

CONTINGENCY PLANS FOR RABI AND SUMMER CROPS

District: Junagadh Gujarat State

1. Rainfall Information(Average of 10 year-2005-6 to 2015)

		Oct – Dec	Jan – Mar
(a)	Normal rainfall during <i>Rabi</i> season:(mm)	24	3.2
(b)	Number of rainy days :Nos.	8	0.5

(Source: Annual weather reports, Agrometeorological Cell, Department of Agronomy, JAU, Junagadh)

2. Rabi and summer crops cultivated

2a Area Production statistics (2011-12 to 2014-15)

S. No	Cropping System	Crop name	Area, '000 ha	Production, '000 t	Productivity, kg/ha
1	Groundnut based cropping system	Wheat	79.40	328.87	4142
		Coriander	42.80	61.18	1430
		Sesame(Summer)	10.10	7.41	734
		Cumin	1.51	12.79	850
		Cucurbits(summer)	2.04	30.00	14710
		Onion	0.85	24.95	29350
		Brinjal	1.53	29.38	19200
		Garlic	0.77	5.16	6700
		Cabbage	1.03	18.75	18200
		Tomato	1.00	25.34	25600
		Cluster bean	0.91	11.45	12650
		Cowpea	0.91	10.15	11150
		Groundnut(Summer)	1.10	2.20	1998
2	Rainfed system	Chickpea	10.70	13.87	1296
3	Horticulture -fruit & plantation crops	Mango	8.20	43.35	5300
		Sapota	3.70	37.48	10180
		Coconut	4.85	48.29 (000 nuts)	9950 (Nuts)

(Source: Reports of Junagadh District Panchayat, Department of Agriculture and Horticulture, Government of Gujarat 2016)

Note: Other horticultural crops (vegetable & spices) showing last three years data and fruit crops shows the data of 2015-16

2b Source wise (Water) cultivated area

S. No	Crop name	Cultivated area under ('000 ha)			
		Residual moisture condition/rainfed	Ground irrigated water	Tank irrigated	Canal irrigated
Field crops					
1	Cotton	-	69.50	-	2.70
2	Wheat	-	45.70	-	2.00
3	Chickpea	5.20	5.00	-	-
4	Groundnut (Summer)	-	1.10	-	-
5	Sesame Summer	-	10.10	-	-
Vegetables					
1	Cucurbits(summer)	-	2.04	-	-
2	Onion	-	0.85	-	-
3	Brinjal	-	1.53	-	-
4	Garlic	-	0.77	-	-
5	Cabbage	-	1.03	-	-
6	Tomato	-	0.99	-	-
7	Cluster bean	-	0.91	-	-
8	Cowpea	-	0.91	-	-
Spices					
1	Coriander	-	40.4	-	2.40
2	Cumin	-	1.01	-	0.50
Fruit crops					
1	Mango	-	8.20	-	-
2	Sapota	-	3.70	-	-
Plantation crops					
1	Coconut	-	4.85	-	-

(Source: Reports of Junagadh District Panchayat, Department of Agriculture and Horticulture, Government of Gujarat, PMKSY District Irrigation plan (2016-2020) Junagadh, Gujarat)

3. Sowing window information

Sr. No.	Soil type	Cropping system	Crop name	Optimum sowing window (Please mention along with week i.e., 2 nd week of Oct- to 4 th week of Nov/etc.)
1	Medium to shallow black & mixed Red and black	Groundnut based cropping system	Wheat	Nov.2 nd week to Nov.4 th week
			Coriander	Nov.2 nd week to Nov.4 th week
			Sesame (Summer)	Feb.3 rd week to Feb.4 th week
			Cumin	Nov.2 nd week to Nov.4 th week
			Cucurbits(summer)	Jan.2 nd week to Feb.2 nd week
			Onion	Nov.2 nd week to Nov.4 th week
			Garlic	Nov.2 nd week to Nov.4 th week
			Cluster bean	Feb.2 nd week to Feb.4 th week
			Cowpea	Feb.2 nd week to Feb.4 th week
			Groundnut(Summer)	Jan.2 nd week to Feb.2 nd week
		Vegetable	Brinjal	Aug. 1 st week to Sep. 2 nd week
	Tomato	Sept. 2 nd week to Oct.2 nd week		
	Cabbage	Sept. 2 nd week to Oct.2 nd week		
2	Coastal alluvial	Groundnut based cropping system	Wheat	Nov.2 nd week to Nov.4 th week
3	Black soil (<i>Ghed</i>)	Chickpea rainfed	Chickpea	Nov.2 nd week to Nov.4 th week

4.Contingency measures Field crops

4.1 For crops grown with residual moisture i.e., under rainfed condition

(a) Excess residual moisture

Sr. No.	Soil type	Cropping system	Crop name	Sowing Window	Variety	Management practices
1	Black soil(<i>Ghed</i>)	Chickpea rainfed	Chickpea	Nov.2 nd week to Nov.4 th week	GG-1,2, GJG-3	<ul style="list-style-type: none"> • Adopt surface drainage or • Delay sowing upto 1 week • Sowing at optimum moisture

(b) Less than optimum moisture i.e., 25% less than normal, which can happen due to insufficient rainfall during September/October months. Deficit of 20-40% rainfall

Sr. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
1	Black soil(Ghed)	Chickpea rainfed	Chickpea	Oct.3 rd week to Nov.1 st week	GG-1,2, GJG-3	<ul style="list-style-type: none"> • Adopt organic mulch/crop residue • Weeding& optimum plant stand
		Sorghum Fodder rainfed	Sorghum Fodder	Sep.2 nd week to Oct.2 nd week	Gundhari, GFS-3, GAFS-11, CSV-21F	<ul style="list-style-type: none"> • Plant thinning • Adopt organic mulch/crop residue.

(c) Severe limitation in moisture. Deficit of rainfall during September/October months by more than 40%.

Sr. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
1	Black soil(Ghed)	Sorghum Fodder rainfed	Sorghum Fodder	Sep.2 nd week to Oct.2 nd week	Gundhari, GFS-3, GAFS-11, CSV-21F	<ul style="list-style-type: none"> • Adopt organic mulch/crop residue. • Plant thinning • Don't feed as green fodder. • Weeding & optimum plant stand

4.2 For crops grown with groundwater

(a) Above normal rainfall in *Kharif* coupled with good distribution

Sr. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
1	Medium to shallow black & mixed red and black	Groundnut based cropping system	Wheat	Nov.2 nd week to Nov.4 th week	GW-451,GJW-463, GW-496, GW-366 Lok-1	<ul style="list-style-type: none"> • Adopt recommended agronomic and irrigation practices. • Immediate after last irrigation spray 2 % urea and mencozeb 75 % WP (27 g/10 litre water) for better quality of grain.
			Coriander	Nov.2 nd week to Nov.4 th week	GC-2,3	<ul style="list-style-type: none"> • Adopt recommended agronomic and irrigation practices • Seed treatment with thirum @ 2-3 gm/kg seed for prevention of wilt disease • After germination make alternative spray of mencozeb 75 % WP (27 g/10 litre water) and hexaconazole 5 % EC (10 ml/10 lit. water) for prevention of blight and PM diseases at 10-12 days interval.

Sr. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
			Cumin	Nov.2 nd week to Nov.4 th week	GC-3, GC-4	<ul style="list-style-type: none"> Adopt recommended agronomic and irrigation practices Seed treatment with thirum @ 2-3 gm/kg seed for prevention of wilt disease After germination make alternative spray of mencozeb 75 % WP (27 g/10 litre water) and hexaconazole 5 % EC (10 ml/10 lit. water) for prevention of blight and PM diseases at 10-12 days interval. Under cloudy weather and fog condition make extra spray of mencozeb 75 % WP (27 g/10 litre water) for prevention of blight.
			Sesame (Summer)	Feb.3 rd week to Feb.4 th week	GT-3,5	<ul style="list-style-type: none"> Adopt recommended package practices
			Groundnut (Summer)	Feb.1 st week to Feb.3 rd week	TG 37A TAG-24, GG -6GJG-31	<ul style="list-style-type: none"> Adopt recommended package of practices
2	Coastal alluvial	Groundnut based cropping system	Wheat	Nov.2 nd week to Nov.4 th week	GW-451,GJW-463, GW-496, GW-366,Lok-1	<ul style="list-style-type: none"> Adopt recommended agronomic and irrigation practices. Immediate after last irrigation spray 2 % urea and mencozeb 75 % WP (27 g/10 litre water) for better quality of grain.
			Chickpea	Nov.2 nd week to Nov.4 th week	GG-1, GJG-3 GJG-5	<ul style="list-style-type: none"> Adopt recommended agronomic practices Monitor the crop for heliothis and prodenia infestation, if infestation observed above ETL spray spinosad 45 % SC (3 ml/10 lit. water).

(b) Normal rainfall

Sr. No.	Soil type	Cropping system	Crop name	Sowing window	Variety	Management practices
1	Medium to shallow black & mixed red and black	Groundnut based cropping system	Wheat	Nov.2 nd week to Nov.4 th week	GW-451,GJW-463, GW-496, GW-366 Lok-1	<ul style="list-style-type: none"> Adopt recommended agronomic and irrigation practices. Immediate after last irrigation spray 2 % urea and mencozeb 75 % WP (27 g/10 litre water) for better quality of grain.

Sr. No.	Soil type	Cropping system	Crop name	Sowing window	Variety	Management practices
			Coriander	Nov.2 nd week to Nov.4 th week	GC-2,3	<ul style="list-style-type: none"> Adopt recommended agronomic and irrigation practices Seed treatment with thirum @ 2-3 gm/kg seed for prevention of wilt disease After germination make alternative spray of mencozeb 75 % WP (27 g/10 litre water) and hexaconazole 5 % EC (10 ml/10 lit. water) for prevention of blight and PM diseases at 10-12 days interval.
			Cumin	Nov.2 nd week to Nov.4 th week	GC-3, GC-4	<ul style="list-style-type: none"> Adopt recommended agronomic and irrigation practices Seed treatment with thirum @ 2-3 gm/kg seed for prevention of wilt disease After germination make alternative spray of mencozeb 75 % WP (27 g/10 litre water) and hexaconazole 5 % EC (10 ml/10 lit. water) for prevention of blight and PM diseases at 10-12 days interval. Under cloudy weather and fog condition make extra spray of mencozeb 75 % WP (27 g/10 litre water) for prevention of blight.
			Sesame (Summer)	Feb.1 st week to Feb.3 rd week	GT-3,5	<ul style="list-style-type: none"> Adopt recommended package practices
			Groundnut Summer	Feb.1 st week to Feb.3 rd week	TPG-37A ,TG 37 TAG-24, GG 2,4,6	<ul style="list-style-type: none"> Adopt recommended package of practices
2	Coastal alluvial	Groundnut based cropping system	Wheat	Nov.2 nd week to Nov.4 th week	GW-451,GJW-463, GW-496, GW-366, Lok-1, KOL-19	<ul style="list-style-type: none"> Adopt recommended agronomic and irrigation practices. Immediate after last irrigation spray 2 % urea and mencozeb 75 % WP (27 g/10 litre water) for better quality of grain.
			Chickpea	Nov.2 nd week to Nov.4 th week	GG-1, GJG-3 GJG-5	<ul style="list-style-type: none"> Adopt recommended agronomic practices Monitor the crop for heliothis and prodenia infestation, if infestation observed above ETL spray spinosad 45 % SC (3 ml/10 lit. water).

(c) Deficient rainfall in *Kharif* season (25-50% deficient)

Sr. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
1	Medium to shallow black & mixed red and black	Groundnut based cropping system	Wheat	Nov.2 nd week to Nov.3 rd week	GW-451, GJW-463, GW-496, GW-366, Lok-1, KRL-19	<ul style="list-style-type: none"> • Adopt management practices as given in point 4.4(a) plus following practices. • Use MIS irrigation system • Irrigate during critical stages only. • Give irrigation during night time to reduce transpiration
			Coriander	Nov.2 nd week to Nov.3 rd week	GC-2, 3	<ul style="list-style-type: none"> • Adopt management practices as given in point 4.4(a) plus following practices. • Adopt MIS with organic mulching • Irrigate during critical stages only. • Give irrigation during night time to reduce transpiration
			Cumin	Nov.2 nd week to Nov.3 rd week	GC-3, GC-4	<ul style="list-style-type: none"> • Adopt management practices as given in point 4.4(a) plus following practices. • Use MIS irrigation system and irrigate upto flowering stage only. • Give irrigation during night time to reduce transpiration
			Sesame (Summer)	-	-	<ul style="list-style-type: none"> • Avoid summer crop sowing
			Groundnut(Summer)	-	-	<ul style="list-style-type: none"> • Avoid summer crop sowing
2	Coastal alluvial	Groundnut based cropping system	Cumin	Nov.2 nd week to Nov.3 rd week	GC-3, GC-4	<ul style="list-style-type: none"> • Adopt management practices as given in point 4.4(a) plus following practices. • Use MIS irrigation system • Irrigate upto flowering stage only. • Give irrigation during night time to reduce transpiration
			Chickpea	Nov.2 nd week to Nov.3 rd week	GG-1, GJG-3, 5	<ul style="list-style-type: none"> • Adopt management practices as given in point 4.4(a) plus following practices. • Use MIS irrigation system with organic mulch • Irrigate during critical stages only. • Give irrigation during night time to reduce transpiration

Sr. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
			Perl millet (semi rabi)	Sep 4 th week to Oct 2 nd week	GHB-538 Govt. approved Hybrids	<ul style="list-style-type: none"> • Adopt management practices as given in point 4.4(a) plus following practices. • Adopt micro irrigation system • Irrigate the crop at critical stage • Use side tillers as fodder purpose

(d) Scanty rainfall in *Kharif* season

Sr. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
1	Medium to shallow black & mixed red and black	Groundnut based cropping system	Coriander	Nov.2 nd week to Nov.3 rd week	GC-2, 3	<ul style="list-style-type: none"> • Adopt management practices as given in point 4.4(a) plus following practices Thinning of plants and sell as green coriander • Use of Drip irrigation system • Irrigation during critical stages. • Give irrigation during night time to reduce transpiration
			Cumin	Nov.2 nd week to Nov.3 rd week	GC-3, GC-4	<ul style="list-style-type: none"> • Adopt management practices as given in point 4.4(a) plus following practices Use drip irrigation system and irrigate upto flowering stage only. • Give irrigation during night time to reduce transpiration
			Chickpea	Nov.2 nd week to Nov.3 rd week	GG-1, GJG-3,5	<ul style="list-style-type: none"> • Adopt management practices as given in point 4.4(a) plus following practices Irrigate at branching stage. • If two irrigations are possible, irrigate during branching and pod development stages only. • Give irrigation during night time to reduce transpiration
			Sesame (Summer)	-	-	<ul style="list-style-type: none"> • Avoid summer crop sowing
			Groundnut Summer	-	-	<ul style="list-style-type: none"> • Avoid summer crop sowing

Sr. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
2	Coastal alluvial	Groundnut based cropping system	Cumin	Nov.2 nd week to Nov.3 rd week	GC-3, GC-4	<ul style="list-style-type: none"> • Adopt management practices as given in point 4.4(a) plus following practices • Use MIS irrigation system and irrigate upto flowering stage only. • Give irrigation during night time to reduce transpiration
			Chickpea	Nov.2 nd week to Nov.3 rd week	GG-1, GJG-3,5	<ul style="list-style-type: none"> • Adopt management practices as given in point 4.4(a) plus following practices • Irrigate at branching stage. • If two irrigations are possible, irrigate during branching and pod development stages only. • Give irrigation during night time to reduce transpiration
			Perl millet (semi rabi)	Sep 2 nd week to Sep3 rd week	GHB-538 and Govt. Approved Hybrids	<ul style="list-style-type: none"> • Adopt micro irrigation system • Irrigate the crop at critical stage • Use side tillers as fodder purpose

Note: Harvesting of excess rainfall water to be carried out during monsoon for rabi season

(e) Management practices for unseasonal rains

Condition	Management practices to be adopted			
	Vegetative stage	Flowering stage	Crop maturity stage	Post-harvest
Continuous high rainfall in a short span leading to water logging				
Wheat	-	-	<ul style="list-style-type: none"> • Surface drainage (for management of water logging, lodging crop and black point in grain. spray mancozeb 0.2% (27g/ 10 lit. water) 	<ul style="list-style-type: none"> • Protect product with plastic sheet (100µ UV stabilized colour plastic) or shift produces to farm shed • Protection against pest/disease damage in storage etc., • Preparation for quick drying technique • Separate good and bad lot.
Groundnut (summer)	-	-	<ul style="list-style-type: none"> • Immediately harvest bunch groundnut. • Quick surface drainage, open channel around field. 	<ul style="list-style-type: none"> • Protect product with plastic sheet (100 µ UV stabilized colour plastic) or shift produces to farm shed • Protection against pest/disease damage in storage • Preparation for quick drying technique • Separate good and bad lot.

Condition	Management practices to be adopted			
	Vegetative stage	Flowering stage	Crop maturity stage	Post-harvest
Continuous high rainfall in a short span leading to water logging				
Sesame (summer)	-	-	<ul style="list-style-type: none"> Quick surface drainage, open channel around field. 	<ul style="list-style-type: none"> Protect product with plastic sheet (100 µ UV stabilized colour plastic) or shift produces to farm shed Protection against pest/disease damage in storage Preparation for quick drying technique Separate good and bad lot.
Chickpea	-	-	<ul style="list-style-type: none"> Provide drainage, harvest immediately after drying 	<ul style="list-style-type: none"> Protect product with plastic sheet (100 µ UV stabilized colour plastic) or shift produces to farm shed Protection against pest/disease damage in storage etc., Preparation for quick drying technique Separate good and bad lot.
Coriander	Surface drainage (For management of water logging condition)	Surface drainage for management of water logging	<ul style="list-style-type: none"> Surface drainage (for management of water logging crop Spray 0.2%% (30g/ 10 lit. water) wettable sulphur for protection against powdery mildew disease 	<ul style="list-style-type: none"> Protect product with plastic sheet (100 µ UV stabilized colour plastic) or shift produces to farm shed Protection against pest/disease damage in storage etc., Preparation for quick drying technique Separate good and bad lot.
Cumin	Surface drainage (For management of water logging condition)	Surface drainage for management of water logging	<ul style="list-style-type: none"> Surface drainage (for management of water logging crop To control cumin blight)spray mancozeb 0.2%% (27g/ 10 lit. water) Spray 0.2% % (30g/ 10 lit. water)wetttable sulphur for protection against powdery mildew disease 	<ul style="list-style-type: none"> Protect product with plastic sheet (100 µ UV stabilized colour plastic) or shift produces to farm shed Protection against pest/disease damage in storage etc., Preparation for quick drying technique Separate good and bad lot.
Perl millet (semi rabi)	-	-	<ul style="list-style-type: none"> Immediately harvest the crop Surface drainage (for management of water logging) 	<ul style="list-style-type: none"> Protect product with plastic sheet (100 µ UV stabilized colour plastic) or shift produces to farm shed Protection against pest/disease damage in storage etc. Preparation for quick drying technique Separate good and bad lot.

4.3 For crops grown with Canal Irrigation: The scenario would be based on the storage available in the reservoirs.

a. Limited release of water

Sr. No.	Soil type	Cropping system	Crop name	Sowing window	Variety	Management practices
1	Medium to shallow black & mixed red and black	Groundnut based cropping system	Coriander	Nov.2 nd week to Nov.4 th week	GC-2, 3	<ul style="list-style-type: none"> • Thinning of plants and sell as green coriander • Canal water should be released to irrigate during critical stages only • Conjunctive use of canal and groundwater • Or groundwater should be utilized during later stages.
			Cumin	Nov.2 nd week to Nov.4 th week	GC-3, GC-4	<ul style="list-style-type: none"> • Canal water should be released to irrigate during critical stages only • Conjunctive use of canal and Groundwater • Or Groundwater should be utilized during later stages
			Chickpea	Oct 2 nd week to Nov.1 st week	GJG-3	<ul style="list-style-type: none"> • Irrigate at branching stage. • If two irrigations are possible, irrigate during branching and pod development stages only.
2	Coastal alluvial	In this soil type no area under canal system				

b. Delayed release of water:

For head reach:

Water Distribution management:

- Repair and maintenance of field channel.
- Cleaning and lining of distributaries and main canal.

Water utilization management:

- Delay sowing upto 4th week of November for prevailing cropping patterns
- There after adopt late sowing varieties like GW173 of wheat.
- Adopt short duration crop varieties.
- Change crop according to time of water availability.
- Conjunctive use of groundwater/harvested water and canal water
- Use MIS on community base according to crops.

For Middle reach:

Water Distribution management:

- Repair and maintenance of field channel.
- Cleaning and lining of distributaries and main canal.

Water utilization management:

- Delay sowing upto 4th week of November for prevailing cropping patterns.
- Use groundwater/ harvested water for sowing and continue using till canal water reaches.
- There after adopt late sowing varieties like GW173 of wheat.
- Adopt short duration crop varieties.
- Change crop according to time of water availability.
- Conjunctive use of groundwater/harvested water and canal water
- Use MIS on community base according to crops.

For tail reach:

Water Distribution management:

- Repair and maintenance of field channel.
- Cleaning and lining of distributaries and main canal.

Water utilization management:

- Delay sowing upto 4th week of November for prevailing cropping patterns.
- Use groundwater/ harvested water for sowing of crop and continue using till canal water released.
- There after adopt late sowing varieties like GW-173 of wheat.
- Adopt short duration crop varieties.
- Change crop according to time of water availability.
- Adopt crops with stress resistant and less water requirement like cumin , semi-rabi pearl millet, fodder sorghum and chickpea
- Irrigate upto flowering stage only or critical stage irrigation approach may be adopted.
- Use alternate furrow irrigation where ever possible.
- Conjunctive use of groundwater/harvested water and canal water
- Use MIS on community base according to crops.

5. Contingency measures for Horticulture Crops (Existing / New plantations)

Sr. No.	Crop Name	Specific management practices to be taken up following excess/deficient/scanty rainfall	Time of intervention	Remarks
Existing plantations				
1	Mango	Excess rainfall		
		<ul style="list-style-type: none"> • Provide surface drainage • Add gypsum 1-2 kg per plant 	June to September	
		<ul style="list-style-type: none"> • Spray 0.2% (30 g/10 litre water) wettable sulphur or 0.005 % (10 ml/10 litre water) hexaconazole for protection against powdery mildew 	December to January	

Sr. No.	Crop Name	Specific management practices to be taken up following excess/deficient/scanty rainfall	Time of intervention	Remarks
		Deficient/scanty rainfall		
		<ul style="list-style-type: none"> • Use of MIS • Use mulching • Use subsurface drip irrigation if possible • Apply of Maurram in soil 	December to May Oct. to May	
2	Sapota	Excess rainfall		
		<ul style="list-style-type: none"> • Provide surface drainage • Add gypsum @ 1-2 kg/ plant 	June to September	
		Deficient/scanty rainfall		
		<ul style="list-style-type: none"> • Use of MIS • Use mulching • Use subsurface drip irrigation if possible • Apply of Murrum in soil 	December to May Oct. to May	
3	Coconut	Excess rainfall		
		-	-	
		Deficient/scanty rainfall		
		<ul style="list-style-type: none"> • Use of MIS • Use mulching • Use subsurface drip irrigation if possible • Apply of Maurram in soil 	December to May Oct. to May	
New plantations				
1	Mango	Excess rainfall		
		<ul style="list-style-type: none"> • Provide proper drainage, • Provide staking • Earthing up near stem • Add gypsum @ 1-2 kg/plant • Drenching of carbendazim @ 10 g/10 lit.water • Forking the soil 	June to September	
		Deficient/scanty rainfall		
		<ul style="list-style-type: none"> • Adopt drip irrigation system for planting, mulching 	-	Apply irrigation through drip with mulch or subsurface drip irrigation in case of last monsoon below normal

Sr. No.	Crop Name	Specific management practices to be taken up following excess/deficient/scanty rainfall	Time of intervention	Remarks
2	Coconut	Excess rainfall		
		<ul style="list-style-type: none"> Add gypsum 1-2 kg per plant Drenching of carbendazim @ 1 g/lit. Forking the soil 	-	
		Deficient/scanty rainfall		
		<ul style="list-style-type: none"> Use of drip irrigation system Use mulching Use subsurface drip irrigation if possible. 	-	

6.Contingency measures for Horticulture Crops(vegetables)

S. No.	Crop Name	Specific management practices to be taken up following excess/deficient/scanty rainfall	Time of intervention	Remarks
1	Onion (GWO-1, Junagadh local(Pilipati), Talaja Red, Agrifound light red, GJRO-11, GJWO-3)	Excess rainfall		
		<ul style="list-style-type: none"> Provide drainage Delay in sowing 	June to September	<ul style="list-style-type: none"> Raise nursery on raised bed or broad bed and furrow Manage soil for good drainage
		Deficient/scanty rainfall		
		<ul style="list-style-type: none"> Use micro irrigation with plastic mulch 	November to February	<ul style="list-style-type: none"> Apply irrigation through MIS Use plastic mulch Give irrigation during night time to reduce transpiration Soil amendments, and/or reduced tillage.
2	Brinjal (JBGR-1, GLB-2, GJB-2,3, GJLB-4, GABH-3, 4)	Excess rainfall		
		<ul style="list-style-type: none"> Provide drainage Delay in nursery raising 	July to August	<ul style="list-style-type: none"> Use surface drainage system Raise nursery on raised bed or broad bed and furrow
		Deficient/scanty rainfall		
		<ul style="list-style-type: none"> Use micro irrigation with plastic mulch and /or place the drip system to subsurface Alternate furrow irrigation 	September to March	<ul style="list-style-type: none"> Apply irrigation through drip with mulch Give irrigation during night time to reduce transpiration Apply irrigation in alternate furrow with rotation Soil amendments, and/or reduced tillage.

S. No.	Crop Name	Specific management practices to be taken up following excess/deficient/scanty rainfall	Time of intervention	Remarks
3	Garlic (GO-3, GJO-3, GJOH-2, 3, 4, GAO-5)	Excess rainfall		
		<ul style="list-style-type: none"> Provide drainage Delay in sowing 	June to September	<ul style="list-style-type: none"> Manage soil for good drainage
		Deficient/scanty rainfall		
		<ul style="list-style-type: none"> Use micro irrigation with plastic mulch Alternate furrow irrigation 	November to February	<ul style="list-style-type: none"> Apply irrigation through MIS with mulch Give irrigation during night time to reduce transpiration Soil amendments, and/or reduced tillage.
4	Tomato (GT-1, 2, Anand Tomato -3, Junagadh Tomato-3, Pusha Rubi and Govt. approved hybrids)	Excess rainfall		
		<ul style="list-style-type: none"> Provide drainage 	June to September	<ul style="list-style-type: none"> Use raised bed or broad bed and furrow system Manage soil for better drainage
		Deficient/scanty rainfall		
		<ul style="list-style-type: none"> Use micro irrigation with plastic mulch 	November to February	<ul style="list-style-type: none"> Apply irrigation through drip with mulch Give irrigation during night time to reduce transpiration Apply irrigation in alternate furrow with rotation Soil amendments, and/or reduced tillage
5	Cabbage(Early: golden acre, pride of india) Mid late: Early drum head) Late: Pusa drum head)	Excess rainfall		
		<ul style="list-style-type: none"> Provide drainage 		<ul style="list-style-type: none"> Use raised bed or broad bed and furrow system Manage soil for good drainage
		Deficient/scanty rainfall		
		<ul style="list-style-type: none"> Use micro irrigation with plastic mulch Alternate furrow irrigation 		<ul style="list-style-type: none"> Apply irrigation through drip with mulch Give irrigation during night time to reduce transpiration Apply irrigation in alternate furrow with rotation Soil amendments, and/or reduced tillage.
6	Cucurbits Gourd:- (Aanad-1) Cucumber:	Excess rainfall		
		<ul style="list-style-type: none"> Provide drainage Avoid planting low areas of the field where water may collect. 		<ul style="list-style-type: none"> Avoid planting in low land areas of the field where water may collect. Manage soil for good drainage,

S. No.	Crop Name	Specific management practices to be taken up following excess/deficient/scanty rainfall	Time of intervention	Remarks
	(Gujarat cucumber-1) Sponge Gourd: GSG-1, GJSG-2 Ridge gourd :(GARG-1, GJRGH-1)	Deficient/scanty rainfall • Adoption of MIS and mulching	-	<ul style="list-style-type: none"> Use subsoiler or vertical tillage to break up compacted layers. Apply irrigation through MIS with mulch Give irrigation during night time to reduce transpiration Soil amendments, and/or reduced tillage.

7. Temperature related stresses for field and horticulture crops:

S.N.	Crop name	Stage of crop growth	Threshold temperature	Suggested management practices
1	Groundnut Summer	Germination	< 17 ⁰ C	If temperature below 17 ⁰ C <ul style="list-style-type: none"> Delay sowing. Use organic mulch. Delay second irrigation after sowing. In case of line sowing harrowing to be followed to loosen the soil surface.
		Vegetative	>35 ⁰ C	<ul style="list-style-type: none"> Use sprinkler and drip irrigation
		Pegging	>30 ⁰ C	<ul style="list-style-type: none"> Sprinkler and drip irrigation to reduce temperature Give light and frequent irrigation
		Pod development	>34 ⁰ C	<ul style="list-style-type: none"> Sprinkler and drip irrigation Give light and frequent irrigation
2	Cotton	Flowering and boll formation	>32 ⁰ C	<ul style="list-style-type: none"> Drip irrigation Straw mulching Give frequent irrigation.
		Boll maturity	>38 ⁰ C	<ul style="list-style-type: none"> Use drip irrigation Straw mulching Give frequent irrigation.
3	Sesame summer	Germination	< 15 ⁰ C not suitable for germination	<ul style="list-style-type: none"> Delay sowing.
		Growth and develop.	>30 ⁰ C	<ul style="list-style-type: none"> Light and frequent irrigation.

S.N.	Crop name	Stage of crop growth	Threshold temperature	Suggested management practices
		Flower dropping and pollination	>35 ⁰ C	<ul style="list-style-type: none"> • Light and frequent irrigation
4	Pearl millet Semi rabi	Germination	<20 ⁰ C	<ul style="list-style-type: none"> • Early sowing (Second week of Sept.)
		Crop growth	>33 ⁰ C	<ul style="list-style-type: none"> • Light and frequent irrigation
5	Wheat	Germination	>25 ⁰ C	<ul style="list-style-type: none"> • Delay sowing up to optimum temp(20-25 0C)
		Anthesis	>22 ⁰ C	<ul style="list-style-type: none"> • Light and frequent irrigation
		Milking stage	>26 ⁰ C	<ul style="list-style-type: none"> • Light and frequent irrigation
		Dough stage	7-18 ⁰ C suitable 5 to 15 days	<ul style="list-style-type: none"> • Light and frequent irrigation
		Grain filling	>30 ⁰ C not suitable	<ul style="list-style-type: none"> • Light and frequent irrigation • Use early sowing variety Lok-1 and prefer early maturing variety GW-173 and GW 11 in late sowing to avoid of high temp.
		Dough stage	7-18 ⁰ C suitable 5 to 15 days	<ul style="list-style-type: none"> • Light and frequent irrigation if temp. greater than 18⁰C
8	Garlic	Bulb develop.	>25 ⁰ C	<ul style="list-style-type: none"> • Drip irrigation • Frequent light irrigation
9	Onion	Bulb develop.	>32 ⁰ C	<ul style="list-style-type: none"> • Drip irrigation • Frequent light irrigation
7	Tomato	Flowering	>32 ⁰ C	<ul style="list-style-type: none"> • Use of mulch and irrigate the crop with mini/micro sprinkler
		Fruit set	>35 ⁰ C	<ul style="list-style-type: none"> • Use of mulch and irrigate the crop with sprinkler
8	Brinjal	Whole crop period	>35 ⁰ C	<ul style="list-style-type: none"> • Drip irrigation • Use of straw/ silver plastic mulch •
9	Cabbage	Whole crop period	> 25 ⁰ C	<ul style="list-style-type: none"> • Drip irrigation • Use of straw/ silver plastic mulch •
10	Chickpea	Germination	> 24 ⁰ C	<ul style="list-style-type: none"> • Delay sowing to get optimum temperature (15-20⁰C)
		Flowering	>30 ⁰ C	<ul style="list-style-type: none"> • Give irrigation • External application of ABA* can protect plant against heat stress
		Pod development	>30 ⁰ C	<ul style="list-style-type: none"> • Give irrigation • External application of ABA* can protect plant against heat stress

S.N.	Crop name	Stage of crop growth	Threshold temperature	Suggested management practices
		Seed development	>30 ⁰ C	<ul style="list-style-type: none"> • Give irrigation • External application of ABA* can protect plant against heat stress
11	Coriander	Germination	>25 ⁰ C	<ul style="list-style-type: none"> • Light and frequent Irrigation • Delay sowing.
12	Cumin	Germination	>22 ⁰ C	<ul style="list-style-type: none"> • Light and frequent irrigation • Delay sowing.
13	Mango	Flowering & fruit setting	< 15 ⁰ C Night & > 25 ⁰ C Day during 5 days	<ul style="list-style-type: none"> • Smudging technique during low temperature at early morning. • Irrigation during low or high temperature. • Mulching during low or high temperature. • Shelter belts/Wind breaks
		Initial fruit development	> 35 ⁰ C with higher day-night fluctuation during week or more.	<ul style="list-style-type: none"> • Nutrients & Irrigation. • Spray NAA**20 ppm + 2% urea(200 g/10 lit. of water) • Mulching • Shelter belts/Wind breaks
		Maturity stage	35-40 ⁰ C during week or more causing sun burning mostly on western side fruits	<ul style="list-style-type: none"> • Give frequent irrigation • Mulching • Sod culture*** • Shelter belts/Wind breaks
14	Coconut	Tree growth	>35 ⁰ C	<ul style="list-style-type: none"> • Application of lime solution on the trunk up to a height of 2-3 m at the start of the summer season
		Flowering & Fruit setting	<20 ⁰ C & >35 ⁰ C	<ul style="list-style-type: none"> • Regular irrigation is recommended during low or high temperature.

*ABA-Abcsic acid

**NAA-Naphthalene acetic acid

***Sod culture-Green cover on soil by growing fodder or green manure crop to reduce soil temperature

8. Management practices for livestock (to cover shelter management during cold or heat waves, production/regulation of fodder in rabi season in deficient monsoon years/ excess monsoon rainfall years etc.),

For Fodder crops grown with residual moisture i.e., under rainfed condition

(a) Excess (rainfall during September/October months) residual moisture

Sr. No.	Soil type	Cropping system	Fodder name	Variety	Management practices
1	Coastal alluvial & black soil of Ghed	Groundnut based cropping system	Sorghum	Gundhari, GFS-3, GAFS-11, CSV-21F	<ul style="list-style-type: none"> • Surface drainage (to control water logging condition)

(b) Normal rainfall (rainfall during September/October months) residual moisture

S. No.	Soil type	Cropping system	Crop name	Variety	• Management practices
1	Coastal alluvial & black soils of Ghed	Groundnut based cropping system	Sorghum	Gundhari, GFS-3, GAFS-11, CSV-21F	<ul style="list-style-type: none"> • Adopt recommended package of agronomic practices

(b) Less than optimum moisture i.e., 25% less than normal, which can happen due to insufficient rainfall during September/October months. Deficit of 20-40% rainfall

Sr. No.	Soil type	Cropping system	Fodder name	Variety	Management practices
1	Coastal alluvial & black soil of Ghed	Groundnut based cropping system	Sorghum	Gundhari, GFS-3, GAFS-11, CSV-21F	<ul style="list-style-type: none"> • Thinning and maintain the plant stand • Don't feed as green fodder.

(c) Severe limitation in moisture. Deficit of rainfall during September/October months by more than 40%.

Sr. No.	Soil type	Cropping system	Fodder name	Variety	Management practices
1	Coastal alluvial & black soil of Ghed	Groundnut based cropping system	Sorghum	Gundhari, GFS-3, GAFS-11, CSV-21F	<ul style="list-style-type: none"> • Thinning and maintain the plant stand • Don't feed as green fodder.

For fodder crops (mostly perennial fodder varieties as sole fodder crop) grown with groundwater

Sr. No.	Soil type	Fodder name	Variety	• Management practices
1	Medium to shallow black soils	Sorghum	Gundhari, GFS-3, GAFS-11, CSV-21F	• Adopt recommended package of agronomic practices
		Lucerne	Anand-2	• Adopt recommended package of agronomic practices
		Grass	Hybrid Napier- CO-3, Jinjvo	• Adopt recommended package of agronomic practices
2	Coastal alluvial soil	Sorghum	Gundhari, GFS-3, GAFS-11, CSV-21F	• Adopt recommended package of agronomic practices
		Lucerne	Anand-2	• Adopt recommended package of agronomic practices
		Grass	Hybrid Napier- CO-3 Jinjvo	• Adopt recommended package of agronomic practices

Livestock management during severe heat waves

Nutritional management	Shelter management	Health management	Miscellaneous, if any
<ul style="list-style-type: none"> • Feed 25 kg green fodder along with unconventional feed per animal. • Give jaggery water with fenugreek powder. • High energy density and low protein diet are beneficial. • Increasing the grain/ forage ratio. 	<ul style="list-style-type: none"> • Covered the shelter roof with dry grasses. • Provide Fans & sufficient ventilation. • Use fogger/ sprinklers system • Forestry blocks can provide temporary shelter from extreme heat. • Providing good-quality drinking water and shade (natural or artificial). 	<ul style="list-style-type: none"> • Spray them with cool water, especially on the legs and feet, or stand them in water • Lay wet towels over them. • Provide Vitamine C through syrup for heat stress management. • Vaccinate the animals against infectious diseases. 	<ul style="list-style-type: none"> • Cattle that are heat stressed will show increased respiration rates as they try to cool themselves down. • Don't allowed cattle to walk in extreme heat. • Use sprinklers and shade in holding yards. • Air flow is also important. • Sprinklers have been found to improve milk production, reduce fly irritation and make for more contented cows in the shed with better milk let down. • Cover animal under insurance

Livestock management during severe cold waves

Nutritional management	Shelter management	Health management	Miscellaneous, if any
<ul style="list-style-type: none"> • Feed silage and Hay (Wheat straw treated with urea) along with concentrate feed. • An increased energy requirement for maintenance as a result of increased resting metabolic rate. 	<ul style="list-style-type: none"> • Operate heaters protect shed by tying gunny bags around shed. 	<ul style="list-style-type: none"> • Add antibiotics in drinking water to protect young calves from Pneumonia. • Cold environment increases the whole body glucose turnover and glucose oxidation thus resulting in less production of ketones. 	<ul style="list-style-type: none"> • Operate heaters, protect shed by tying gunny bags around shed. • Protect animals from direct cold waves. • Cover animal under insurance