-Gujarat)				
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):	900	40	2 nd Week of June	2 nd Week of September
	NE Monsoon(Oct-Dec):	-	-	-	-
	Winter (Jan- March)	-	-	-	-
	Summer (Apr-May)	-	-	-	-
	Annual	900	-	-	-

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)	884.8	534.3	176.0	45.5	89.0	8.8	0.00	132.9	17.0	0.00

(Source: Reports of Junagadh District Panchayat, Junagadh)

1.4	Major Soils	Area ('000 ha)	Percent (%) of total
	Medium to shallow black soils	619	70
	Mixed red and black soils	132	15
	Coastal alluvial soils	125	14

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	535	128
	Area sown more than once	150	
	Gross cropped area	685	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	195		
	Gross irrigated area	220		
	Rain fed area	314		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals	(263 km)	11.0	5.6
	Tanks	8	1.0	0.5
	Open wells	103764	73.0	37.4
	Bore wells	110594	1095	56.0
	Lift irrigation schemes	-	-	-
	Micro-irrigation		1.4	-
	Other sources, Ponds & Check dams	-	1.0	0.5
	Total Irrigated Area		196.9	
	Pump sets	108626		
	No. of Tractors	9773		
	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 =72 %, Semi critical
	Over exploited	1	7.5	Saline (with sea water intrusion)
	Critical	2	11.2	Saline
	Semi- critical	7	42.2	Moderate saline
	Safe	4	39.1	-
	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 Junagadh District Panchayat, Junagadh & Reports on GWR&IP in Gujarat, NWR,WS & Kalpsar Deptt., Govt. of Gujarat)

1.7 Area under major field crops & horticulture (as per latest figures) (Specify year 2008-09)

1.7	Major field crops cultivated	Area ('000 ha)							
		<i>Kharif</i>			<i>Rabi</i>				
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Summer	Grand total
	Groundnut	-	404.3	404.3	-	-	-	18.7	423.0
	Wheat	-	-	-	188.1	-	188.1	-	188.1
	Cotton	39.80	2.7	42.5	-	-	-	-	42.5
	Pulses	-	7.9	7.9	8.1	-	8.1	-	15.0
	Sugarcane	-	-	-	14.6	-	-	-	14.9
	Bajra(Pearl Millet)	-	9.4	9.4	-	-	-	3.5	12.9
	Others								
	Other Oil seed crops	-	-	-	-	-	-	0.3	-
	Horticulture crops - Fruits	Area ('000 ha)							
		Total							
	Mango	16.9							
	Sapota	3.7							
	Banana	1.7							

Citrus	0.5
Ber	0.3
Horticulture crops - Vegetables	Total
Garlic	11
Onion	3.2
Tomato	1.0
Brinjal	8.3
Others	-
Medicinal and Aromatic crops	Total
Isabgul	0.3
Fenugreek	0.1
Cumin	18.2
Coriander	17.0
Others	-
Plantation crops	Total
Coconut	6.5
eg., industrial pulpwood crops etc.	-

	Fodder crops	Total
	Sorghum	-
	Total fodder crop area	-
	Grazing land	88.9
	Sericulture etc	-

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)			445.0
	Crossbred cattle			
	Non descriptive Buffaloes (local low yielding)			304.5
	Graded Buffaloes			
	Goat			122.0
	Sheep			55.8
	Others (Camel, Pig, Yak, horse etc.)			33.4
	Commercial dairy farms (Number)			3.0
1.9	Poultry	No. of farms	Total No. of birds ('000)	
	Commercial	-	39.6	
	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)	
		33364	9239	257	260459	-
ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds		No. of Reservoirs		No. of village tanks	
	-		-		-	
B. Culture						
	Water Spread Area (ha)		Yield (t/ha)		Production ('000 tons)	
i) Brackish water (Data Source: MPEDA/ Fisheries Department)	0.1		0.8		0.08	
ii) Fresh water (Data Source: Fisheries Department)	-		-		-	

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

1.11 Production and Productivity of major crops (Average of last 5 years: 2004-09; specify years)

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										
	Grounut	656.9	1657.4	-	-	34.3	1742.4	691.2	1699	1283.5
	Cotton	215.7	887.1	-	-	-	-	215.7	887	-
	Wheat	-	-	517.1	3639.2	-	-	517.1	3639	631.7
	Bajra	23.3	1797.4	-	-	15.8	2431.4	39.1	2114	76.0
	Pulses	5.6	654.1	10.4	1296.2	-	-	16.0	975	23.9
	Sugarcane	102.4	9075.6	-	-	-	-	102.4	9076	-
Major Horticultural crops										
	Mango	-	-	-	-	-	-	77.0	4671	-
	SapotaChiku)	-	-	-	-	-	-	32.1	8779	-
	Banana	-	-	-	-	-	-	77.3	39862	-
	Citrus	-	-	-	-	-	-	3.0	6404	-
	Coconut	-	-	-	-	-	-	46.3	9315	-
	Ber	-	-	-	-	-	-	1.0	3775	-

(Source :Reports of Department Agriculture, Govt. of Gujarat)

1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Groundnut	Cotton	Wheat	Bajra (Pearl Millet)	Green gram
	Khharif- Rainfed	June 2 nd wk to July 1 st wk	June 2 nd wk to July 1 st wk	-	June 2 nd wk to July 2 nd wk	June 2 nd wk to July 2 nd wk
	Khharif-Irrigated	-	May 4 th wk to June 2 nd wk	-	-	-
	Rabi- Rainfed	-	-	-	-	-
	Rabi-Irrigated	-	-	Nov.2 nd wk to Nov.4 th wk	-	Oct.3 rd wk to Nov.4 th wk

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(Una,Kodinar,Sutrapada,Veraval, Maliya Hatina & Mangrol talukas)	√		
	Pests and disease outbreak (specify) Pests-Aphid, Jasad, Thrips, White fly&Fruit fly Diseases-Powdery Mildew,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 1	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			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Normal Crop / Cropping system	Change in crop / cropping system ^c including variety	Agronomic measures	Remarks on Implementation
Delay by 2 weeks (June 4 th week)	Medium & shallow black to mixed red & black soils	Groundnut (spreading & semi spreading)	No Change	-	-
		Bajra			
	Green gram				
	Coastal Alluvial soils	Bajra			-
Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system (including variety)	Agronomic measures	Remarks on Implementation
Delay by 4 weeks (July 2 nd week)	Medium & shallow black to mixed red & black soils	Groundnut (spreading & semi spreading)	Prefer bunch variety GG-2/GG-5/ GG-7/Semi spreading variety G-20 of groundnut	Keep 45 cm and 60 cm row spacing for bunch and semi spreading groundnut, respectively. Other practices will be as such	Agencies for quality seed supply are National Seed Corporation(NSC), Gujarat State Seed Corporation(GSSC), University,Gujcomasol.
		Bajra	Castor(GAU-CH-1,GCH-6)Pigeonpea (GT-100, BDN-2)/ Sorghum (GFS-4&5, Gundhari, S-1049)	As per crop change, follow the package of	

				practices.	
		Green gram	Green Gram (Variety Guj. Mug-4) / Black Gram (Guj. Udad-1, T-9)	As per crop change, follow the package of practices.	
	Coastal alluvial soils	Bajra	Castor GAU-CH-1, GCH-6 / Pigeon pea, GT-100, BDN-2 / Sorghum GFS-4&5, Gundhari, S-1049	As per crop change, follow the package of practices.	

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 (July 4 th week)	Medium & shallow black to mixed red & black soils	Groundnut (spreading & semi spreading)	Green Gram (Guj. Mung-4, K-85)/ Sesame (Purva-1)/Sorghum (GFS-4&5, Gundhari, S-1049)/ Castor (GAU-CH-1, GCH-6) / Pigeon pea, (BDN-2)/ Cotton (G cot 13,15,21)	Keep 45 cm and 60 cm row spacing for bunch and semi spreading groundnut, respectively.	Agencies for quality seed supply are National Seed Corporation(NSC), Gujarat State Seed Corporation(GSSC), University,Gujcomasol. Supply of quality seed from NSC, GSSC, SAU, and zero till seed drill, seed dressing equipments, Spayers & dusters from government schemes(Implements like seed drill,seed dressing are available in Rajkot).
		Bajra	-do-		
		Greengram	Green Gram (Variety Guj. Mug-4) / Black Gram (Guj. Udad-1, T-9)		

	Coastal Alluvial	Bajra	Greengram (Variety Guj. Mug-4) / Blackgram (Guj. Udad-1, T-9) / Sorghum GFS-4&5, Gundhari, S-1049/ Castor GAU-CH-1, GCH-6 / Pigeon pea, GT-100, BDN-2, Cotton G cot 13,15,21	(As per crop change, follow the package of practices.)	
Condition			Suggested Contingency measures		
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 8 weeks (Aug 2nd week)	Medium & shallow black to mixed red & black	Groundnut (spreading & semi spreading)	Sesame Purva-1/Sorghum GFS-4&5, Gundhari, S-1049/ Castor GAU-CH-1, GCH-5/	Keep 45 cm and 60 cm row spacing for bunch and semi spreading groundnut, respectively.	Agencies for quality seed supply are National Seed Corporation(NSC), Gujarat State Seed Corporation(GSSC), University,Gujcomasol. Supply of quality seed from NSC, GSSC, SAU, and zero till seed drill, seed dressing equipments, spayers & dusters from government schemes(Implements like seed drill,seed dressing are available in Rajkot).
		Bajra	-do-		
	Green gram	-do-			
	Coastal alluvial soils	Bajra	Sorghum GFS-4&5, Gundhari, S-1049/ Castor GAU-CH-1, GCH-5		

Condition				Suggested Contingency measures	
Early season drought (Normal onset)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Medium & shallow black to mixed red & black	Groundnut	Gap filling	Intercultivation to fill soil cracks, mulching with wheat straw or shredded cotton stalk Mulching(Plastic film 25 micron, ~200 kg/ha.)	Supply of plastic film through govt. schemes. Cotton stock shredding machine which available in Jasdan Village of Rajkot district to be supplied by Govt.
		Bajra	Thinning to maintain 10 cm	Intercultivation to fill soil cracks, mulching with wheat	

			plant to plant spacing	straw or shredded cotton stalk	
		Greengram	-	-do-	
	Coastal alluvial soils	Bajra	Thinning to maintain 10 cm plant to plant spacing	Mulching with wheat straw or shredded cotton stalk.	

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 to mixed red & black	Groundnut	Weeding. Protection against sucking pests (control Jassid with methyle-o-demeton @ 10 ml / 10 lit. water or dimetheote @10 ml/ 10 lit water) , life saving irrigation if possible	Mulching with wheat straw or crushed cotton stalk Mulching(Plastic film 25 micron, ~200 kg/ha.) Inter tilling ,	Supply of plastic film and pesticides through govt. schemes. Ensure electric supply for life saving irrigation
		Bajra	Weeding/ thinning to maintain 10 cm plant to plant spacing. Life saving irrigation if possible.	Inter tilling. Spray 1 % N through urea after relief of drought.	
		Greengram	Weeding. Protection against sucking pests_(To control Jassid spraying of methyle-o-demeton @ 10 ml / 10 lit. water or dimetheote @10 ml/ 10 lit water). Life saving irrigation if possible.	Intercultivation	
	Coastal alluvial soils	Bajra	Weeding/ thinning to maintain 10 cm plant to plant spacing life saving irrigation if possible	Intercultivation	Ensure electric supply for life saving irrigation by Electricity Supply Board of State

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 to mixed red & black	Groundnut	Supplemental irrigation 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 -
		Green gram	Supplemental irrigation if possible followed by weeding.	-	-do -
	Coastal alluvial soils	Bajra	Supplemental Irrigation Harvest non flowering plants for fodder	Intercultivation, Top dressing N through urea after relief of drought	Supply of urea through govt. schemes

Condition			Suggested Contingency measures		
Terminal drought (Early withdrawal of monsoon)	Major Farming situation	Normal Crop/cropping system	Crop management	Rabi Crop planning	Remarks on Implementation
	Medium & shallow black to mixed red & black	Groundnut	Life saving irrigation from harvested water	-	Ensure electric supply for life saving irrigation by Electricity Supply Board of State
		Bajra	Supplemental irrigation. Harvest non flowering plants	-	

			for fodder.		
		Green gram	Supplemental irrigation. Thin out plant population. Harvest at physiological maturity	-	
	Coastal alluvial soils	Bajra	Supplemental irrigation. Harvest non flowering plants for fodder purpose.	-	

2.1.2 Drought - Irrigated situation

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed/ limited release of water in canals due to low rainfall	Medium & shallow black to mixed red & black	Wheat	No change	-	-
	Coastal alluvial soils	Sugarcane		-	-

Note : Very limited canal irrigation facility exists in Junagadh

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Non release of water in canals under delayed onset of monsoon in catchment			NA		

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

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			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 to mixed red & black		NA		
	Coastal alluvial soils				

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 to mixed red & black	Wheat	No Change	Supply irrigation during night time to reduce transpiration.	Ensure electric supply for life saving irrigation by Electricity Supply Board of State
			Gram ICC 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. Reduce area of irrigation.	Construction of Well recharge structures, Timely supply of MIS and seeds through govt. schemes.
		Cotton	No Change	Give irrigation during night time to reduce transpiration.	Ensure electric supply for life saving irrigation by Electricity Supply Board of State.
			Gram ICC 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.	Supply of MIS and plastic film through govt. schemes.
	Coastal alluvial medium land	Wheat	No Change	Give irrigation during night time to reduce	Ensure electric supply for life saving irrigation

	soils			transpiration losses	
			Gram ICC 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, deficit irrigation, Reduce area of irrigation.	Construction of well recharge structures, Timely supply of MIS and seeds through govt. schemes.
Sea water intrusion	Coastal alluvial, medium land soils	Wheat	Leafy vegetables, Carrot, Beet, Lucerne	Adoption of drip irrigation system, limited area under irrigation, Light frequent irrigations, to reduce over exploitation some extent & limit depth of pumping	-

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 to control 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,	Surface drainage for management of water logging,	Surface drainage (for management of water logging) harvesting mature bolls	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,
Groundnut	-	-	delay harvesting for	Protect produce with plastic sheet (100 µm,

			spreading groundnut if possible. Immediately harvest bunch groundnut. Quick surface drainage, Open channel around field.	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.
Bajra	-	-	Harvest mature ear heads.	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.
Greengram	-	-	Arrange drainage, Harvest mature pods.	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.
Horticulture				
Mango	Provision of drainage. Fertilizer application. Control leaf blight	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.	Utilized unripe fruits for pickles.
Heavy rainfall with high speed winds in a short span²				
Wheat	Surface drainage (to control water logging condition).	Surface drainage (to control water logging condition).	Surface drainage (for management of water logging, and to control 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)	Surface drainage (for management of water logging. After drainage apply	Surface drainage (for management of water	Protect produce with plastic sheet (100 µm, UV stabilized colour plastic) or shift produces

	of water logging. After drainage	199 Kg/ha ammonium sulphate.	logging). Harvesting mature bolls.	to farm shed and protection against pest/disease damage in storage etc
Groundnut	-	-	Harvesting delay for spreading groundnut if possible. Immediately harvested bunch groundnut. Quick surface drainage , Open channel around field.	-Do-
Bajra	-	-	Harvest mature ear heads, Quick surface drainage.	-Do-
Green gram	-	-	Provide drainage , Harvest mature pods.	-Do-
Horticulture				
Mango	-	Spray 0.2% wettable sulphur or 0.005% Hexaconazole for protection against powdery mildew.	Collect fallen fruits.	Utilized unripe fruits for pickles.
Outbreak of pests and diseases due to unseasonal rains				
Wheat	Spray mancozeb 0.2% control leaf Blight & rusts.	Spray mancozeb 0.2% control leaf & rusts.	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.	Control cotton angular leaf spot by spray of Copper Oxy chloride 0.2 % & streptocycline 100 ppm.	-
Groundnut	Spray 0.005% hexaconazole for rust & tikka disease control.	Spray 0.005% hexaconazole for rust & tikka disease control.	Spray 0.005% hexaconazole for rust & tikka disease control.	-
Bajra	-	-	Spray Mancozeb 0.2%	-
Green gram			-	
Horticulture				

Mango	Provision of drainage, fertilizer application, Control leaf blight.	Spray 0.2% wettable sulphur or 0.005% hexaconazole for protection against powdery mildew after cessation of heavy rain.	Hang methyl euginol trap, one /acre for control of fruit fly.	-
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2.3 Floods

Condition				
Transient water logging/ partial inundation	Seedling / Nursery stage	Vegetative stage	Reproductive stage	At harvest
Groundnut	NA	As a preventive step open drainage channel	As a preventive step open drainage channel	
Cotton	NA	As a preventive step open drainage channel	As a preventive step open drainage channel	
Bajra	NA	As a preventive step open drainage channel	As a preventive step open drainage channel	
Green gram	NA	As a preventive step open drainage channel	As a preventive step open drainage channel	
Horticulture	-	-	-	
Mango	Provide surface drainage	Provide surface drainage	Provide surface drainage	
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% hexaconazole for rust & leaf spot management.	As a preventive step open drainage channel followed by spray 1 % FeSO ₄ + 0.1 % citric acid for control yellowing.	
Cotton	As a preventive step open	As a preventive step open	As a preventive step open	

	drainage channel and apply amonium sulphate.	drainage channel and apply amonium sulphate.	drainage channel. Harvesting mature bolls.	
Bajra	As a preventive step open drainage channel and spray mancozeb 0.2% control downy mildew	As a preventive step open drainage channel and spray mancozeb 0.2% control downy mildew.	As a preventive step open drainage channel and spray mancozeb 0.2% control rusts.	Harvest mature ear heads.
Green gram	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 powdery mildew.	Picking of mature pods.
Horticulture				
Mango	Shift grafts to safe place & proper surface drainage.	Surface drainage.	Surface drainage.	Surface drainage.
Sea water intrusion	NA	NA	NA	NA

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

Extreme event type	Suggested contingency measure			
	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	-
Hailstorm	NA	NA	NA	NA
Cyclone				
Wheat	Quick drainage	Quick drainage	Quick drainage and spray mancozeb 0.2% to control black point in grain.	Shift produce at safer place.
Cotton	Earthing up , quick drainage	Earthing up, quick drainage	Earthing up, quick drainage	
Groundnut	Quick drainage	Quick drainage	Quick drainage	
Horticulture				

Mango	Shift grafts to safe place if possible & build Cyclone proof nursery, Grow wind barrier trees around nursery.	Reduce canopy & tying plants diagonally if possible, Grow wind barrier trees around field.	Reduce canopy & tying plants diagonally if possible.	Early harvesting of crop.
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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	Store fodder (silage and hay). Conventional feeds are used for feeding (Roughages & concentrates) of maize, sorghum, groundnut fodder & wheat straw).	Stored feed & fodder in silage & Hay. Treated wheat straw with 4 % urea solution. Use chaff cutter for fodder. Use press for making compact bundles of fodder for easy transportation. Establish feed block preparation facilities for animals. Arrange bulk transportation of fodder.	Feed little green fodder along with unconventional feed, 5 kg green feed/mature animal.
Drinking water	Rain water harvesting and create water bodies/watering points. When water is scarce use only for drinking water for animals.	Avoid wallowing. Judicious use of drinking water. Establish and arrange the community based drinking water facilities. In coastal area community based R.O. Plant to be established for drinking water. Add bleaching powder to drinking water (1%).	Give sufficient water as per the animal requirement..
Health and disease management	Foot & Mouth disease vaccination in June, Vaccination for Bacterial diseases e.g. , HS,BQ Deworming of the animals (cattle & buffaloes). Add mineral mixtures 25 g/animal/day along	Add mineral mixtures 25 g/Animal/day along with feed, deworming of the animals. Arrange mobile dispensary for animal health in the region. Establish link with Agricultural/Veterinary University for	Add vitamin mineral mixtures 25 g/Animal/day along with feed, quarantine diseased animals and deworming of the animals.

	with feed. Animals to be covered cover under insurance schemes. Vaccination for bacterial diseases e.g. , HS,BQ	animal health. Involve vet. science students for health management of animal. Carry out decease diagnosis camps.	
Floods			
Feed and fodder availability	Harvest available fodder and store it at safe place if floods forecast. Shift animals to safe place. Identify rescue places for safety of animals.	Give stored fodder with mineral mixture. Fodder should be stored at safe place. In severe rain and flood unteather animals.	Feed silage & hay material along with concentrate feed. Use chaff cutter for fodder. Use press for making compact bundles of fodder for easy transportation. Establish community based shelter houses for animals. Establish feed block preparation facilities for animals. Arrange bulk transportation of fodder.
Drinking water	Add bleaching powder (1%) to drinking water when heavy rains occur and flood expected.	Add bleaching powder to drinking water (1%).	Add bleaching powder to drinking water (1%).
Health and disease management	Provide insurance cover to the animals.	Vaccination of animals against HS, BQ Add mineral mixtures 25 g/Animal/day along with feed, deworming of the animals. Arrange mobile dispensary for animal heath in the region. Establish link with Agricultural/Veterinary University for animal health. Involve vet. science students for health management of animal. Carry out decease diagnosis camps.	Disposal of dead animals by burning the carcass and sanitation measures to control spread of diseases. Health checking to diseases out break.
Cyclone			
Feed and fodder availability	Early harvesting & storage of fodder.	Shift animals to safe place, give stored fodder with mineral mixture along with	Feed silage & hay material along with concentrated feed.

		concentrated feed. In severe rain and flood unteather animals.	Use chaff cutter for fodder. Use press for making compact bundles of fodder for easy transportation. Establish community based shelter houses for animals. Establish feed block preparation facilities for animals. Arrange bulk transportation of fodder.
Drinking water	Add bleaching powder to drinking water (1%).	Add bleaching powder to drinking water (1%).	Add bleaching powder to drinking water (1%).
Health and disease management	Provide insurance cover to the animals.	Vaccination of animals to HS & BQ. Keep animal free. Add mineral mixtures 25 g/Animal/day along with feed, deworming of the animals. Arrange mobile dispensary for animal health in the region. Establish link with Agricultural/Veterinary University for animal health. Involve vet. science students for health management of animal. Carry out decease diagnosis camps.	Disposal of dead animals by burning the carcas and sanitation measures to control spread of diseases. Health checking to diseases out break.
Heat wave and cold wave	NA	NA	NA
Heat wave	NA	NA	NA

^s based on forewarning wherever available

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 & RD).	Linkage Govt. schemes with public/NGOs at grass root levels.
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	N.A.	N.A.	N.A.	-
Health and disease management	N.A.	N.A.	N.A.	-

^a based on forewarning wherever available

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	During the event	After the event

1) Drought			
A. Capture			
Marine	NA	NA	NA
Inland	NA	NA	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	NA	NA
Inland	NA	NA	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)	-	-	Repaire & maintenance of aqua structures to be given
(vi) Any other	-	-	-

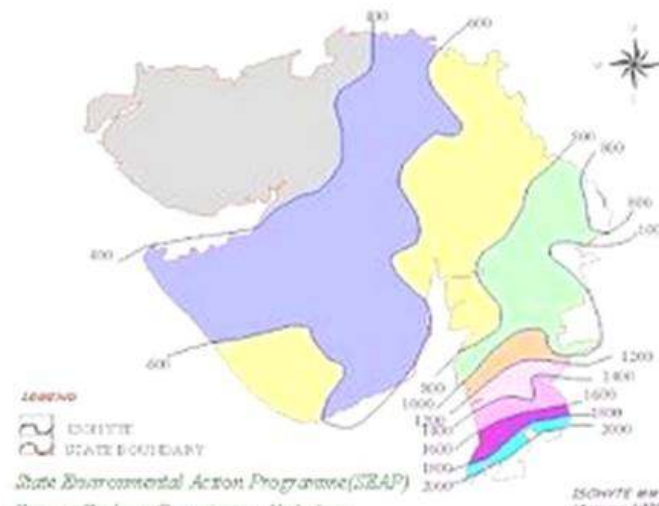
3. Cyclone / Tsunami			
A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives	For warning systems to be installed. Insurance & communication instruments supplied to fisher man , Warning systems to be installed	Warning systems to be installed	Compensations to be paid for 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	NA	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
4. Heat wave and cold wave			
Heat wave			
A. Capture			

Marine	NA	NA	NA
Inland	NA	NA	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	
(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	NA	NA
Inland	NA	NA	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	-	-	-

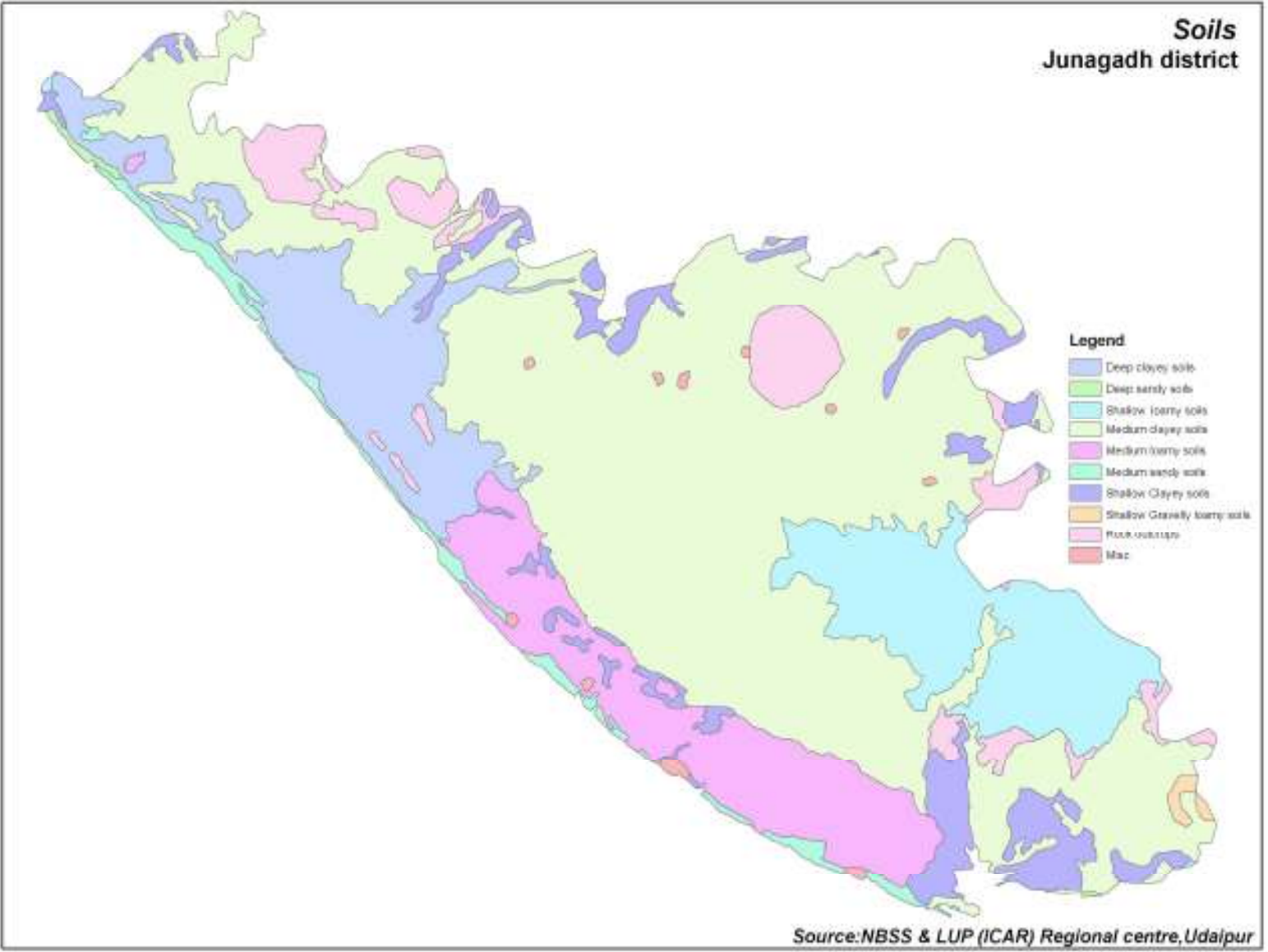
Annexure-1: Location map of Junagadh district



Annexure 2 : Mean annual rainfall of Junagadh



Soils Junagadh district



Source: NBSS & LUP (ICAR) Regional centre, Udaipur