State: MAHARASHTRA
Agriculture Contingency Plan for District JALNA

1.0 District Agriculture profile				
1.1	**Agro-Climatic/ Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	Deccan Plateau, Hot Semi-Arid Eco-Region (6.2)		
	Agro-Climatic Region (Planning Commission)	Western Plateau and Hills Region (IX)		
	Agro Climatic Zone (NARP)	Central Maharashtra plateau Central Maharashtra plateau Zone (MH-7)		
	List all the districts or part thereof falling under the NARP Zone	Aurangabad, Jalana, Parbhani, Hingoli, Beed, Osmanabad, Latur, Nanded, Dhule, Buldhana, Amravathi, Jalgaon, Akola, Yeotmal		
	Geographic coordinates of district	Latitude	Longitude	Altitude
		19° 50'20.22" N	75° 53'13.84" E	534 m above MSL
	Name and address of the concerned ZRS / **ZARS** / RARA / RRA / RRTTS	Marathwada Agriculture University Parbhani National Agricultural Research Project, Paithan Road ,Aurangabad 500431 (Maharashtra)		
	Mention the KVK located in the district	Marathwada Sheti Sahaya Mandal,s Krishi Vigyan Kendra, Kharpudi , District Jalna- 431 203.		

1.2	**Rainfall**	Average (mm)	Normal Rainy days (number)	(Specify week and month)	Normal Cessation (Specify week and month)
	SW monsoon (June - Sep) :	634.1	33	June 2nd week (MW 23)	October 1st week (MW 40)
	NE monsoon (Oct - Dec) :	84.5	5		
	Winter (Jan - Feb) :	5.2	-		
	Summer (Mar - May) :	26.6	-		
	Annual	750.4	38		
	(Source: Meteorology Department, MAU, Parbhani				

1.3	**Land use pattern of the district (latest statistics)**	Geographical area (000 ha)	Cultivable area	Forest area	Land under non-agricultural use	Permanent pastures	Cultivable waste land	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
		772.6	712.8	4.9	20.8	24.8	15.9	10.8	7.3	98.7	18.1

(Source: Agriculture Statistical Information Maharashtra Sate 2005-06, Part – II

1.4	**Major Soils types**	**Area ('000 ha)**	**Percent (%) of total geographical area**
	1.Daeep black soils	85.16	13.37
	2.Medium deep soils	136	21.36
	3.Shallow soils	415.61	65.27

(Source: NBSS and LUP, Nagpur)

1.5	**Agricultural land use**	**Area ('000 ha)**	**Cropping intensity %**
	Net sown area	529.0 / 596.5	130 / 122
	Area sown more than once	159.0	
	Gross cropped area	688.0	

1.6	**Irrigation**	Area ('000 ha)	Percent (%)	
	Net Irrigated area	116.48	22.17	
	Gross irrigated area	124.03	10.57	
	Rainfed area	412.52		
	Sources of Irrigation	**Number**	**Area ('000 ha)**	**(%)**
	Canals		*22.17*	18
	Tanks	-	*10.57*	8
	Open wells	49774	91.28	74
	Bore wells	-	-	-
	Lift irrigation	-	-	-
	Other sources (Farm ponds)	40000	-	-
	Total	-	124.03	100
	No. of tractors	2408	-	-
	Pump sets	26920	-	-
	Micro-irrigation (2009-2010) Drip 4.51 and Sprinkler 2.16 ha	-	6.68	-
	Groundwater availability and use	No. of blocks	% area	**Quality of water**
	Over exploited	-	-	-
	Critical	-	-	-
	Semi-critical	-	-	-
	Safe	-	-	-
	Waste water availability and use	-	-	safe
	Ground water quality	-	-	Suitable for drinking and irrigation

* Over-exploited: groundwater utilization > 100%; critical: 90-100% semi-critical: 70-90%; safe: < 70%
(Source: Comprehensive District Agriculture Plan, Jana District, 2008)

Area under major field crops & horticulture etc.

1.7	**Major Field Crops cultivated**	**Area ('000 ha)**							
		Kharif 2009-2010			**Rabi 2007-08**			**Summer**	
		Irrigated	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**		**Total**
	Cotton	-	209.5	209.5	-	-	-	-	209.5
	Pearlmillete	-	69.7	69.7	-	-	-	-	69.7
	Maize	-	58.9	58.9	-	-	-	-	58.9

	Pigeon pea	-	51.6	51.6	-	-	-	-	51.6
	Grreen gram	-	44.0	44.0	-	-	-	-	44.0
	Rabi jowar	-	-	-	-	159.3	159.3	-	159.3
	Wheat	-	-	-	23.2	-	23.2	-	23.2
	Safflower	-	-	-	-	22.6	22.6	-	22.6
	Gram	-	-	-	-	15.7	15.7	-	15.7
	Sunflower	-	-	-	12.4	-	12.4	-	12.4
	Ground nut	-	-	-	-	-	-	1.9	1.9
	Sunflower	-	-	-	-	-	-	1.5	1.5

	Horticulture crops – Fruits (2006-07)	**Total area (000 ha)**
	Sweet orange (Mosambi)	18.80
	Banana	0.49
	Mango	0.40
	Grape	0.15
	Guava	0.14
	Total	38.15
	Horticulture crops – Vegetables (2006-07)	**Total area(000 ha)**
	Tomato	0.2
	Brinjal	0.2
	Okra (Bhendi)	0.2
	Onion	0.8
	Carrot	0.3
	Total	2.5
	Medicinal and Aromatic crops	**Total area**
		NA
	Spices	**Total area**
	Turmeric	0.04
	Ginger	0.17
	Garlic	0.05
	Coriander	0.05
	Onion(seed)	0.50
	Total	9.00
	Flower crops (2009-10)	**Total area**
	Marigold	0.03
	Rose	0.01
	Aster	0.01
	Mogra	0.12
	Nisigandh	0.15

	Total	0.44
	Fodder crops	**Total area**
	Sorghum	**NA**
	Maize	NA
	Lucern	NA
	Berseem	NA
	Gajraj	NA
	Total fodder crop area	NA
	Grazing land	NA
	Sericulture etc	0.20
	Others (Specify)	

* If break up data (irrigated, rainfed) is not available, give total area

(Source: Comprehensive District Agriculture plan of Jalana District (C-Dap 2008) & Divisional Review Meeting Report, Kharif 2010-11)

1.8	**Livestock (2003 Census)**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Non descriptive indigenous cattle (local low yielding)	230286	204660	434946
	Improved / crossbred cattle	14383	21409	35792
	Non descriptive buffaloes (local low yielding)	12107	64272	76379
	Improved Graded buffaloes	0	0	0
	Goat	59732	190663	250395
	Sheep	17973	28911	46884
	Sheep Crossbred	17	24	41
	Total	**334498**	**509939**	**844437**
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
	Commercial	-	400745	
	Backyard	-	0	
	Total	**-**	**400745**	

1.10 **Fisheries (2008-09)** (Data source: Chief Planning Officer)

A. Capture

i) Marine (Data Source: Fisheries Department)	**No. of fishermen**	**Boats**		**Nets**		**Storage facilities (Ice plants etc.)**
		Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	
	-	-	-	-	-	-

ii) Inland (Data Source: Fisheries Department)	**No. Farmer owned ponds**	**No. of Reservoirs**	**No. of village tanks**	
	0	**56**	**1020**	
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)		16017	0.11	1770
Others				

(Source: Maharashtra Animal and Fishery Sciences University, Nagpur

1.11	**Production and Productivity of major crops (Average of last 5 years: 2003 to 2008)**	**Kharif**		**Rabi**		**Summer**		**Total**	
		Production ('000 t)	**Productivity (kg/ha)**	**Production ('000 t)**	**Productivity (kzg/ha)**	**Production ('000 t)**	**Productivity (kg/ha)**	**Production ('000 t)**	**Productivity (kg/ha)**
	Cotton	358.6	291 lint	-	-	-	-	358.6	291 lint
	Pearl millet	65.0	933	-	-	-	-	65.0	933
	Maize	126.2	2152	-	-	-	-	126.2	2152
	Pigeon pea	34.3	665	-	-	-	-	34.3	665
	Green gram	17.0	386	-	-	-	-	17.0	386
	Rabi jowar	-	-	155	973	-	-	155	973
	Wheat	-	-	973	1537	-	-	973	1537
	Safflower	-	-	17.4	771	-	-	17.4	771
	Gram	-	-	10.4	673	-	-	10.7	673
	Sunflower	-		7.6	615	-	-	7.6	615
	Ground nut	-	-	-	-	3.1	1578	3.1	1578
	Sunflower	-	-	-	-	1.4	938	1.4	938
	Major Horticultural crops								
	Sweet orange (Mosambi)	-	-	-	-	-	-	24.45	13000
	Banana	-	-	-	-	-	-	0.199	4000
	Mango	-	-	-	-	-	-	0.16	4000
	Grape	-	-	-	-	-	-	0.296	2000
	Guava	-	-	-	-	-	-	0.203	1400
	Horticulture crops - Vegetables								
	Tomato	-	-	-	-	-	-	0.03	1500
	Brinjal	-	-	-	-	-	-	2.60	1300

	Okra (Bhendi)	-	-	-	-	-	-	0.01	900
	Onion	-	-	-	-	-	-	0.11	1350
	Carrot	-	-	-	-	-	-	3.90	1300

(Source: District Agriculture plan of Jalana District (C-Dap 2008) & Divisional Review Meeting Kharif 2010-11)

1.12	**Sowing window for 5 major crops (start and end of sowing period)**	: Cotton	Pearlmillet	Maize	Pigeon pea	Green gram
	Kharif - Rainfed	June 15 to July 15	June 15 to July 30	June 15 to July 30	June 15 to July 30	June 15 to July 7
	Kharif - Irrigated	May 15 to June 15	NA	June 15 to July 30	May 15 to June 30	NA
		Wheat	Gram	Sorghum	Safflower	Sunflower
	Rabi - Rainfed		Oct.1 to 15	Oct.1 to 15	Oct.1 to 15	Oct.1 to 15
	Rabi – Irrigated	Nov.1 to Nov 20	Oct 15 to Nov. 15.	Oct 15 to Nov. 15	Oct 15 to Nov. 15	Oct 15 to Nov. 15

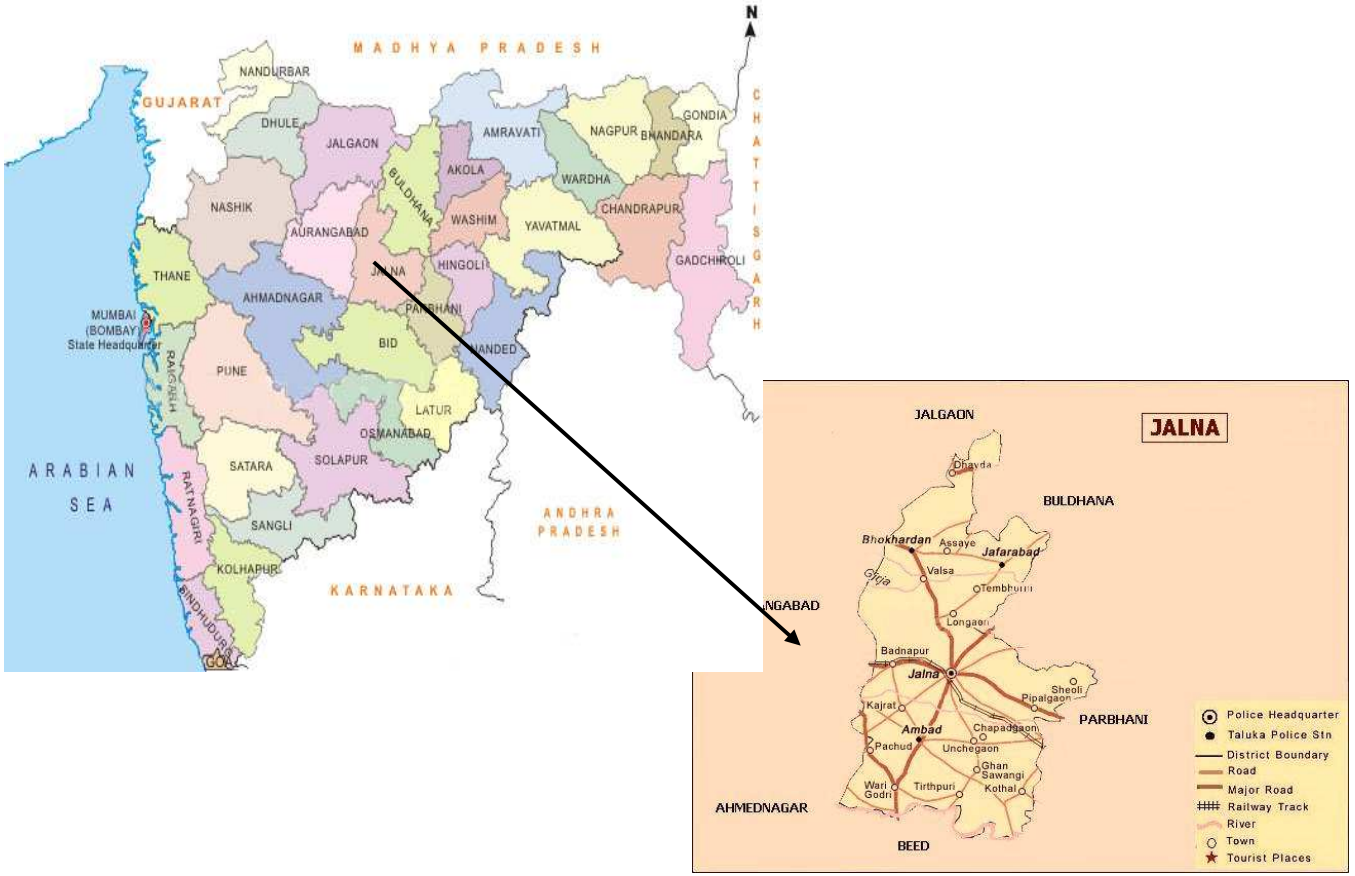
1.13	**What is the major contingency the district is prone to? (Tick mark** and mention years if known during the last 10 years period **)**	**Regular**	**Occassional**	**None**
	Drought	-	√	-
	Flood	-	√	-
	Cyclone	-	-	√
	Hail storm	-	-	√
	Heat wave	-	√	-
	Cold wave	-	√	-
	Frost	-	-	√
	Sea water inundation	-	-	√
	Pests and diseases	-	√ 1.Heliothis (pigeonpea , gram) 2.Spodoptera (Soybean) 3.Sphingid (Moong and Urd) 4.Jassids&whitefly (cotton)	-

Source: Maharashtra Animal and Fishery Sciences University, Nagpur

1.14	**Include Digital maps of the district for**	Location map of district within States as Annexure 1	Enclosed : Yes
		Mean annual rainfall as Annexure 2	Enclosed : Yes
		Soil map as Annexure 3	Enclosed : Yes

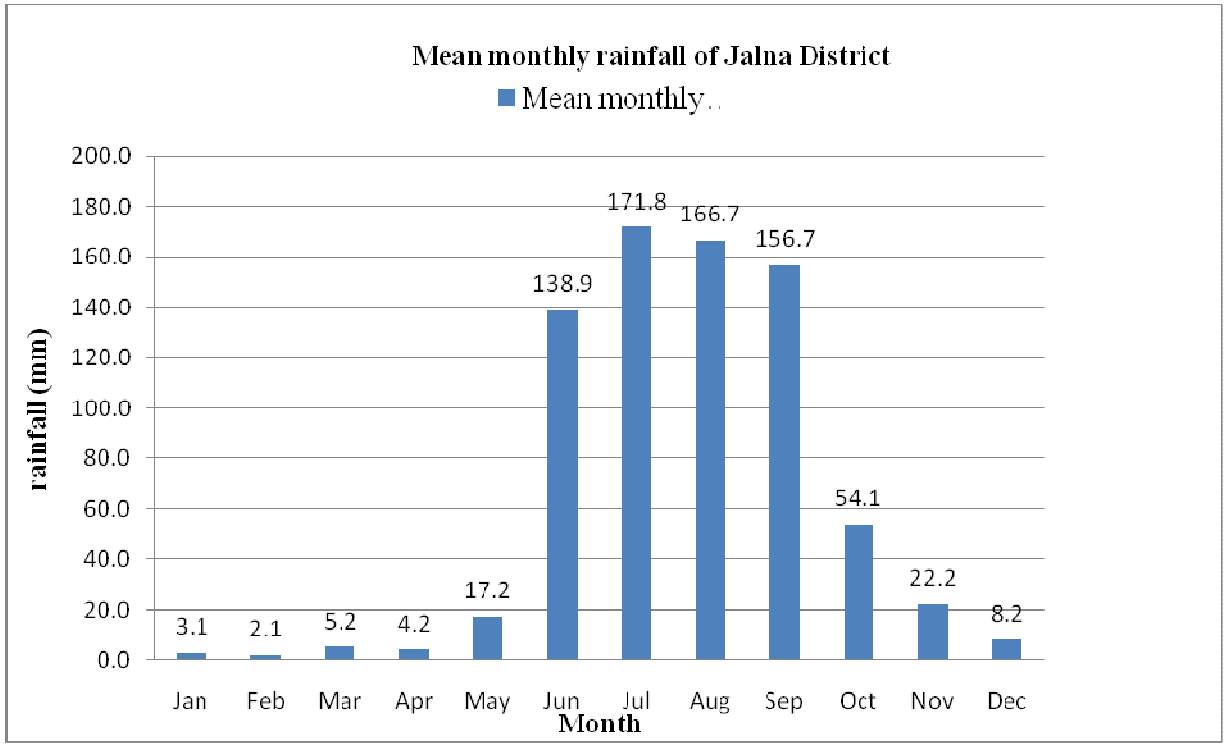
Annexure-I

Location map of Jalna district



Annexure 2

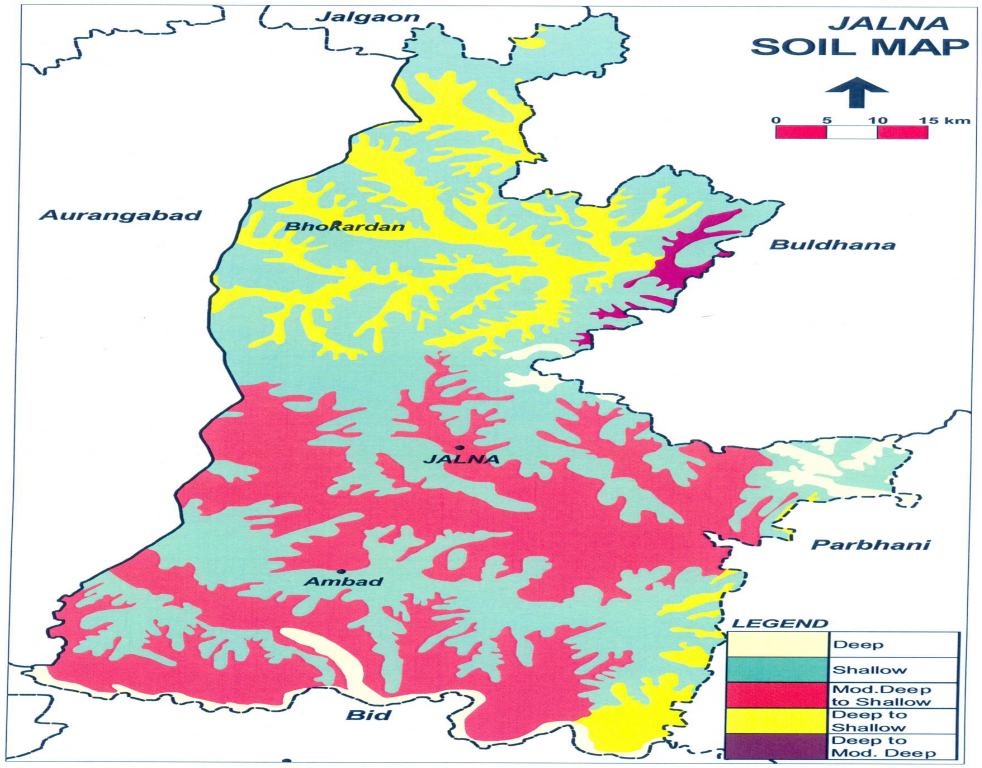
Mean monthly rainfall of jalna district



(Source: IMD) (1941 – 1990)

Annexure 3

Soil map of jalna district



Source: NBSS & LUP, Nagpur

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**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks (June 4th week)	Medium deep to deep black soils	Cotton	No Change	No Change	Linkage with MAU, MSSC and NSC for seed. Linkage with MAIDC for implements. Linkage with MAU, KVK for agro techniques
		Pearl millet	No Change	No Change	
		Maize	No Change	No Change	
		Pigeon pea	No Change	No Change	
		Green gram – sorghum / safflower / chickpea	No Change	No Change	
		Soybean	No Change	No Change	
	Shallow soils	Cotton	No Change	No Change	
		Pearl millet	No Change	No Change	
		Maize	No Change	No Change	
		Pigeon pea	No Change	No Change	
		Green gram – sorghum / safflower / chickpea	No Change	No Change	
		Soybean	No Change	No Change	

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 week July 2nd week	Medium deep to deep black soils	Cotton	Cotton + Pigeonpea 6:2 (BSMR 736, 853, BDN 708, 711)	Normal package of practices recommended by MAU, Parbhani or adopt 15-20 % more seed rate than recommended and reduce fertilizer dose by 25 per cent.	Linkage with MAU, MSSC and NSC for seed. Linkage with MAIDC for implements.
		Pearl millet	No change	Normal package of practices recommended by MAU, Parbhani	

		Maize	No change	-do-	Linkage with MAU, KVK for agro techniques
		Pigeon pea	NO change / Soybean + Pigeonpea 4:2 (JS-335, MAUS-71,81)	**-do-**	
		Green gram – sorghum / safflower / chickpea	Soybean + Pigeonpea 4 : 2 (JS-335, MAUS-71,81)	**-do-**	
		Soybean	No change / Soybean+ pigeon pea 4:2 row proportion (MAUS 71,81)	No change / Soybean+ pigeon pea 4:2 row proportion (MAUS 71,81)	
	Shallow soils	Cotton	Cotton + Pigeonpea 6:2 (BSMR 736, 853, BDN 708, 711)	Normal package of practices recommended by MAU, Parbhani or adopt 15-20 % more seed rate than recommended and reduce fertilizer dose by 25 per cent.	
		Pearl millet	No change	Normal package of practices recommended by MAU, Parbhani	
		Maize	No change	-do-	
		Pigeon pea	NO change / Soybean + Pigeonpea 4 : 2 (JS-335, MAUS-71,81)	Normal package of practices recommended by MAU, Parbhani	
		Green gram – sorghum / safflower / chickpea	Soybean + Pigeonpea 4 : 2 (JS-335, MAUS-71,81)	**-do-**	
		Soybean	Soybean + pigeonpea 4:2 row proportion (MAUS 71 , 81)	**-do-**	

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 6 week July 4th week	Medium deep to deep black soils	Cotton	Cotton + Pigeonpea 6:2 (BSMR 736, 853, BDN 708, 711)	Normal package of practices recommended by MAU, Parbhani or adopt 15-20% more seed rate than recommended and reduce fertilizer dose by 25 per cent.	Linkage with MAU, MSSC and NSC for seed. Linkage with MAIDC for implements. Linkage with MAU, KVK for agro techniques
		Pearl millet	No change	Normal package of practices recommended by MAU, Parbhani	
		Maize	No change	-do-	
		Pigeon pea	NO change /	No change / Soybean+ pigeon pea	

			Soybean + Pigeonpea 4 : 2 (JS-335, MAUS-71,81) + (BSMR 736 853, BDN 708, 711)	4:2 row proportion (MAUS 71,81) + (BSMR 736 853, BDN 708, 711)	
		Green gram – sorghum / safflower / chickpea	Soybean + Pigeonpea 4 : 2 (JS-335, MAUS-71,81) + (BSMR 736 853, BDN 708, 711)	**-do-**	
		Soybean	No change / Soybean+ pigeon pea 4:2 row proportion (MAUS 71,81) + (BSMR 736 853, BDN 708, 711)	**-do-**	
	Shallow soils	Cotton	Cotton + Pigeonpea 6:2 (BSMR 736, 853, BDN 708, 711)	Normal package of practices recommended by MAU, Parbhani or adopt 15-20% more seed rate than recommended and reduce fertilizer dose by 25 per cent.	
		Pearl millet	No change	Normal package of practices recommended by MAU, Parbhani	
		Maize	No change	-do-	
		Pigeon pea	NO change / Soybean + Pigeonpea 4 : 2 (JS-335, MAUS-71,81) + (BSMR 853, BDN 708, 711)	Normal package of practices recommended by MAU, Parbhani	
		Green gram – sorghum / safflower / chickpea	Soybean + Pigeonpea 4 : 2 (JS-335, MAUS-71,81) + (BSMR 853, BDN 708, 711)	**-do-**	
		Soybean	Soybean+ pigeon pea 4:2 row proportion (MAUS 71,81) + (BSMR 853, BDN 708, 711)	**-do-**	

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	***Normal* Crop/Cropping system**	**Change in Crop/Cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 8 weeks **Aug 2nd week**	Medium deep to deep black soils	Cotton	Pigeonpea (BDN 708, 711)	Prefer early maturing varieties recommended by MAU, Parbhani. Reduce intera row spacing and adopt 15-20% more seed rate than recommended	Linkage with MAU, MSSC and NSC for seed. Linkage with MAIDC for implements. Linkage with MAU, KVK for agro
		Pearl millet	Pearl millet + Pigeonpea in 3:3 or 4:2 row proportion	• Normal package of practices recommended by MAU,	

				Parbhani. • Open conservation furrow after every 6-8 rows.	techniques
		Maize	No change. Alternatively go for castor (VI9, Aruna, GGH-4, 5, 6 and DCH-117 / 32)	• Normal package of practices recommended by MAU, Parbhani. • Open conservation furrow after every 6-8 rows	
		Pigeon pea	No change and prefer early maturing varieties	Normal package of practices recommended by MAU, Parbhani	
		Green gram – sorghum / safflower / chickpea	Pigeonpea (BDN 708, 711) or Keep fallow and plan for Rabi Crops like Sorghum, Chickpea, Sunflower and Safflower.	-------**do**--------	
		Soybean	Sunflower (Morden, SS-56, LSFH-35, BSH-1)	**-do-**	
	Shallow soils	Cotton	Pigeonpea (BDN 708, 711)	Prefer early maturing varieties recommended by MAU, Parbhani. Reduce intera row spacing and adopt 15-20% more seed rate than recommended	
		Pearl millet	No change. Prefer intercropping with pigeonpea	Open conservation furrow after every 6-8 rows	
		Maize	No change /fodder maize	-do-	
		Pigeon pea	Keep fallow and plan for early Rabi Crops like Sorghum, Chickpea, Sunflower and Safflower.	Normal package of practices recommended by MAU, Parbhani	
		Green gram – sorghum / safflower / chickpea	Keep fallow and plan for early Rabi Crops like Sorghum, Chickpea, Sunflower and Safflower.	**-do-**	
		Soybean	Sunflower (Morden, SS-56, LSFH-35, BSH-1)	**-do-**	

Condition			Suggested Contingency measures		
Early season drought (Normal onset)	**Major Farming situation**	**Crop/Cropping system**	**Crop management**	**Soil nutrient & moisture Conservation measures**	**Remarks on Implementation**
Normal onset followed by 15-20 days dry spell after sowing germination / crop stand etc.	Medium deep to deep black soils	Cotton	Gap filling 7-10 days after sowing by pot watering within the rows with same cultivar or pigeonpea to maintain at least 75% plant population. Raise cotton seedlings in polythene bags and transplant when sufficient soil moisture is available. Give protective irrigation wherever possible	Making of conservation furrows for moisture conservation When the crop is 2 weeks old take up interculture with harrow. Spray 2 % urea solution or 1% water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 to supplement nutrition	Linkage with MAU, MSSC and NSC for seed. Linkage with MAIDC for implements. Linkage with MAU, KVK for agrotechniques Linkage with DSAO for farm ponds and micro irrigation system through RKVY
		Pearl millet	Gap filling or transplanting of seedlings either from the same field or from nursery or gap filling with pigeonpea	Interculture with hoe.	
		Maize	Gap filling within the rows with same or short duration cultivar to maintain at least 75% plant population	-do-	
		Pigeon pea	Gap filling within the rows with same or short duration cultivar to maintain at least 75% plant population	When the crop is 2 weeks old take up Interculture with hoe	
		Green gram – sorghum / safflower / chickpea	If the plant population is less than 75% of optimum, go for resowing of the alternate crops like sunflower / pigeonpea . If possible give protective irrigation with sprinkler.	When the crop is 2 weeks old take up Interculture with hoe	
		Soybean	Gap filling within the rows with same or short duration cultivar to maintain at least 75% plant population or if the plant population is less than 50% re sow the crop	Avoid applying fertilizers till sufficient soil. moisture is available	
	Shallow soils	Cotton	Gap filling within the rows with same cultivar or pigeonpea to maintain at least 75% plant population. Raise cotton seedlings in polythene bags and transplant when sufficient soil moisture is available. Give protective irrigation wherever possible	Avoid applying fertilizers till sufficient soil. moisture is available Making of conservation furrows for moisture conservation Interculture with harrows	
		Pearl millet	Gap filling or transplanting of seedlings	Interculture with hoe.	

			either from the same field or from nursery or gap filling with pigeonpea		
		Maize	Gap filling within the rows with same or short duration cultivar to maintain at least 75% plant population	-do-	
		Pigeon pea	Gap filling within the rows with same or short duration cultivar to maintain at least 75% plant population	When the crop is 2 weeks old take up interculture with hoe	
		Green gram – sorghum / safflower / chickpea	If the plant population is less than 75% of optimum, go for resowing of the alternate crops like sunflower / pigeonpea . If possible give protective irrigation with sprinkler.	When the crop is 2 weeks old take up interculture with hoe	
		Soybean	Gap filling within the rows with same or short duration cultivar to maintain at least 75% plant population	Interculture with hoe	

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	**Major Farming situation**	**Crop/Cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At vegetative stage	Medium deep to deep black soils	Cotton	Give protective irrigation wherever possible Maintain weed free conditions	Avoid applying fertilizers till sufficient soil moisture is available Making of conservation furrows for moisture conservation Interculture with harrows Two sprays of 2% MgSO4, Zn, Boron at weekly interval when the crop is encountered reddening symptoms Spray 2 % urea solution or 1% water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 to supplement nutrition.	Linkage with ongoing govt. scheme to encourage adoption of micro irrigation for better water use efficiency (WUE) Linkage with MAU and KVK for agro techniques Linkage with DSAO for farm ponds and micro irrigation system through
		Pearl millet	• Avoid top dressing of fertilizers till sufficient soil moisture is available.	• Opening of alternate furrows with Balaram plough.	

			• Interculture with harrow for weeding and to create soil mulch. • Give protective irrigation if possible	• Mulching with crop residue • Spraying of 2% urea or DAP	RKVY
		Maize	-----do-----	-----do-----	
		Pigeon pea	Inter culture for weeding Protective irrigation if possible	Opening of alternate furrows with Balaram plough. Spraying of 2% urea and DAP	
		Green gram – sorghum / safflower / chickpea	Inter culture for weeding Protective irrigation if possible	-----do-----	
		Soybean	Interculture for weeding and to create soil mulch. Give protective irrigation wherever possible	-----do-----	
	Shallow soils	Cotton	Give protective irrigation wherever possible Maintain weed free conditions	Avoid applying fertilizers till sufficient soil moisture is available Making of conservation furrows for moisture conservation Interculture with harrows Two sprays of 2% MgSO4, Zn, Boron at weekly interval when the crop is encountered reddening symptoms Spray 2 % urea solution or 1% water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 to supplement nutrition.	
		Pearl millet	• Avoid top dressing of fertilizers till sufficient soil moisture is available. • Interculture with harrow for weeding and to create soil mulch. • Give protective irrigation if possible	Opening of alternate furrows	
		Maize	-do-	-do-	
		Pigeon pea	Inter culture for weeding Protective irrigation if possible	Spraying of 2% urea and DAP	
		Green gram – sorghum /	Inter culture for weeding Protective irrigation if possible	-do-	

		safflower / chickpea			
		Soybean	Give protective irrigation wherever possible	-do-	

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell)	**Major Farming situation**	**Crop/Cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At flowering / fruiting stage or At reproductive stage	Medium deep to deep black soils	Cotton	Give protective irrigation wherever possible	Avoid applying fertilizers till sufficient soil moisture is available. Making of conservation furrows for moisture conservation Interculture with harrows Two sprays of 2% MgSO4, Zn, Boron at weekly interval when the crop is encountered reddening symptoms Spray 2 % urea solution or 1% water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 to supplement nutrition.	Linkage with ongoing govt. scheme to encourage adoption of micro irrigation for better water use efficiency (WUE) Linkage with MAU and KVK for agro techniques Linkage with DSAO for farm ponds and micro irrigation system through RKVY
		Pearl millet	Give protective irrigation	Mulching with crop residue@ 3-5 t / ha	
		Maize	If feasible spray anti-transparent 6% kaolin	-do-	
		Pigeon pea	Protective irrigation if possible	Opening of furrows with Balaram plough. Spraying of 2% urea and DAP	
		Green gram – sorghum / safflower / chickpea	Protective irrigation if possible	--	
		Soybean	Give protective irrigation wherever possible	Opening of alternate furrows with Balaram plough. Spraying of 2% urea and DAP	
	Shallow soils	Cotton	Give protective irrigation wherever possible	Avoid applying fertilizers till sufficient soil moisture is available	

				Making of conservation furrows for moisture conservation Interculture with harrows Two sprays of 2% MgSO4, Zn, Boron at weekly interval when the crop is encountered reddening symptoms Spray 2 % urea solution or 1% water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 to supplement nutrition.	
		Pearl millet	-do-	Mulching with crop residue @ 3-5 t / ha	
		Maize	• Give protection irrigation • If feasible spray anti-transparent 6% kaolin. • In case of severe stress harvest as green fodder	-do-	
		Pigeon pea	Protective irrigation if possible	Opening of furrows with Balaram plough. Spraying of 2% urea and DAP	
		Green gram – sorghum / safflower / chickpea	Protective irrigation if possible or in case of sever moisture stress use as fodder / green manuring	--	
		Soybean	Give protective irrigation wherever possible	Opening of alternate furrows with Balaram plough. Spraying of 2% urea and DAP	

Condition			Suggested Contingency measures		
Terminal drought	**Major Farming situation**	**Crop/Cropping system**	**Crop management**	**Rabi Crop planning**	**Remarks on Implementation**
	Medium deep to deep black soils	Cotton	Give protective irrigation with drip Picking	If possible, adopt relay cropping of chickpea, safflower, rabi sorghum	Linkage with MAIDC / DSAO for harvesting implements (thresher, harvester). Linkage with DSAO for farm ponds and micro irrigation system through RKVY Linkage with MAU, MSSC and NSC for seed. Linkage with MAU, KVK for agro techniques
		Pearl millet	Life saving irrigation or harvest at physiological maturity	Plan for rabi crops chickpea / safflower	
		Maize	-do-	-do-	
		Pigeon pea	Life saving irrigation Foliar spray of 2% KNO_3, urea and DAP	---	
		Green gram – sorghum / safflower / chickpea	Harvest at physiological maturity or in case of severe drought use as fodder/ green manuring	Plan for rabi crops chickpea / safflower / rabi sorghum / sunflower	
		Soybean	Give life saving irrigation or harvest at physiological maturity	Sowing of rabi crops like sorghum, chickpea, safflower immediately after harvest of soybean with minimum tillage	
	Shallow soils	Cotton	Give protective irrigation with drip Picking	If possible, adopt relay cropping of chickpea, safflower, rabi sorghum	
		Pearl millet	Life saving irrigation or harvest at physiological maturity	Plan for rabi crops chickpea / safflower	
		Maize	Life saving irrigation In case of severe stress harvest as green fodder	-do-	
		Pigeon pea	Life saving irrigation	Foliar spray of 2% KNO_3, urea and DAP	
		Green gram – sorghum / safflower / chickpea	Harvest at physiological maturity or in case of severe drought use as fodder/ green manuring	Plan for rabi crops chickpea / safflower / rabi sorghum / sunflower	
		Soybean	Give life saving irrigation or harvest at physiological maturity	Sowing of rabi crops like sorghum, chickpea, saffalower immediately after harvest of soybean with minimum tillage	

2.1.2 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 deep to deep black soils	Sugarcane Turmeric	No change/Cotton (Irrigated) Wheat	1.Limited irrigation	1.Supply of seed through MSSC, MAU, Village seed production programme
	Shallow soils	Sweet orange Ginger Vegetable crops	.Maize .Cotton	2.Alternate furrow irrigation 3.Drip irrigation	

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	Medium deep to deep black soils	Irrigated Cotton	Cotton	1.Recommended spacing (120 x 45 cm) and 80:40:40 NPK Kg/ha	
	Shallow soils	Ginger / Turmeric	Cotton and Maize	Alternate furrow irrigation	

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 deep to deep black soils	Irrigated Cotton	Cotton	1.Recommended spacing (120 x 45 cm) and 80:40:40 NPK Kg/ha	1.Release of water at critical growth stages by Irrigation Department
	Shallow soils l	Ginger / Turmeric	Cotton and Maize	Alternate furrow irrigation	

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/Cropping system**	**Change in crop / cropping system**	**Agronomic measures**	**Remarks on Implementation**
Insufficient groundwater recharge due to low rainfall	Medium deep to deep black soils	Irrigated Cotton	Cotton	1.Recommended spacing (120 x 45 cm) and 80:40:40 NPK Kg/ha	1.Supply of seed through MSSC, NFSM, MAU, Village seed production programme
	Shallow soils l	Ginger / Turmeric	Cotton and Maize	Alternate furrow irrigation	

2.2 Unusual rains (untimely, unseasonal etc) (for both rainfed and irrigated situations)

Condition	**Suggested contingency measure**			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity Stage**	**Post harvest**
Cotton	• Drain excess water • Interculture at optimum soil moisture • Apply 25KgN/Ha to cotton	Drain excess water	Drain out excess water Timely harvest	Protect picked cotton from drenching and soiling Dry wet cotton and market
Maize	Drain out excess water as early as possible Intercultivation and Earthing up	Drain out excess water as early as possible Intercultivation and Earthing up	Drain out excess water Harvest green cobs from dislodged plants for immediate marketing	Harvest cobs after proper drying Dry the grain to optimum moisture content before storage
Soybean, Pigeonpea and short duration pulses	Drain out excess water	-do-	-do-	Shift to safer place Dry the produce
Horticulture				
Mango	Opening of field channels to drain out excess water and avoid surface ponding, Interculture at optimum soil moisture	Opening of field channels to drain out excess water and avoid surface ponding, Interculture at optimum soil moisture	Collect fallen fruits, grade and market if feasible	Grading, cleaning and marketing of fruits
Sweet orange	-do-	-do-	-do-	-do-
Heavy rainfall with high speed winds in a short span				
Cotton	• Drain excess water • Interculture at optimum soil	Drain excess water	Drain out excess water Timely harvest	Protect picked cotton from drenching and soiling

	moisture • Apply 25KgN/Ha to cotton			Dry wet cotton and marketing
Maize	Drain out excess water as early as possible	Drain out excess water as early as possible	Drain out excess water Harvest green cobs from dislodged plants for immediate marketing	Harvest cobs after proper drying Dry the grain to optimum moisture content before storage
Soybean, Pigeonpea and short duration pulses	Drain out excess water	-do-	-do-	Shift to safer place Dry the produce
Horticulture				
Mango	Drain out excess water	Provide support to prevent lodging and uprooting in young orchards	Apply multinutrient and hormonal spray to promote flowering	Shift produce to safer place
Sweet orange	-do-	-do-	-do-	-do-
Outbreak of pests and diseases due to unseasonal rains				
Cotton	Apply soil drench of carbendazim 0.1% or COC @ 3g/litre at base of plants to prevent wilt in low lying patches	Apply foliar spray of streptocycline sulphate @ 6g/60 litre + COC @ 25g/10 litre to prevent bacterial leaf blight Apply Sulphur 25g/10 litre (300 mesh) to prevent grey mildew Apply MgSO4 25 kg/ha soil application or 1% MgSO4 foliar spray to prevent leaf reddening	Foliar spray of carbendazim 0.1% or Ditane M45 0.2% to prevent boll rot	-
Maize		Foliar application of Mancozeb at 0.25-0.5% at 8-10 days interval to control Turcicum leaf blight		
Soybean	Manually remove infested plants or plant parts from below the girdles Protect against semilooper when density reaches >4 larvae per meter row with foliar spray of NSKE 5% or dimethoate 30 EC 1 ml/litre	-		
Horticulture				
Mango	Spray imidacloprid 0.3 ml or dimethoate 1 ml/liter to control hopper Drench the seedlings with COC 0.25% against root rot	Protect against hopper	Spray Dithane M 45 3g/litre or carbendazim 1g/liter against anthracnose Spray sulphur 0.5% to control powdery mildew	Maintain aeration in storage to prevent fungal infection and blackening or fruits

Sweet orange	Protect against Citrus Psylla with foliar spray of malathion 50 EC 10 ml or quinalphos 25 EC 10 ml or cypermethrin 25EC 4 ml per 10 liters	Protect against Citrus Psylla with foliar spray of malathion 50 EC 10 ml or quinalphos 25 EC 10 ml or cypermethrin 25EC 4 ml per 10 liters	-	-

2.3 Floods: Not applicable

Condition	**Suggested contingency measure**			
Transient water logging / partial inundation	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Continuous submergence for more than 2 days	Not applicable			
Sea water inundation				

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				
Horticulture				
Sweet orange	Frequent irrigation Shade temporary shade net Mulching	Irrigation and pruning of affected branches / twigs	Irrigation and pruning of affected branches / twigs Apply 1% Bordeaux paste to cut ends	Immediate harvesting, grading and marketing
Cold wave				
Sweet orange	Protect with polythene sheet	Smoking, frequent and light irrigation during evening hours, basin mulching, apply supplementary dose of fertilizers	Smoking, frequent and light irrigation during evening hours, basin mulching, apply supplementary dose of fertilizers	
Frost	Not applicable			
Hailstorm	Not applicable			
Cyclone	Not applicable			

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event[s]	**During the event**	**After the event**
Drought			
Feed and fodder availability	Sowing of cereals (Sorghum/Bajra) and leguminous crops (Lucerne, Berseem, Horse gram, Cowpea) during North-East monsoon under dry land system for fodder production Collection of soya meal waste and sunflower/safflower/ groundnut seed cake for use as feed supplement during drought Motivating the sugarcane farmers to convert green sugarcane tops in to silage by the end of February Preserving the green maize fodder as silage Development of hortipastoral systems inexisting orchards Establishment of fodder bank at village level with available dry fodder (wheat straw, Sorghum/ Bajra stover, groundnut haulms, sugarcane tops) Development of silvopastoral models with Leucaena, Glyricidia, Prosopis as fodder trees and Marvel, Madras Anjan, Stylo, Desmanthus, etc., as under storey grass Encourage fodder production with Sorghum – stylo-Sorghum on rotation basis and also to cultivate short-term fodder crops like sunhemp Promote Azola cultivation at backyard Formation of village Disaster Management Committee Capacity building and preparedness of the stakeholders and official staff for the drought/floods/cyclones	Harvest and use biomass of dried up crops (Pearlmillet, Pigeon pea, Sorghum, maize, Wheat, Green gram, Black gram, Soybean, cluster bean) material as fodder Use of unconventional and locally available cheap feed ingredients especially soya meal waste and sunflower/safflower/ groundnut seed cake for feeding of livestock during drought Harvest all the top fodder available (Subabul, Glyricidia, Pipol, Prosopis etc) and feed the LS during drought Concentrate ingredients such as Grains, brans, chunnies & oilseed cakes, low grade grains etc. unfit for human consumption should be procured from Govt. Godowns for feeding high productive animals during drought Promotion of Horse gram as contingent crop and harvesting it at vegetative stage as fodder All the hay should be enriched with 2% Urea molasses solution or 1% common salt solution and fed to LS. Continuous supplementation of minerals to prevent infertility. Encourage mixing available kitchen waste with dry fodder while feeding to the milch animals Arrangements should be made for mobilization of small ruminants across the districts where no drought exits Unproductive livestock should to be culled	Encourage progressive farmers to grow multi cut fodder crops of sorghum/bajra/maize(UP chari, MP chari, HC-136, HD-2, GAINT BAJRA, L-74, K-677, Ananad/African Tall, Kisan composite, Moti, Manjari, B1-7 on their own lands with input subsidy Supply of quality seeds of COFS 29, Stylo and fodder slips of Marvel, Yaswant, Jaywant, Napier, guinea grass well before monsoon Flushing the stock to recoup Replenish the feed and fodder banks

		during severe drought Create transportation and marketing facilities for the culled and unproductive animals (10000-20000 animals) Subsidized loans (5-10 crores) should be provided to the livestock keepers	
Drinking water	Make available wholesome clean drinking water throughout the year for livestock Adopt various water conservation methods at village level to improve the ground water level for adequate water supply. Identification of water resources Rain water harvesting and create water bodies/watering points (when water is scarce use only as drinking water for animals) Construction of drinking water tanks in herding places/village junctions/relief camp locations Drinking water troughs should be provided in shandies /community grazing areas	Provide wholesome clean drinking water throughout the day Restrict wallowing of animals in water bodies/resources Add alum in stagnated water bodies	Watershed management practices should be promoted to conserve the rainwater. Bleach (0.1%) drinking water / water sources Desilting of ponds Sensitize the farming community about importance of clean drinking water for livestock
Health and disease management	Procure and stock emergency medicines and vaccines for important endemic diseases of the area All the stock must be immunized for endemic diseases of the area before the onset of monsoon Surveillance and disease monitoring network to be established at Joint Director (Animal Husbandry) office in the district Adequate refreshment training on disaster management to be given to animal husbandry department staff Procure and stock multivitamins & area specific mineral mixture	Conduct mass animal health camps in every village Keep close watch on health of different livestock species Identification and quarantine of sick animals Performing ring vaccination (8 km radius) in case of any outbreak Tick control measures should be implemented to prevent tick borne diseases in productive animals Keep the animal houses clean and spray disinfectants Safe and hygienic disposal of dead animal carcasses	Keep close surveillance on disease outbreak. Undertake the vaccination depending on need Restricting movement of livestock in case of any epidemic Farmers should be advised to breed their milch animals during July-September so that the peak milk production does not coincide with mid summer

Cyclone/ **Floods**	Harvest all the possible immature and or wetted grain (Pearlmillet, Pigeon pea, Sorghum, Wheat, Green gram, Black gram, maize, Soybean, cluster bean etc) and store properly for use as animal feed. Protect the stored dry roughage feed (wheat straw/sorghum stover etc.,) from wetting and inundation of stagnated water Procure and stock vaccines for important endemic diseases Make available emergency medicines, anti-diarrheal drugs and electrolytes for transport to the needy areas Keep stock of bleaching powder and lime Don't allow the animals for grazing in case of early forewarning (EFW) Incase of EFW of severe cyclone/floods, shift the animals to safer places Surveillance and disease monitoring network to be established at Animal Husbandry Department in each district Arrange transportation facilities for animals to shift from low lying areas to safer places and also for animal health workers for rescue operations	Arrange relief camps to save productive and high valued animals Shift productive and high valued animals from affected areas to relief camps Carryout deworming to all the animals entering into relief camps Proper hygiene and sanitation of the relief camps, animal sheds and surroundings Avoid feeding soaked and mould infected feeds / fodders to livestock Treatment of the sick, injured and affected animals through arrangement of mobile emergency veterinary hospitals / rescue animal health workers. Spray fly repellants like neem oil, Butax etc., in animal sheds and relief camps Identification and quarantine of sick animals Perform ring vaccination (8 km radius) in case of any disease outbreak Sprinkle lime in relief camps and animal sheds Proper disposal of dung from relief camps and animal sheds	Restrict movement of animals in case of epidemic Repair of animal shed Cleaning and disinfection of the shed Bleach (0.1%) drinking water / water sources Deworm all the animals through mass camps Vaccinate against possible disease out breaks like HS, BQ, FMD and PPR Proper dispose of the dead animals / carcasses by burning / deep burying (4-8 feet) with lime powder (1kg for small ruminants and 5kg for large ruminants) in pit Bleach / chlorinate (0.1%) drinking water or water resources Collect drowned crop material, dry it and store for future use Sowing of short duration fodder crops in unsown and water logged areas when crops are damaged and no chance to replant Application of urea (20-25kg/ha) in the inundated areas and CPR's to enhance the bio mass production.
Heat & Cold wave	Arrangement for protection from **heat wave** i) Plantation around the shed ii) Arrangement of H_2O sprinklers / foggers in the shed **iii)** Application of white reflector paint on the roof **iv)** Thatched sheds should be provided as a	**Heat wave:** Allow the animals early in the morning or late in the evening for grazing Feed green fodder/silage / concentrates during day time and roughages / hay during night time Put on the foggers / sprinkerlers during day time In severe cases, vitamin 'C' and electrolytes should be added in H_2O during day time **Cold wave :**	Feed the animals as per routine schedule Allow the animals for grazing (normal timings)

	shelter to minimize heat stress **Cold wave :** Covering all the wire meshed walls / open area with gunny bags/ polyethylene sheets (with a mechanism for lifting during the day time and putting down during night time)	Allow for grazing between 10AM to 3PM Add 25-50 ml of edible oil in concentrates and fed to the animals Put on the heaters during night time Apply / sprinkle lime powder in the animal shed to neutralize ammonia accumulation	
Insurance	Encouraging insurance of livestock	Listing out the details of the dead animals	Submission for insurance claim and availing insurance benefit Purchase of new productive animals

2.5.2 Poultry

	Suggested contingency measures		
	Before the event[a]	**During the event**	**After the event**
Drought			
Shortage of feed ingredients	Storing of grain like maize, bajra, jowar, broken wheat/ rice etc, to use as supplemental feed during drought	Feed with house hold grain to all the birds in the noon i.e., after morning scavenging Supplementation of shell grit (calcium) for laying birds Culling of weak birds	Feed supplementation to all the survival birds
Drinking water	Store adequate good quality water	Use water sanitizers and offer cool hygienic drinking water	Provide clean and hygienic drinking water
Health and disease management	Culling of sick birds. Deworming and vaccination against RD and IBD	Supplementation of Vit. A,D,E, K and B-complex including vit C in drinking water (5ml in one litre water)	Hygienic and sanitation of poultry house Disposal of dead birds by burning / burying with lime powder in pit
Floods			
Shortage of feed ingredients	In case of early forewarning of floods, shift the birds to safer place Storing of grain like maize, bajra, jowar, broken wheat/ rice etc	Use stored feed as supplement Don't allow for scavenging Culling of weak birds	Routine practices are followed Deworming and vaccination against RD
Drinking water	Protect the stored water from contamination	Use water sanitizers Offer hygienic drinking water	Provide clean and hygienic drinking water
Health and disease management	In case of EFW, add antibiotic powder (Terramycin/Ampicilline/ Ampiclox etc., 10g in one litre) in drinking water to prevent any disease outbreak	Prevent water logging around the sheds Provide proper drainage facility to clear stagnated water Assure supply of electricity by	Sanitation of poultry house Treatment of affected birds Disposal of dead birds by burning / burying with line powder in pit

		generator or solar energy or biogas Sprinkle lime powder to prevent ammonia accumulation due to dampness Sanitation of poultry house	Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD
Cyclone			
Shortage of feed ingredients	In case of EFW, shift the birds to safer place Storing of grain like maize, bajra, jowar, broken wheat/ rice etc Culling of weak birds	Use stored feed as supplement Don't allow for scavenging Protect from thunder storms	Routine practices are followed
Drinking water	Protect the stored water from contamination	Use water sanitizers Offer hygienic drinking water	Provide clean and hygienic drinking water
Health and disease management	In case of EFW, add antibiotic powder in drinking water to prevent any disease outbreak	Sanitation of poultry house Treatment of affected birds Prevent water logging around the sheds Assure supply of electricity Sprinkle lime powder (5-10g per square feet) to prevent ammonia accumulation due to dampness	Disposal of dead birds by burning / deep burying with lime powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against Ranikhet Disease
Heat wave			
Shelter/environment management	Provision of proper shelter with good ventilation	In severe cases, foggers/water sprinklers/wetting of hanged gunny bags should be arranged in the shed Don't allow for scavenging during mid day	Routine practices are followed
Health and disease management	Deworming and vaccination against RD and fowl pox	Supplementation with house hold grain Provide cool and clean drinking water with electrolytes and vit. C In hot summer, add anti-stress probiotics in drinking water or feed	Routine practices are followed
Cold wave			
Shelter/environment management	Provision of proper shelter Arrangement for brooding Assure supply of continuous electricity	Close all openings with polythene sheets In severe cases, arrange heaters in the shed Don't allow for scavenging during	Routine practices are followed

		early morning and late evening	
Health and disease management	Deworming and vaccination against IBD	Supplementation with house hold grain Sanitation of poultry house Sprinkle lime powder (5-10g per square feet) to prevent ammonia accumulation due to dampness	Routine practices are followed

[a] based on forewarning wherever available**2.5.3** **Fisheries:** Not applicable