

State: GUJARAT

Agriculture Contingency Plan for District: GIR SOMNATH

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)		West coast 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, Gir Sonath, Porbandar and part of Amreli, Bhavnagar and Rajkot		
	Geographic coordinates of district headquarters		Latitude	Longitude	Altitude
			20° 54' 28N	70° 22' 4E	23 MSL
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS		Directorate of Research, Junagadh Agricultural University, Junagadh (ZRS) Main Sugarcane Research Station, JAU, Kodinar 362720		
	Mention the KVK located in the district		Krishi Vigyan Kendra, Ambujanagar, Kodinar, Pin 362720 District Gir Somnath		

1.2	Rainfall (Avg. of 2002-3 to 2014-15)	Normal RF (mm)	Normal Rainy days (number)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June-Sep):*	1115	30	2 nd Week of June	2 nd Week of September
	NE Monsoon (Oct-Dec):	-	-	-	-
	Winter (Jan-March):	-	-	-	-
	Summer (Apr-May):	-	-	-	-
	Annual:	1115	30	-	-

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)	376.5	182.6	19.8	17.1	42.2	5.5	0.0	104.7	4.7	0.0

(Source :Junagadh District Panchayat report)

1.4	Major Soils (common names like red sandy loam deep soils (etc.,))*	Area ('000 ha)	Percent (%) of total
	Medium to shallow black soils	103.3	56.6
	Mixed Red and Black soils	21.2	11.6
	Coastal alluvial soils	58.1	31.8

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	182.6	140.0
	Area sown more than once	73.2	
	Gross cropped area	255.8	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	91.6		
	Gross irrigated area	128.3		
	Rain fed area	54.31		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals	162 km	5.1	3.9
	Tanks		0.00	-
	Open wells/Bore wells	8710	86.3	67.3
	Lift irrigation schemes		-	-
	Micro-irrigation		-	-
	Other sources, Ponds & Check dams	28557	36.9	28.8
	Total Irrigated Area		128.3	

	Pump sets	20881		
	No. of Tractors	321		
	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)
	Over exploited	-	-	Moderate saline
	Critical	-	-	
	Semi-critical	3	32.5	
	Safe	2	67.5	
	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 (Irrigation): Junagadh District Panchayat report-2012-13)

Source : District Panchayat report and reports on GWR & IP in Gujarat, NWR, WS & Kalpsar Dept., Govt. of Gujarat)

1.7 Area under major field crops & horticulture (as per latest figures of year 2011-12 to 2013-14)

1.7	Major field crops cultivated	Area ('000 ha)							
		<i>Kharif</i>			<i>Rabi</i>			Summer	Grand total
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total		
	Groundnut	-	107.4	107.4	-	-	-	6.8	114.3
	Wheat	-	-	-	70.4	-	70.4	-	70.4
	Cotton	16.5	-	16.5	-	-	-	-	16.5
	Pulses	-	1.7	1.7	0.7	-	0.7	2.8	5.1
	Sugarcane	-	-	-	12.8	-	-	-	12.8
	Bajra (Pearl millet)	-	7.8	7.8	6.4	-	6.4	5.8	20.0
	Others								
	2.Other oil seed crops (Sesame, castor, mustard)		0.7	0.7				6.5	6.3

	Horticulture crops - Fruits	Area ('000 ha)
		Total
	Mango	10.4
	Sapota	0.8
	Banana	1.8
	Citrus	0.2
	Other (Ber etc.)	0.6
	Horticulture crops - Vegetables	Total
	Onion	2.9
	Brinjal	-
	Others	9.4
	Medicinal and Aromatic crops	Total
	Fenugreek	0.6
	Cumin	0.7
	Coriander	1.0
	Others	-
	Plantation crops	Total
	Coconut	4.0
	eg., Industrial pulpwood crops etc.	-
	Fodder crops	Total
	Sorghum	0.2
		-
	Total fodder crop area	18.2
	Grazing land	42.2
	Sericulture etc	-

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)	121.0	138.6	259.6
	Crossbred cattle	3.0	6.5	9.4
	Non descriptive Buffaloes (local low yielding)	19.5	138.2	157.7
	Graded Buffaloes	-	-	-
	Goat	-	-	44.1
	Sheep	-	-	23.0

	Others (Camel, pig, yak, horse etc.)	-	-	3.6	
	Commercial dairy farms (Number)				
1.9	Poultry	No. of farms	Total No. of birds ('000)		
	Commercial	-	30.2		
	Backyard	-	-		
1.10	Fisheries (Data source: Chief Planning Officer)				
	A. Capture				
	i) Marine (Data Source: Fisheries Department)	No. of fishermen	Boats		Nets
			Mechanized	Non-mechanized	
		78746	4577	113	330672
	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)				
	ii) Fresh water (Data Source: Fisheries Department)	-	-	-	

(Source: Junagadh District Panchayat report-2012-13, Fisheries and Animal husbandry departments)

1.11 Production and productivity of major crops (2011-12 to 2013-14)

1.11	Name of crop	<i>Kharif</i>		<i>Rabi</i>		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										
	Groundnut	169.5	1578	-	-	12.5	1828	182.0	1593	331.2
	Cotton	9.4	568	-	-	-	-	9.4	568	-
	Wheat	-	-	282.5	4015	-	-	282.5	4015	338.9
	Bajra	11.1	1437	13.0	2027	15.7	2695	39.8	1993	75.6
	Pulses	1.0	580	1.3	1871	1.4	525	3.7	724	5.7
	Sugarcane	-	-	949.7	74010	-	-	949.7	74010	161.4
Major Horticultural crops										
	Mango	-	-	-	-	-	-	83.3	7992	-
	Sapota (Chiku)	-	-	-	-	-	-	6.8	8975	-
	Banana	-	-	-	-	-	-	42.3	23216	-
	Citrus	-	-	-	-	-	-	1.0	4146	-
	Coconut	-	-	-	-	-	-	44.3	11000	-
	Other (Beretc)	-	-	-	-	-	-	11.0	3700	-

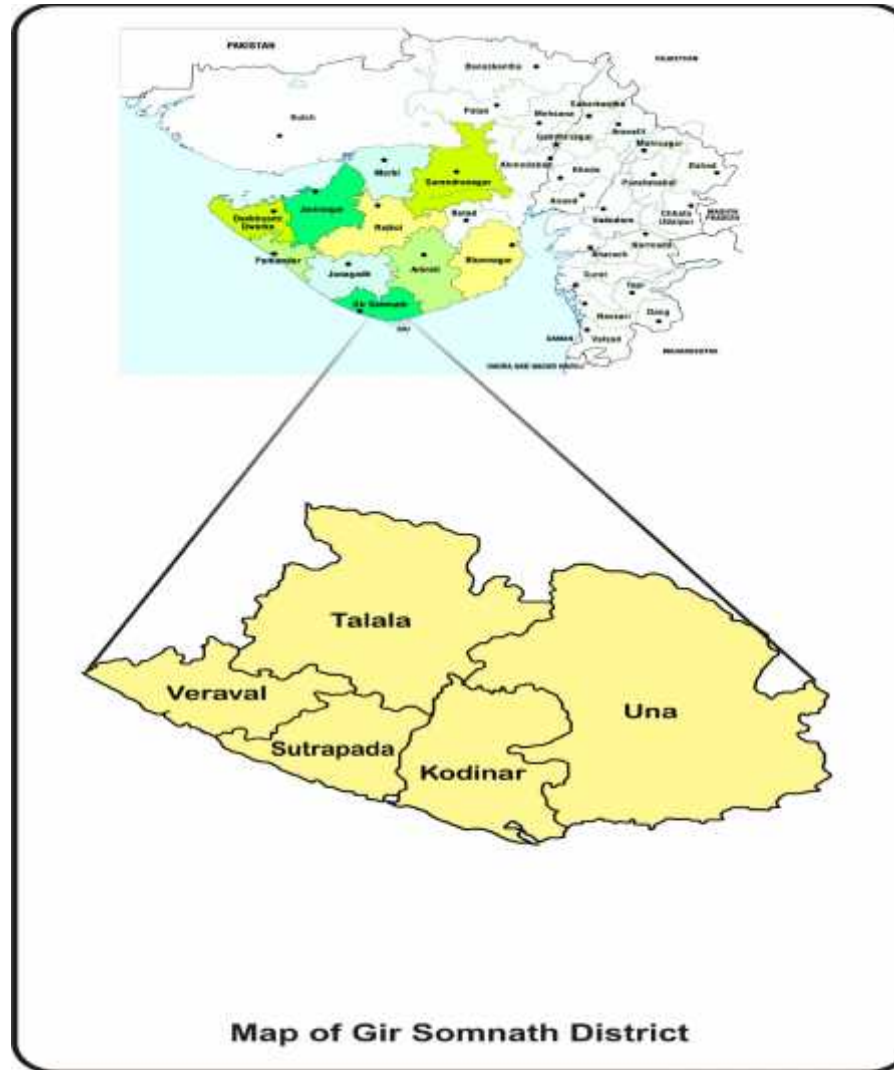
(Source: Reports of Department of Agriculture, Govt. of Gujarat)

1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Groundnut	Cotton	Wheat	Sugarcane	Bajra (Pearl Millet)
	<i>Kharif</i> - 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
	<i>Kharif</i> -Irrigated	-	May 4 th wk to June 2 nd wk	-	-	-
	<i>Rabi</i> - Rainfed	-	-	-	-	-
	<i>Rabi</i> / summer-Irrigated	-	-	November 2 nd wk to November 4 th wk	October 4 th wk to February 4 th wk	October 2 nd wk to November 1 st wk

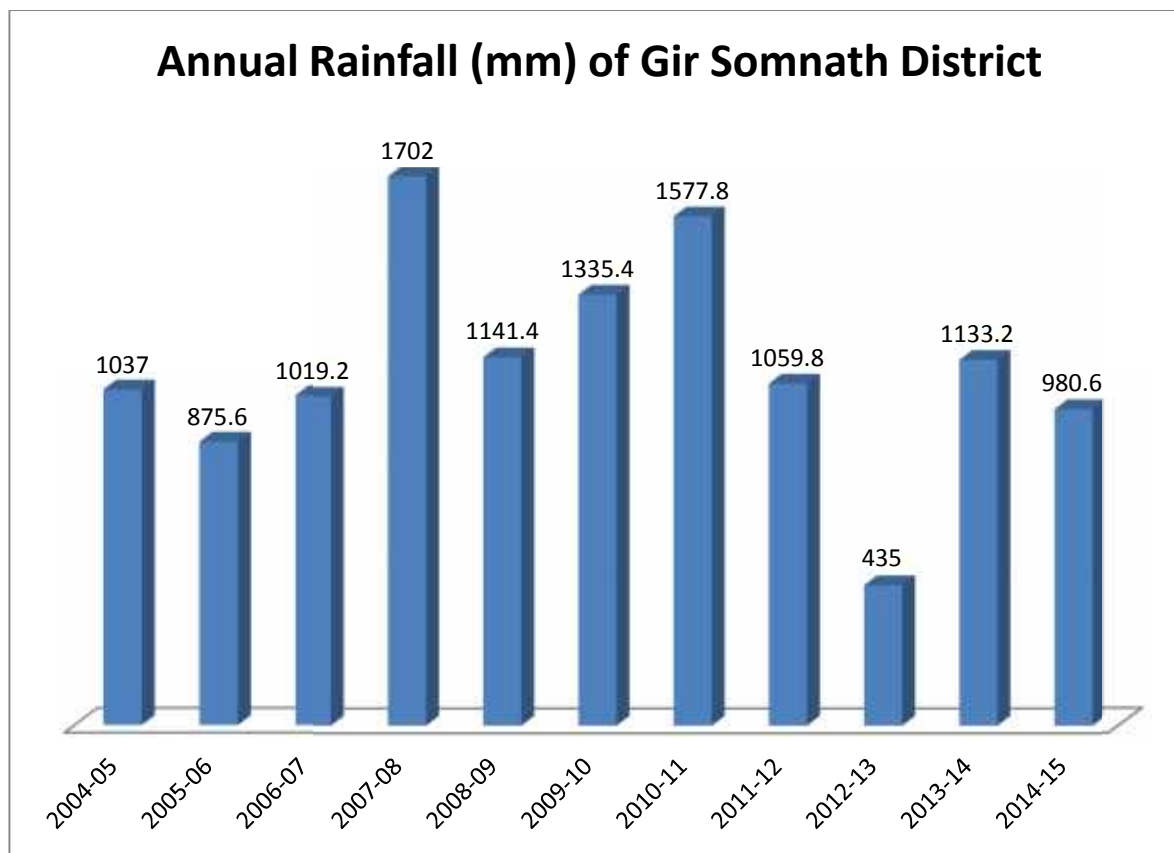
1.13	What is the major contingency the district is prone to? (Tick mark)	Regular	Occasional	None
	Drought	-		-
	Flood	-		-
	Cyclone	-		-
	Hail storm	-	-	
	Heat wave	-		-
	Cold wave	-	-	
	Frost	-	-	
	Sea water intrusion (Una, Kodinar, Sutrapada & Veravaltalukas)		-	-
	Pests and disease outbreak (specify) Pests-aphid, jasad, thrips, white fly, mealy bug, scale insect, early shoot borer, heliothis, leaf roller Diseases-wilt, red rot, rust, tikka & downy mildew		-	-
	Others (specify)	-	-	-

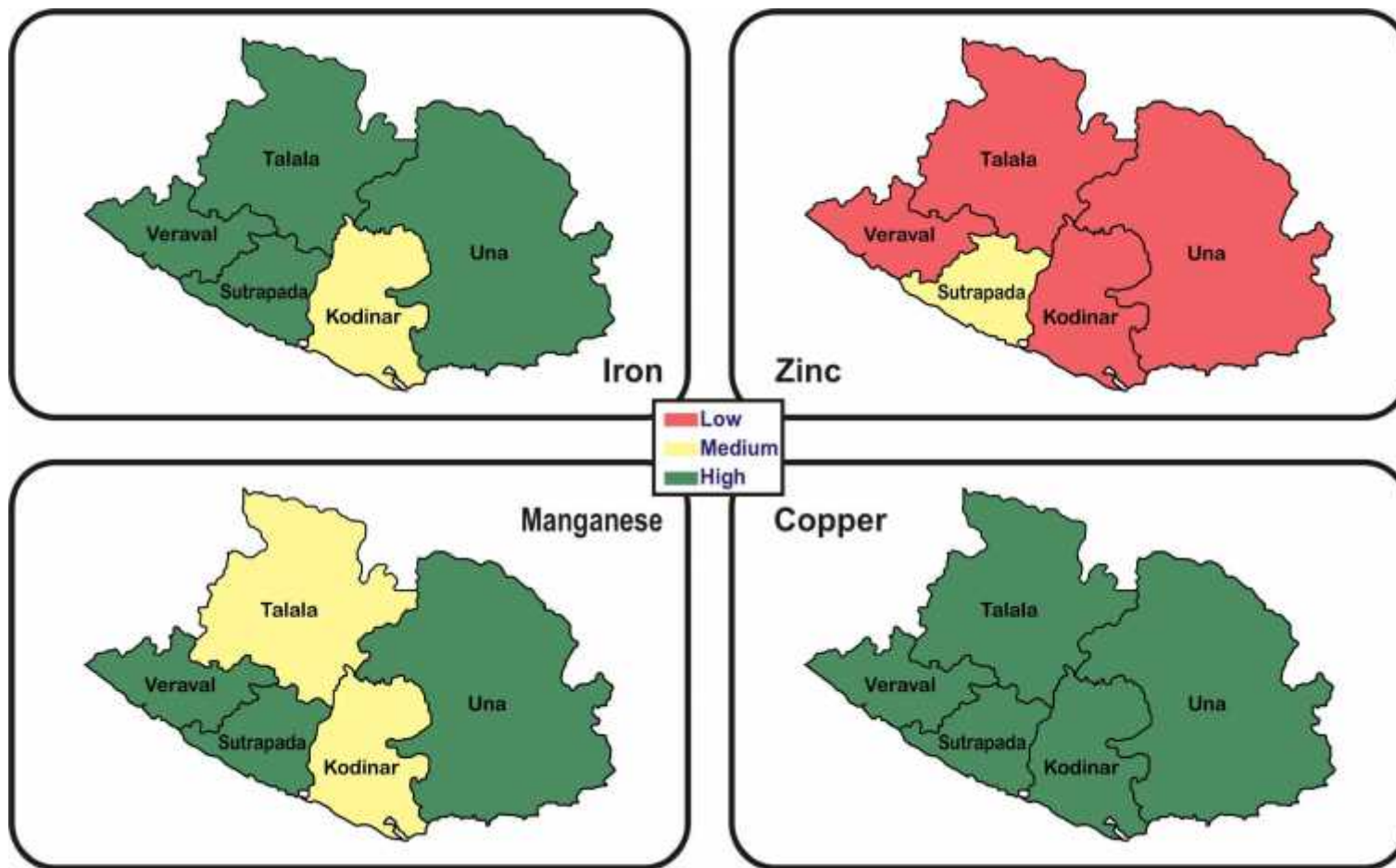
1.14	Include Digital maps of the district for	Location map of district within State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure II	Enclosed: Yes
		Soil map as Annexure III a & b	Enclosed: Yes

Annexure-I: Location map of Gir Somnath district in Gujarat



Annexure II: Mean annual rainfall of Gir Somnath district





Status of micronutrients in soils of Gir Somnath District

Annexure III b: Soil map of Gir-Somnath district

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 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	-	-
		Cotton			
		Bajra			
	Coastal Alluvial soils	Bajra			
		Groundnut (spreading & semi spreading)			
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 2 nd week)	Medium & shallow black to mixed red & black soils	Groundnut (spreading & semi spreading)	Prefer bunch variety (GG-2/GG-5/ GG-7, GJG-9, TG 37 A) / semi spreading variety (GG-20, GJG 22) 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.
		Cotton	No change	-	
		Bajra	Castor (GC-3, GCH-4, GCH-6, GCH-7) pigeon pea (BDN-2, vaishali) sorghum (GFS-4&5, Gundhari, S-1049)	As per crop change, follow the package of practices.	
	Coastal Alluvial soils	Bajra	Castor (GC-3, GCH-4, GCH-6, GCH-7), / pigeon pea (BDN-2, Vaishali), /sorghum (GFS-4&5, gundhari,S-1049)	As per crop change, follow the package of practices.	

		Groundnut (spreading & semi spreading)	Prefer bunch variety GG-2/GG-5/ GG-7,GJG-9, TG 37 A/ semi spreading variety GG-20, GJG 22 of groundnut	Keep 45 cm and 60 cm row spacing for bunch and semi spreading groundnut, respectively. Other practices will be as such.	
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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)	Medium & shallow black to mixed red & black soils	Groundnut (spreading & semi spreading)	Greengram (GM-4, K-851)/ Sesame (GT-2,GT-3,GT-4)/sorghum (GFS-4&5, gundhari, S-1049)/Castor (GC-3, GCH-4, GCH-6, GCH-7)/ pigeon pea (BDN-2, vaishali) cotton (G cot 13,15,21)	As per crop change, follow the package of practices.	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, sprayers& dusters from government schemes.
		Cotton	do	As per crop follow the package of practices	
		Bajra	-do-	-do-	
	Coastal Alluvial soils	Bajra	Greengram (GM-4, K-851)/ Black Gram (Guj. Urd-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)	-do-	
		Groundnut (spreading & semi spreading)	Greengram (GM-4, K-851)/ sesame (GT-2, GT-3, GT-4)/sorghum (GFS-4&5, gundhari, S-1049)/castor (GC-3, GCH-4, GCH-6, GCH-7)/ pigeon pea (BDN-2, vaishali) cotton (G cot 13, 15, 21, 23)	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 2 nd week)	Medium & shallow black to mixed red &	Groundnut (spreading & semi spreading)	Sesame (GT-2, GT-3, GT-4, purva-1)/sorghum (GFS-4, 5, gundhari, S-1049)/ castor (GC-3, GCH-4, GCH-5	As per crop change, follow the package of practices, Irrigate the	Agencies for quality seed supply are National Seed Corporation

	black soils		GCH-6, GCH-7), soybean (GS-1, GS-3, JS-335), greengram (GM-4, K-851)/ blackgram (Guj. Urd-1, T-9)	castor as per need.	(NSC), Gujarat State Seed Corporation (GSSC), University, Gujcomasol. Supply of quality seed from NSC,GSSC, SAU and zerotill seed drill, seed dressing equipments, sprayers& dusters from Government schemes.
		Cotton	-do-	-do-	
		Bajra	-do-	-do-	
Coastal Alluvial soils	Bajra	Sorghum (GFS-4&5, gundhari, S-1049)/ castor (GC-3, GCH-4, GCH-5 GCH-6, GCH-7)	-do-		
	Groundnut (spreading & semi spreading)	Sesame (GT-2, GT-3, GT-4, purva-1)/sorghum (GFS-4, 5, gundhari, S-1049)/ castor (GC-3, GCH-4, GCH-5, GCH-6, GCH-7)	-do-		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			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 soils	Groundnut	Gap filling	Interculturing 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 stalk shredding machine is available in Jasdantown of Rajkot district to be supplied by Govt.
		Cotton	Gap filling	Interculturing to fill soil cracks, Mulching with wheat straw or shredded cotton stalk, mulching (Plastic film 25 micron, ~200 kg/ha).	
		Bajra	Thinning to maintain 10 cm plant to plant spacing	Interculturing to fill soil cracks, Mulching with wheat straw or	

	Coastal Alluvial soils	Bajra	Thinning to maintain 10 cm plant to plant spacing	shredded cotton stalk. Mulching with wheat straw or shredded cotton stalk.	
		Groundnut	Gap filling	Interculturing to fill soil cracks, Mulching with wheat straw or shredded cotton stalk, mulching (Plastic film 25 micron, ~200 kg/ha).	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Mid-season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)					
At vegetative stage	Medium & shallow black to mixed red & black soils	Groundnut	Weeding. Protection against sucking pests (control of jassid and aphid, spray Imidacloprid 17.8 SL 4 ml/10 lt. water) Life saving irrigation if possible	Mulching with wheat straw or shredded 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.
		Cotton	-do-	-do-	
		Bajra	Weeding & thinning to maintain 10 cm plant to plant spacing, Life saving Irrigation if possible	Inter tilling. Spray of 1 % N through urea after relief of drought.	
	Coastal Alluvial soils	Bajra	Weeding & thinning to maintain 10 cm plant to plant spacing Life saving Irrigation if possible	Interculturing	
		Groundnut	Weeding. Protection against sucking pests (control of jassid and aphid, spray Imidacloprid 17.8 SL 4 ml/10 lt. water) Life saving irrigation if possible	Mulching with wheat straw or shredded cotton stalk, mulching (Plastic film 25 micron, ~200 kg/ha), inter tilling.	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Mid season drought (long dry spell)	Medium & shallow black to mixed red & black soils	Groundnut	Supplemental Irrigation followed by weeding	-	Ensure electric supply for life saving irrigation by Electricity Supply Board of State
		Cotton	- do-	-	
		Bajra	Weeding, Supplemental irrigation if possible. Harvest non flowering plants for fodder purpose if water is not available	Interculturing, top dressing of N through urea after relief of drought	-do-
	Coastal Alluvial soils	Bajra	Supplemental irrigation if possible. Harvest non flowering plants for fodder purpose	Interculturing, top dressing of N through urea after relief of drought	-do-
		Groundnut	Supplemental Irrigation followed by weeding	-	-do-

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

2.1.2 Drought - Irrigated situation

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

Note: Very limited canal irrigation facility exists in Gir Somnath

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

Condition			Suggested Contingency measures		
	Major Farming situation	Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Medium & shallow black to mixed red & black soils		NA		
	Coastal 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 to mixed red & black soils	Wheat	No change	Supply irrigation during night time to reduce transpiration.	Ensure electric supply for life saving irrigation by PGVCL.
			Greengram (GG- 1, GJG-3)/ coriander (Guj 1 & 2)/, fenugreek (GM-2)/ 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 PGVCL.
			Greengram (GG- 1, GJG-3)/ coriander (Guj 1 & 2)/, fenugreek (GM-2)/ leafy vegetables / carrot	Adoption of drip irrigation system. Mulching of 50 T, ~370 kg/ha. Reduce area of irrigation.	Supply of MIS and plastic film through Govt. schemes.
Costal Alluvial Medium land soils	Wheat	No change	Give irrigation during night time to reduce transpiration losses.	Ensure electric supply for life saving irrigation	
		Greengram (GG- 1, GJG-3)/ coriander (Guj 1 & 2)/, fenugreek (GM-2)/ 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 to reduce over exploitation some extent & limit depth of pumping	-
			Semi <i>rabi</i> bajra (GHB-538)		

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	-	Drainage of excess water	Surface drainage for management of water logging, lodging crop and black point in grain, spray mancozeb 0.2 %.	Protect produce with plastic sheet (100 micron, 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 of mature bolls.	Protect produce with plastic sheet (100 micron, UV stabilized colour plastic) or shift produces to farm shed and protection against pest/disease damage in storage etc.
Groundnut	-	-	Delay harvesting of spreading groundnut if possible. Immediately harvest bunch groundnut. Quick surface drainage, Open channel around field.	Protect produce with plastic sheet (100 micron, 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 micron, 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.

Sugarcane	Surface drainage	Surface drainage, Provide physical support through tying the bunch of plants	Surface drainage, Provide physical support through tying the bunch of plants	-
Horticulture				
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 methyl eugenol trap, one /acre for control of fruit fly.	Utilize unripe fruits for pickles.
Heavy rainfall with high speed winds in a short span				
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 micron, 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)	Surface drainage (for management of water logging). Upright the lodged plant and press the soil around the plant.	Surface drainage (for management of water logging) harvesting of mature bolls,	Protect produce with plastic sheet (100 micron, UV stabilized colour plastic) or shift produces to farm shed and protection against pest/disease damage in storage etc.
Groundnut	-	-	Harvesting delay for spreading groundnut if possible. Immediately harvest bunch groundnut. Quick surface	-do-

			drainage, Open channel around field.	
Bajra	-	-	Harvest mature ear heads. Quick surface drainage.	-do-
Mango	-	Spray 0.2% wettable sulphur or hexaconazole 0.005% for protection against powdery mildew	Collect fallen fruits	Unripe fruit may be used for pickles.
Outbreak of pests and diseases due to unseasonal rains				
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	-	-	-	-
Groundnut	Spray hexaconazole 0.005% for rust & tikka disease control.	Spray hexaconazole 0.005% for rust & tikka disease control.	Spray hexaconazole 0.005% for rust & tikka disease control.	-
Bajra	-	-	Spray mancozeb 0.2%	-
Horticulture				
Mango	Provision of drainage, fertilizer application, control leaf blight.	Spray 0.2% wettable sulphur for protection against powdery mildew after cessation of heavy rain.	Hang methyl eugenol trap, one /acre for control of fruitfly.	-

2.3 Floods

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation¹				
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 days²				
Groundnut	As a preventive step open drainage channel followed by spray of 0.05 % carbendazim for control of leaf spot.	As a preventive step open drainage channel followed by spray of 1 % FeSO ₄ +citric acid for control of yellowing, 0.0025 % hexaconazole for rust & leaf spot management	As a preventive step open drainage channel followed by spray of 1 % FeSO ₄ + 0.1 %citric acid for control yellowing	-
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 of 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 0.025 % carbendazim for control of powdery mildew.	As a preventive step open drainage channel and spray 0.025 % carbendazim for leaf spot & powdery mildew.	As a preventive step open drainage channel carbendazim for control powdery mildew	Picking of mature pods.
Horticulture				
Mango	Shift grafts to safe place &proper surface drainage	Surface drainage	Surface drainage	Surface drainage
Sea water inundation	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	-	-	
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.

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 and 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	Avoid wallowing. Judicious use of	Give sufficient water as per the

	water bodies/watering points. When water is scarce use only for drinking water for animals.	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%)	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 with feed. Animals to be covered cover under insurance schemes.	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 disease diagnosis camps.	Add vitamin mineral mixtures 25 g/animal/day along with feed, quarantine diseased animals and deworming of the animals.
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	Disposal of dead animals by burning the carcass and sanitation measures to control spread of

		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 disease diagnosis camps.	diseases. Health checking to diseases outbreak.
Cyclone			
Feed and fodder availability	Early harvesting & storage of fodder	Shift animals to safe place. Give stored fodder with mineral mixture along with concentrated feed. In severe rain and flood unteather animals.	Feed silage & hay material along with concentrated 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 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 against HS & BQ. 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 disease diagnosis camps.	Disposal of dead animals by burning the carcass and sanitation measures to control spread of diseases. Health checking to diseases outbreak.
Heat wave and cold wave	NA	NA	NA
Heat wave	NA	NA	NA

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	Use stored feed, conventional feed, antibiotics and probiotics	Use 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/NGO's 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 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 biotic and assures supply of electric power.	Routine practices are followed	Linkage Govt. schemes with public/NGO's 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 /NGO's 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, probiotic	Routine practices are 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 fan, 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 vaccinations add calcium in the poultry feed.	Routine practices are to be followed.	-
Cold wave				
Shelter/environment management	NA	NA	NA	-
Health and disease management	NA	NA	NA	-

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.	Use of KMnO ₄ for bath of fish 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 begiven.
(vi) Any other	-	-	-
3. Cyclone / Tsunami			
A. Capture	-	-	-
Marine	-	-	-
(i) Average compensation to be paid due to loss of fishermen lives	Forewarning 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.	-	Seed and feed to be supplied through dept. of fisheries,
(v) Infrastructure damage (pumps, aerators, shelters/hutsetc)	-	-	Compensation on assessment of actual losses & damage of pumps, aerators, shelters/huts to be given.

(vi) Any other	-	-	-
4. Heat wave and cold 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 diseases.	KMnO ₄ 2 % to maintain oxygen level
(iii) Any other	-	-	-