CONTINGENCY PLANS FOR RABI AND SUMMER CROPS

District: Morbi Gujarat State

1. Rainfall Information(Average of 10 year-2006 to 2015)

		Oct – Dec	Jan – Mar
(a)	Normal rainfall during *Rabi* season:(mm)	8.2	NIL
(b)	Number of rainy days :Nos.	1	NIL

2. Rabi crops cultivated

2aArea Production statistics

S. No	Cropping System	Crop name	Area '000 ha	Production '000 t	Productivity Kg/ha
1	Groundnut/cotton base cropping system	Wheat	14.100	51.225	3633
		Cumin	18.650	20476	1080
		Coriander	6.500	10.400	1600
		Sesame (Summer)	2.884	3.146	1091
		G'nut (Summer)	1.188	3.200	2082
2.	Groundnut base cropping system	Garlic	1.000	8.800	8800
		Tomato	0.625	15.152	24243
		Cabbage	0.655	13.918	21250
		Brinjal	0.850	15.954	18769
		Okra	0.780	6.197	7945
		Onion	1.500	37.500	25000
3.	Horticulture-Fruits & plantation crops	Lemon	1.039	13.351	12850
		Pomogranate	0.593	8302	14000

(Source: Reports of Rajkot and Surendranagar District Panchayat , District wise estimated area & production of Horticutural crops, Directorate of Horticulture, Gujarat State, *2015-16)*

2b Source wise (Water) cultivated area

S. No	Crop name	Cultivated area under (‘000 ha)			
		Residual moisture condition/rainfed	Ground water irrigated	Tank irrigated	Canal irrigated
1	Wheat	0	2.864	0	11.236
2	Cumin	0	6.232	0	12.418
3	Coriander	0	0.855	0	5.645
4	Garlic	0	0.824	0	0.176
5	Sesame (summer)	0	0	0	2.884
6	G’nut (Summer)	0	0	0	1.188
7	Tomato	0	0.425	0	0.200
8	Cabbage	0	0.325	0	0.330
9	Brinjal	0	0.400	0	0.450
10	Okra	0	0.340	0	0.440
11	Onion	0	0.625	0	0.875
12	Lemon	0	0.539	0	0.500
13	Pomogranate	0	0.293	0	0.300

(Source: Reports of Rajkot and Surendranagar District Panchayat , District wise estimated area & production of Horticutural crops, Directorate of Horticulture, Gujarat State, *2015-16* & District Irrigation Plan, PMKSY, 2016)

3. Sowing window information

S. No.	Soil type	Cropping system	Crop name	Optimum sowing window
1	Medium and shallow black Soils (Clayey)	Groundnut base cropping system	Wheat	2nd week of Nov. to 4th week of Nov.
			Cumin	2nd week of Nov. to 4th week of Nov.
			Coriander	2nd week of Nov. to 4th week of Nov.
			Garlic	2nd week of Nov. to 4th week of Nov.
			Tomato	2nd week of Aug. to 2nd week of Sept.
			Cabbage	2nd week of Aug. to 2nd week of Sept.
			Brinjal	2nd week of Aug. to 2nd week of Sept.
			Okra	2nd week of Feb. to 2nd week March
			Onion	2nd week of Nov. to 4thweek of Nov.
		Cotton base cropping system	Wheat	2nd week of Dec. to 4th week of Dec.
			Coriander	2nd week of Dec. to 4th week of Dec.
2	Alluvial soils (Sandy-loam, Loamy)	Groundnut base cropping system	Wheat	2nd week of Nov. to 4th week of Nov.
			Coriander	2nd week of Nov. to 4th week of Nov.
			Tomato	2nd week of Aug. to 2nd week of Sept.
			Cabbage	2nd week of Aug. to 2nd week of Sept.
			Brinjal	2nd week of Aug. to 2nd week of Sept.
			Okra	2nd week of Feb. to 2nd week March
			Onion	2nd week of Nov. to 4thweek of Nov.
		Cotton base cropping system	Wheat	2nd week of Dec. to 4th week of Dec.
			Coriander	2nd week of Dec. to 4th week of Dec.
			Sesame (Summer)	2nd week of Feb-4th week of Feb.
			Groundnut (Summer)	2nd week of Feb-4th week of Feb.
3	Saline problematic soil	Cotton base cropping system	Wheat	2nd week of Dec. to 4th week of Dec.

4.Contingency measures Field crops

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

(a) Excess residual moisture:

S. No.	Soil type	Cropping system	Crop name	Sowing Window	Variety	Management 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

S.No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
-	-	-	-	-	-	-

(c) Severe limitation in moisture. More than 40% deficit of rainfall during September/October months

S.No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
-	-	-	-	-	-	-

4.2 For crops grown with groundwater

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

S. N.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
1	Medium and shallow black Soils (Clayey)	Groundnut base cropping system	Wheat	2nd week of Nov. to 4th week of Nov.	GW-463, GW-451, GW 366, GW 496, Lok-1	• Adopt recommended agronomic and irrigation practices. • Immediate after last irrigation spray 2 % urea and mencozeb 75 % WP (27g/10 litre water) for better quality of grain.
			Coriander	2nd week of Nov. to 4th week of Nov.	GC-1, GC-2, GC-3	• Adopt recommended agronomic practices and apply control irrigation • Spray profenofos 20 % EC (10 ml/ 10lit. water) andhexaconazole 5 % EC (10 ml/10 lit. water) for control of thrips and to prevent PM disease infestation.

S. N.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
		Cotton base cropping system	Wheat	2nd week of Dec. to 4th week of Dec.	GW-173 LOK-1	• Adopt recommended agronomic and irrigation practices. • Immediate after last irrigation spray 2 % urea and mencozeb 75 % WP (27g/10 litre water) for better quality of grain.
			Coriander	2nd week of Dec. to 4th week of Dec.	GC-1, GC-2, GC-3	• Adopt recommended agronomic practices and apply control irrigation • Spray profenofos 20 % EC (10 ml/ 10lit. water) andhexaconazole 5 % EC (10 ml/10 lit. water) for control of thrips and to prevent PM disease infestation.
2	Alluvial soils (Sandy-loam, Loamy)	Groundnut base cropping system	Wheat	2nd week of Nov. to 4th week of Nov.	GW 366 GW 496	• Adopt recommended agronomic and irrigation practices. • Immediate after last irrigation spray 2 % urea and mencozeb 75 % WP (27g/10 litre water) for better quality of grain.
			Cumin	2nd week of Nov. to 4th week of Nov.	GC-4	• 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 (27g/10 litre water) and hexaconazole 5 % EC (10 ml/10 lit. water) for prevention of blight and PM diseasesat 10-12 days interval. • Under cloudy weather and fog condition make extra spray of mencozeb 75 % WP (27g/10 litre water) for prevention of blight.

S. N.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
			Coriander	2nd week of Nov. to 4th week of Nov.	GC-1, GC-2, GC-3	• Adopt recommended agronomic practices and apply control irrigation • Spray profenofos 20 % EC (10 ml/ 10lit. water) andhexaconazole 5 % EC (10 ml/10 lit. water) for control of thrips and to prevent PM disease infestation.
			Sesame (Summer)	3rd wkFeb.to 4thwk Feb.	GT-3,5	Adopt recommended package practices
			Groundnut (Summer)	1stwk Feb.To3rdwk Feb.	TG 37A TAG-24, GG -2,4,6	Adopt recommended package of practices
		Cotton base cropping system	Wheat	2nd week of Dec. to 4th week of Dec.	GW-173 LOK-1	• Adopt recommended agronomic and irrigation practices. • Immediate after last irrigation spray 2 % urea and mencozeb 75 % WP (27g/10 litre water) for better quality of grain.
			Coriander	2nd week of Dec. to 4th week of Dec.	GC-1, GC-2, GC-3	• Adopt recommended agronomic practices and apply control irrigation • Spray profenofos 20 % EC (10 ml/ 10lit. water) andhexaconazole 5 % EC (10 ml/10 lit. water) for control of thrips and to prevent PM disease infestation.
3	Saline problem atic soil	Cotton base cropping system	Wheat	2nd week of Dec. to 4th week of Dec.	GW-173 LOK-1	• Adopt recommended agronomic and irrigation practices. • Immediate after last irrigation spray 2 % urea and mencozeb 75 % WP (27g/10 litre water) for better quality of grain.

(b) Normal rainfall

S. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
1	Medium and shallow black Soils (Clayey)	Groundnut base cropping system	Wheat	2nd week of Nov. to 4th week of Nov.	GW-463, GW-451 GW 366, GW 496, Lok-1	• Adopt recommended agronomic and irrigation practices. • Immediate after last irrigation spray 2 % urea and mencozeb 75 % WP (27g/10 litre water) for better quality of grain.
			Cumin	2nd week of Nov. to 4th week of Nov.	GC-4	• 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 (27g/10 litre water) and hexaconazole 5 % EC (10 ml/10 lit. water) for prevention of blight and PM diseasesat 10-12 days interval. • Under cloudy weather and fog condition make extra spray of mencozeb 75 % WP (27g/10 litre water) for prevention of blight.
			Coriander	2nd week of Nov. to 4th week of Nov.	GC-1, GC-2 GC-3	• Adopt recommended agronomic practices and apply control irrigation • Spray profenofos 20 % EC (10 ml/ 10lit. water) andhexaconazole 5 % EC (10 ml/10 lit. water) for control of thrips and to prevent PM disease infestation.

S. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
		Cotton base cropping system	Wheat	2nd week of Dec. to 4th week of Dec.	GW-173, Lok-1	• Adopt recommended agronomic and irrigation practices. • Immediate after last irrigation spray 2 % urea and mencozeb 75 % WP (27g/10 litre water) for better quality of grain.
			Coriander	2nd week of Dec. to 4th week of Dec.	GC-1, GC-2 GC-3	• Adopt recommended agronomic practices and apply control irrigation • Spray profenofos 20 % EC (10 ml/ 10lit. water) andhexaconazole 5 % EC (10 ml/10 lit. water) for control of thrips and to prevent PM disease infestation.
2	Alluvial soils (Sandy-loam, Loamy)	Groundnut base cropping system	Wheat	2nd week of Nov. to 4th week of Nov.	GW-463, GW-451 GW 366, GW 496, Lok-1	• Adopt recommended agronomic and irrigation practices. • Immediate after last irrigation spray 2 % urea and mencozeb 75 % WP (27g/10 litre water) for better quality of grain.
			Cumin	2nd week of Nov. to 4th week of Nov.	GC-4	• 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 (27g/10 litre water) and hexaconazole 5 % EC (10 ml/10 lit. water) for prevention of blight and PM diseasesat 10-12 days interval. • Under cloudy weather and fog condition make extra spray of mencozeb 75 % WP (27g/10 litre water) for prevention of blight.

S. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
			Coriander	2nd week of Nov. to 4th week of Nov.	GC-1, GC-2 GC-3	• Adopt recommended agronomic practices and apply control irrigation • Spray profenofos 20 % EC (10 ml/ 10lit. water) andhexaconazole 5 % EC (10 ml/10 lit. water) for control of thrips and to prevent PM disease infestation.
			Sesame (Summer)	3rd wk Feb.to 4thwk Feb.	GT-3,5	Adopt recommended package practices
			Groundnut (Summer)	1stwk Feb.To 3rdwk Feb.	TG 37A TAG-24, GG -2,4,6	Adopt recommended package of practices
		Cotton base cropping system	Wheat	2nd week of Dec. to 4th week of Dec.	GW-173 LOK-1	• Adopt recommended agronomic and irrigation practices. • Immediate after last irrigation spray 2 % urea and mencozeb 75 % WP (27g/10 litre water) for better quality of grain.
			Coriander	2nd week of Dec. to 4th week of Dec.	GC-1, GC-2 GC-3	Adopt recommended package of practices
3	Saline problematic soil	Cotton base cropping system	Wheat	2nd week of Dec. to 4th week of Dec.	GW-173 LOK-1	• Adopt recommended agronomic and irrigation practices. • Immediate after last irrigation spray 2 % urea and mencozeb 75 % WP (27g/10 litre water) for better quality of grain.

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

S. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
1	Medium and shallow black Soils (Clayey)	Groundnut base cropping system	Wheat	2nd week of Nov. to 4th week of Nov.	Lok-1	• 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
			Cumin	2nd week of Nov. to 4th week of Nov	GC-4	• 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
			Garlic	2nd week of Nov. to 4th week of Nov.	GG-4 GJG-5	• Use MIS irrigation system • Irrigate during critical stages only. • Give irrigation during night time to reduce transpiration
			Coriander	2nd week of Nov. to 4th week of Nov.	GC-1 GC-2 GC-3	• 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
		Cotton base cropping system	Wheat	2nd week of Dec. to 4th week of Dec.	GW-173 LOK-1	• 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

S. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
			Coriander	2nd week of Dec. to 4th week of Dec.	GC-1 GC-2 GC-3	• 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
2	Alluvial soils (Sandy-loam, Loamy)	Groundnut base cropping system	Wheat	2nd week of Nov. to 4th week of Nov.	GW-463 GW-451 GW 366 GW 496 Lok-1	• 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
			Cumin	2nd week of Nov. to 4th week of Nov.	GC-4	• 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
			Coriander	2nd week of Nov. to 4th week of Nov.	GC-1 GC-2 GC-3	• 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

S. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
		Cotton base cropping system	Wheat	2nd week of Dec. to 4th week of Dec.	GW-173 LOK-1	• 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	2nd week of Dec. to 4th week of Dec.	GC-1 GC-2 GC-3	• 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
3	Saline problematic soil	Cotton base cropping system	Wheat	2nd week of Dec. to 4th week of Dec.	GW-173 LOK-1	• 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

(d**) Scanty rainfall in *Kharif* season**

S. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
1	Medium and shallow black Soils (Clayey)	Groundnut base cropping system	Cumin	1st week of Nov. to 3rd week of Nov.	GC-4	• 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

S. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
			Coriander	1st week of Nov. to 3rd week of Nov.	GC-1 GC-2 GC-3	• Adopt management practices as given in point 4.4(a) plus following practices • Thinning of plants and sell as green coriander • Use of MIS irrigation system • Irrigation during critical stages. • Give irrigation during night time to reduce transpiration •
		Cotton base cropping system	Coriander	2nd week of Dec. to 4th week of Dec.	GC-1 GC-2 GC-3	• Adopt management practices as given in point 4.4(a) plus following practices • Thinning of plants and sell as green coriander • Use of MIS irrigation system • Irrigation during critical stages. • Give irrigation during night time to reduce transpiration •
2	Alluvial soils (Sandy-loam, Loamy)	Groundnut base cropping system	Coriander	1st week of Nov. to 3rd week of Nov.	GC-1 GC-2 GC-3	• Adopt management practices as given in point 4.4(a) plus following practices • Thinning of plants and sell as green coriander • Use of MIS irrigation system • Irrigation during critical stages. • Give irrigation during night time to reduce transpiration

S. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
			Cumin	1st week of Nov. to 3rd week of Nov.	GC-4	• Use MIS irrigation system • Irrigate upto flowering stage only. • Give irrigation during night time to reduce transpiration
		Cotton base cropping system	Coriander	2nd week of Dec. to 4th week of Dec.	GC-1 GC-2 GC-3	• Adopt management practices as given in point 4.4(a) plus following practices • Thinning of plants and sell as green coriander • Use of MIS irrigation system • Irrigation during critical stages. • Give irrigation during night time to reduce transpiration
3	Saline problematic soil	Cotton base cropping system	-	-	-	-

(e) Management practices for unseasonal rains

Condition	**Management practices to be adopted**			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post-harvest**
Wheat	-	-	Surface drainage (for management of water logging, lodging crop and black point in grain. spray mancozeb 0.2% (27 g/10 litre water).	• Protect product with plastic sheet (100 micron 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.

Condition	Management practices to be adopted			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post-harvest**
Groundnut (summer)	-	-	Immediately harvest bunch groundnut. Quick surface drainage, open channel around field.	• Protect product with plastic sheet (100 micron 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.
Sesame (summer)	-	-	Quick surface drainage, open channel around field.	• Protect product with plastic sheet (100 micron 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/ Coriander	Surface drainage (For management of water logging condition)	Surface drainage for management of water logging	Surface drainage (for management of water logging crop and to control cumin blight)spray mancozeb 0.2% (27 g/10 litre water)and 0.2% wettablesulpher for protection against powdery mildew disease	• Protect product with plastic sheet (100 micron 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

S. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
1	Medium and shallow black Soils (Clayey)	Groundnut base cropping system	Cumin	2nd week of Nov. to 4th week of Nov	GC-4 .	• Canal water should be released to irrigate during critical stages only • Conjunctive use of canal and Groundwater • Groundwater should be utilized during later stages
			Coriander	2nd week of Nov. to 4th week of Nov.	GC-1 GC-2 GC-3	• 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 • Groundwater should be utilized during later stages.
		Cotton base cropping system	Sesame Summer	2nd week of Feb to 3rd week of Feb	G.Til-3	• Canal water should be released to irrigate during critical stages only • Conjunctive use of canal and Groundwater • Groundwater should be utilized during later stages
2	Alluvial soils (Sandy-loam, Loamy)	Groundnut base cropping system	Cumin	2nd week of Nov. to 4th week of Nov	GC-4 .	• Canal water should be released to irrigate during critical stages only • Conjunctive use of canal and Groundwater • Groundwater should be utilized during later stages
			Coriander	2nd week of Nov. to 4th week of Nov.	GC-2 GC-3	• 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 • groundwater should be utilized during later stages.

S. No.	Soil type	Cropping system	Crop name	Sowing time	Variety	Management practices
		Cotton base cropping system	Sesame Summer	2nd week of Feb to 3rd week of Feb	G.Til-3	• Canal water should be released to irrigate during critical stages only • Conjunctive use of canal and Groundwater • Groundwater should be utilized during later stages
			Coriander	2nd week of Nov. to 4th week of Nov.	GC-2 GC-3	• 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 • Groundwater should be utilized during later stages.

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 cropand 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	Lemon	**Excess rainfall**		
		• Provide surface drainage • Add gypsum 1-2 kg per plant	June to September	
		Deficient/scanty rainfall		
		• Use of MIS • Use mulching • Use subsurface drip irrigation if possible • Apply of *Murram* soil	December to May Oct. to May December to May	
2	Pomogranate	**Excess rainfall**		
		• Provide surface drainage • Add gypsum @ 1-2 kg/ plant	June to September	
		Deficient/scanty rainfall		
		• 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	Lemon	**Excess rainfall**		
		• Provide proper drainage, • Earthingup near stem • Add gypsum @ 1-2 kg/plant • Drenching of carbendazim @ 1 g/lit. • Forking the soil	June to September June to September June to September June to September Oct. to May	

Sr. No.	Crop Name	Specific management practices to be taken up following excess/deficient/scanty rainfall	Time of intervention	Remarks
		Deficient/scanty rainfall		
		Adopt drip irrigation system for planting, mulching	June to September	Apply irrigation through drip with mulch or subsurface drip irrigation in case of last monsoon below normal
2	Pomogranate	**Excess rainfall**		
		• Add gypsum 1-2 kg per plant • Drenching of carbendazim @ 1 g/lit. • Forking the soil	June to September June to September	
		Deficient/scanty rainfall		
		• Use of drip irrigation system • Use mulching	December to May	

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	Brinjal (JBGR-1, GLB-2, GJB-2,3, GJLB-4, GABH-3, 4)	**Excess rainfall**		
		• Provide drainage • Delay in nursery raising	July to August	• Use surface drainage system • Raise nursery on raised bed or broad bed and furrow
		Deficient/scanty rainfall		
		• Use micro irrigation with plastic mulch and /or place the drip system to subsurface • Alternate furrow irrigation	September to March	• 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
2	Onion (GWO-1, Junagadh local(Pilipati), Talaja Red, Agri found light red, GJRO-11, GJWO-3)	**Excess rainfall**		
		• Provide drainage • Delay in sowing	June to September	• Raise nursery on raised bed or broad bed and furrow • Manage soil for good drainage
		Deficient/scanty rainfall		
		• Use micro irrigation with plastic mulch	November to February	• Apply irrigation through MIS • Use plastic mulch • Give irrigation during night time to reduce transpiration • Soil amendments, and/or reduced tillage.
3	Okra (GO-3, GJO-3, GJOH-2, 3, 4, GAO-5)	**Excess rainfall**		
		• Provide drainage • Delay in sowing	June to September	• Raised bed or broad bed and furrow • Manage soil for good drainage
		Deficient/scanty rainfall		
		• Use micro irrigation with plastic mulch	November to February	• Apply irrigation through MIS • Use plastic mulch • Give irrigation during night time to reduce transpiration • 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
4	Tomato (GT-1, 2, Anand Tomato -3, Junagadh Tomato-3, Pusha Rubi and Govt. approved hybrids)	**Excess rainfall**		
		• Provide drainage	June to September	• Use raised bed or broad bed and furrow system • Manage soil for better drainage
		Deficient/scanty rainfall		
		• Use micro irrigation with plastic mulch	November to February	• 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 (Pride of India, Golden aker, Early drum head, Pusa drum head) and Govt. approved varieties.	**Excess rainfall**		
		• Provide drainage		• Use raised bed or broad bed and furrow system • Manage soil for good drainage
		Deficient/scanty rainfall		
		• Use micro irrigation with plastic mulch • Alternate furrow irrigation		• 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.

7. Temperature related stresses for field and horticulture crops:

a. Temperatures**less than normal**

SN	Crop name	Stage of crop growth	Threshold temperature	Suggested management practices
1	Groundnut Summer	Germination	< 17^0C	If temperature is below than 17^0C • Delay sowing. • Use organic mulch. • Delay second irrigation after sowing. • In case of line sowing harrowing to be followed to loose the soil surface.
		Vegetative	>35^0C	• Sprinkler and drip irrigation
		Pegging	>30^0C	• Sprinkler and drip irrigation
		Pod development	>34 ^{0}C	• Sprinkler and drip irrigation
2	Cotton	Flowering and boll formation	>32 ^{0}C	• Drip irrigation • Straw mulching • Give frequent irrigation.
		Boll maturity	>38 ^{0}C	• Use drip irrigation • Straw mulching • Give frequent irrigation.
3	Sesame summer	Germination	< 15^0C not suitable for germination	• Delay sowing.
		Growth and develop.	>30 ^{0}C	• Light and frequent irrigation.
		Flower dropping and pollination	>35^0C	• Light and frequent irrigation
4	Wheat	Germination	>25 ^{0}C	• Delay sowing up to optimum temp(20-25 ^{0}C)
		Anthesis	>22 ^{0}C	• Light and frequent irrigation
		Milking stage	>26 ^{0}C	• Light and frequent irrigation

SN	Crop name	Stage of crop growth	Threshold temperature	Suggested management practices
		Dough stage	7-18 ^{0}C suitable 5 to 15 days	• Light and frequent irrigation if temp. greater than 18 ^{0}C
		Grain filling	>30 ^{0}C not suitable	• 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.
5	Onion	Bulb develop.	>25 ^{0}C	• Drip irrigation • Frequent light irrigation
6	Tomato	Flowering	>32 ^{0}C	• Use of mulch and irrigate the crop with sprinkler
		Fruit set	**>**35 °C	• Use of mulch and irrigate the crop with sprinkler
7	Brinjal	Whole crop period	>35^{0}C	• Drip irrigation • Use of straw/ silver plastic mulch
8	Cabbage	Whole crop period	> 25 ^{0}C	• Drip irrigation • Use of straw/ silver plastic mulch
9	Ladies finger (Okra)	Whole crop period	> 25 ^{0}C	• Drip irrigation • Use of straw/ silver plastic mulch
10	Coriander	Germination	>25^{0}C	• Light and frequent Irrigation • Delay sowing.
11	Cumin	Germination	>22 ^{0}C	• Light and frequent irrigation • Delay sowing.
12	Lemon	Pl. growth	<15 ^{0}C & > 40 ^{0}C	• Smudging technique during low temperature at early morning. • White washing of trunk • Shelter to plant by thatching • Frequent light irrigation • Mulching with organic waste. • Shelter belts/wind breaks

SN	Crop name	Stage of crop growth	Threshold temperature	Suggested management practices
		Flowering & fruit setting	> 35 ^{0}C during a week or more	• Frequent light irrigation • Mulching with organic waste. • Shelter belts/wind breaks
		Fruit maturity	> 40 ^{0}C during a week or more	• White washing of trunk • Frequent light irrigation • Mulching with organic waste. • Shelter belts/wind breaks
13	Pomegranate	Pl. growth	< 18 ^{0}C low & > 35 ^{0}C high	• Smudging technique during low temperature at early morning. • Irrigation during low or high temperature. • Mulching during low or high temperature. • Shelter belts/wind breaks
		Flowering & fruit setting	< 20 ^{0}C low & > 35 ^{0}C high	
		Fruit maturity	> 40 ^{0}C high for one week or more	• Wrapping of individual fruits • Frequent and light irrigation • Mulching or sod culture • Shelter belts/wind breaks

* Temperature increase or decrease over normal and for number of days. For example, increase of 3 degrees over normal for a period of 5 days

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

S. No.	Soil type	Cropping system	Fodder name	Variety	Management practices
1	Medium and shallow black Soils (Clayey)	Groundnut base cropping system	Sorghum	Gundari GFS-3, GAFS-11, , CSV-15, CSV-21F	Surface drainage (to control water logging condition)
2	Alluvial soils (Sandy-loam, Loamy)	Groundnut base cropping system	Sorghum	Gundari GFS-3, GAFS-11, , CSV-15, CSV-21F	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	Medium and shallow black	Groundnut base cropping system	Sorghum	Gundari GFS-3, GAFS-11, , CSV-15, CSV-21F	Adopt recommended package of agronomic practices
2	Alluvial soils	Groundnut base cropping system	Sorghum	Gundari GFS-3, GAFS-11, , CSV-15, CSV-21F	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

S. No.	Soil type	Cropping system	Fodder name	Variety	Management practices
1	Medium and shallow black	Groundnut base cropping system	Sorghum	Gundari GAFS-11, , CSV-15, CSV-21F	• Timely sowing • Thinning and Maintain optimum plant population with row and intra row spacing Keep weed free and frequent inter- culturing • Don’t feed as green fodder.
2	Alluvial soils	Groundnut base cropping system	Sorghum	Gundari GAFS-11, , CSV-15, CSV-21F	• Timely sowing • Thinning and Maintain optimum plant population with row and intra row spacing Keep weed free and frequent inter- culturing • Don’t feed as green fodder.

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

S. No.	Soil type	Cropping system	Fodder name	Variety	Management practices
1	Medium and shallow black	Groundnut base cropping system	Sorghum	Gundari GAFS-11, , CSV-15, CSV-21F	• Timely sowing • Thinning and Maintain optimum plant population with row and intra row spacing Keep weed free and frequent inter- culturing • Don't feed as green fodder.
2	Alluvial soils	Groundnut base cropping system	Sorghum	Gundari GAFS-11, , CSV-15, CSV-21F	• Timely sowing • Thinning and Maintain optimum plant population with row and intra row spacing Keep weed free and frequent inter- culturing • Don't feed as green fodder.

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

S. No.	Soil type	Cropping system	Crop name	Variety	Management practices
1	Medium and shallow black	Groundnut base cropping system	Grass	NapierJinjvo	Adopt recommended package of agronomic practices
			Lucerne	Anand-2	Adopt recommended package of agronomic practices
2	Alluvial soils	Groundnut base cropping system	Grass	NapierJinjvo	Adopt recommended package of agronomic practices
			Lucerne	Anand-2	Adopt recommended package of agronomic practices

Livestock management during severe heat waves

Nutritional management	Shelter management	Health management	Miscellaneous, if any
➢ Feed 25 kg green fodder along with unconventional feed per animal. ➢ Give jiggery water with fenugreek powder. ➢ High energy density and low protein diet are beneficial. ➢ Increasing the grain/forage ratio.	➢ Covered the shelter roof with dry grasses. ➢ Provide Fans and 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).	➢ 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.	➢ 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
➢ 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.	➢ Operate heaters protect shed by tying gunny bags around shed.	➢ 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.	➢ Operate heaters, protect shed by tying gunny bags around shed. ➢ Protect animals from direct cold waves. ➢ Cover animal under insurance