State: MAHARASHTRA

Agriculture Contingency Plan for District: PUNE

1.0 District Agriculture profile				
1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	Deccan Plateau for Semi – Arid Eco region - AER (6.1)		
	Agro-Climatic Zone (Planning Commission)	Western Plateau and hills region (IX)		
	Agro Climatic Zone (NARP)	Western Maharashtra Plain Zone – ZARS, Ganeshkhind, Pune Western Ghat Zone - ZARS, Igatpuri, Dist. Nashik Western Maharashtra Scarcity Zone (MH-6),- ZARS, Solapur Sub Montane Zone – ZARS, Kolhapur		
	List all the districts or part thereof falling under the NARP Zone	**Western Maharashtra Plain Zone** – Pune (Eastern Part), Kolhapur, Sangli, Satara, Nashik (Central Part) **Western Ghat Zone** - Nashik (Western Part), Nandurbar, Satara, Kolhapur, Pune **Scarcity Zone** - Sangli, Nandurbar, Nasik (Eastern Part), Dhule, Ahmednagar, Pune, Solapur, Satara(Part), Kolhapur (Part), Jalgaon **Sub Montane Zone** – Part of Satara, Nashik (Western Part) , Kolhapur, Pune		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		16^0-30' to 22^0-03'N	73^0-47' to 74^0-40'N	557.74
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Zonal Agricultural Research Station, Western Maharashtra Plain Zone – ZARS, Ganeshkhind, Pune Ph. 020 – 25693750, Fax – 020 – 25698734 email : frganesh@dataone.in		
	Mention the KVK located in the district	Krishi Vigyan Kendra, Agricultural Development Trust, Baramat, Dist: Pune Ph. no. 02112 255207, 02112 255227 e-mail: kvkbmt@yahoo.com, Web: www.kvkbaramati.com		

1.2	**Rainfall**	Normal RF(mm)	Normal Rainy days (number)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep)	480.5	23	1st fortnight of June	1st fortnight of October
	NE Monsoon(Oct-Dec)	202.3	12	-	-
	Winter (Jan- Feb)	4.7	2	-	-
	Summer (Mar-May)	57.4	6	-	-
	Annual	744.9	43	-	-

1.3	**Land use pattern of the district** (latest statistics)	Geographical area	Cultivable area	Forest area	Land under non-agricultural use	Permanent pastures	Cultivable wasteland	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	Area ('000 ha)	1562.0	945.4	165.1	114.0	74.6	38.1	13.1	147.4	34.5	39.8

Source : Agricultural Statistical Information, Maharashtra State (2006), I & II Volume

1. 4	**Major Soils**	**Area ('000 ha)**
	Shallow red / grey soils	571.1
	Deep black soils	200.5
	Medium deep black soils	173.3

1.5	**Agricultural land use**	Area ('000 ha)	Cropping intensity (%)
	Net sown area	945	121
	Area sown more than once	203	
	Gross cropped area	1148	

Source : Agricultural Statistical Information, Maharashtra State (2006), I & II Volume

1.6	**Irrigation**	Area (‘000 ha)		
	Net irrigated area	287		
	Gross irrigated area	313		
	Rainfed area	835		
	Sources of Irrigation	Number	Area (‘000 ha)	Percentage of total irrigated area
	Canals	19	121.5	42.3
	Tanks	74	12.7	4.4
	Open wells	90427	92.3	32.1
	Bore wells	--	--	--
	Lift irrigation schemes	41	10.9	3.8
	Micro-irrigation	--	--	--
	Other sources (please specify)	229	49.3	17.1
	Total Irrigated Area		**287.0**	**100**
	Pump sets (Diesel + Electrical)	66065	--	
	No. of Tractors	--	--	--
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)
	Over exploited	--		--
	Critical	--		--
	Semi- critical	--		--
	Safe	--		--
	Wastewater availability and use	--		--
	Ground water quality			

(Source – Agricultural Statistical information Maharashtra State 2006 Part -I)

1.7 Area under major field crops & horticulture etc. (2008-09)

1.7	Major Field Crops cultivated	Area ('000 ha)							
		Kharif			*Rabi*			Summer	Total
		Irrigated	*Rainfed*	Total	*Irrigated*	*Rainfed*	Total		
	Sorghum	-	2.8	2.8	-	427.9	427.9	-	430.7
	Sugarcane	85.6	-	85.6	-	-	-	-	85.6
	Paddy	-	61.2	61.2	-	-	-	-	61.2
	wheat	-	-	-	60.9	-	60.9	-	60.9
	Chick pea	-	-	-	47.4	-	47.4	-	47.4
	Pearl millet	-	34.5	34.5	-	-	-	-	34.5
	Groundnut	-	31.0	31.0	-	-	-	2.1	33.1
	Maize	-	5.7	5.7	10.4	-	10.4	1.5	17.6
	Soyabean	-	2.4	2.4	-	-	-	-	2.4
	Pigeon pea	-	1.9	1.9	-	-	-	-	1.9
	Horticulture crops Fruits	**Total area ('000 ha)**			**Irrigated**			**Rainfed**	
	Mango	19.5			19.5			--	
	Sapota	13.8			13.8			--	
	Custard apple	13.2			13.2			--	
	Horticultural crops Vegetables	**Total area ('000 ha)**			**Irrigated**			**Rainfed**	
	Onion	19.0			19.0			--	
	Potato	9.5			9.5			--	
	Tomato	6.2			6.2			--	
	Brinjal	3.5			3.5			--	
	Okra	2.1			2.1			--	
	Chilli	2.3			2.3			--	
	Cole crops	5.0			5.0			--	
	Horticultural crops - Flowers	**Total area ('000 ha)**			**Irrigated ('000 ha)**			**Rainfed ('000 ha)**	
	Rose	5.0			5.0			--	
	Marigold	2.2			2.2			--	
	Tuberose	0.9			0.9			--	
	Chrysanthemum	0.4			0.4			--	

	Aster	0.4	0.4	--
	Plantation crops	**Total area**	**Irrigated**	**Rainfed**
		NA	NA	NA
	Others such as industrial pulpwood crops etc (specify)			
	Fodder crops	**Total area**	**Irrigated**	**Rainfed**
		NA	NA	NA
	Others (specify)	--	--	--
	Total fodder crop area	--	--	--
	Grazing land	--	--	--
	Sericulture etc	--	--	--
	Others (Specify)	--	--	--

1.8	**Livestock**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Cow			782.1
	Buffaloes total			303.8
	Commercial dairy farms	NA	NA	-
	Goat			532.8
	Sheep			367.0
	Others (Camel, Pig, Yak, etc.)			-
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
	Commercial	NA	2542.1	

Source: Animal Husbandry Provisional 2007

1.10	**Fisheries** (Data source: Chief Planning Officer)						
	A. Capture						
	i) Marine	**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)	
		NA	NA	NA	NA	NA	NA
	ii) Inland	**No. Farmer owned ponds**		**No. of Reservoirs**		**No. of village tanks**	
		NA		NA		NA	
	B. Culture						
		Water Spread Area (ha)		**Yield (t/ha)**		**Production ('000 tons)**	
	i) **Brackish water**	NA		NA		NA	
	ii) **Fresh water**	NA		NA		NA	
	Others	NA		NA		NA	

1.11 Production and Productivity of major crops (Average of last 5 years: 2004, 05, 06, 07, 08, 09)

1.11	Name of crop	***Kharif***		***Rabi***		**Summer**		**Total** Production ('000 t)	Productivity (kg/ha)	**Crop residue as fodder** ('000 tons)
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)			
Major Field crops (Crops to be identified based on total acreage)										
	Paddy	76.3	1192.2	--	--	--	--	76.3	1192.2	
	Sorghum	2.8	930.6	236.1	543.4	--	--	238.9	737.0	
	Pearl millet	76.3	746.6	--	---	--	--	76.3	746.6	
	Maize	16.9	2320.8	20.6	2555.2	2.36	1671.8	62.3	2182.6	
	Pigeon pea	2.0	606.6	--	--	--	--	2.0	606.6	
	Chick pea	--	--	34.3	692.2	---	--	34.3	692.2	
	Groundnut	39.1	910.2	--	--	9.66	1928.8	48.8	1419.5	
	Soyabean	3.9	2060.0	--	--	--	--	3.9	2060.0	
	Sugarcane	--	--	--	--	--	--	6552.2	92000.0	

10	Wheat	--	--	119.8	1852.4	--	--	119.8	1852.4	
Major Horticultural crops - Fruits										
	Mango	--	--	--	--	--	--	78.0	4500	
	Sapota	--	--	--	--	--	--	62.4	12000	
	Custard apple	--	--	--	--	--	--	46.7	7900	
Horticulture – Vegetable										
	Onion	--	--	--	--	--	--	245.1	12900	
	Potato	--	--	--	--	--	--	324.9	34200	
	Tomato	--	--	--	--	--	--	97.0	15560	
	Brinjal	--	--	--	--	--	--	85.1	24320	
	Okra	--	--	--	--	--	--	39.2	18700	
	Chilli	--	--	--	--	--	--	153.7	66900	
	Cole crops	--	--	--	--	--	--	101.0	20200	
Horticultural crops - Flowers										
	Rose	--	--	--	--	--	--	49.3	9870	
	Marigold	--	--	--	--	--	--	22.2	10000	
	Tuberose	--	--	--	--	--	--	7.8	8000	
	Chrysanthemum	--	--	--	--	--	--	4.6	10000	
	Aster	--	--	--	--	--	--	4.5	10000	

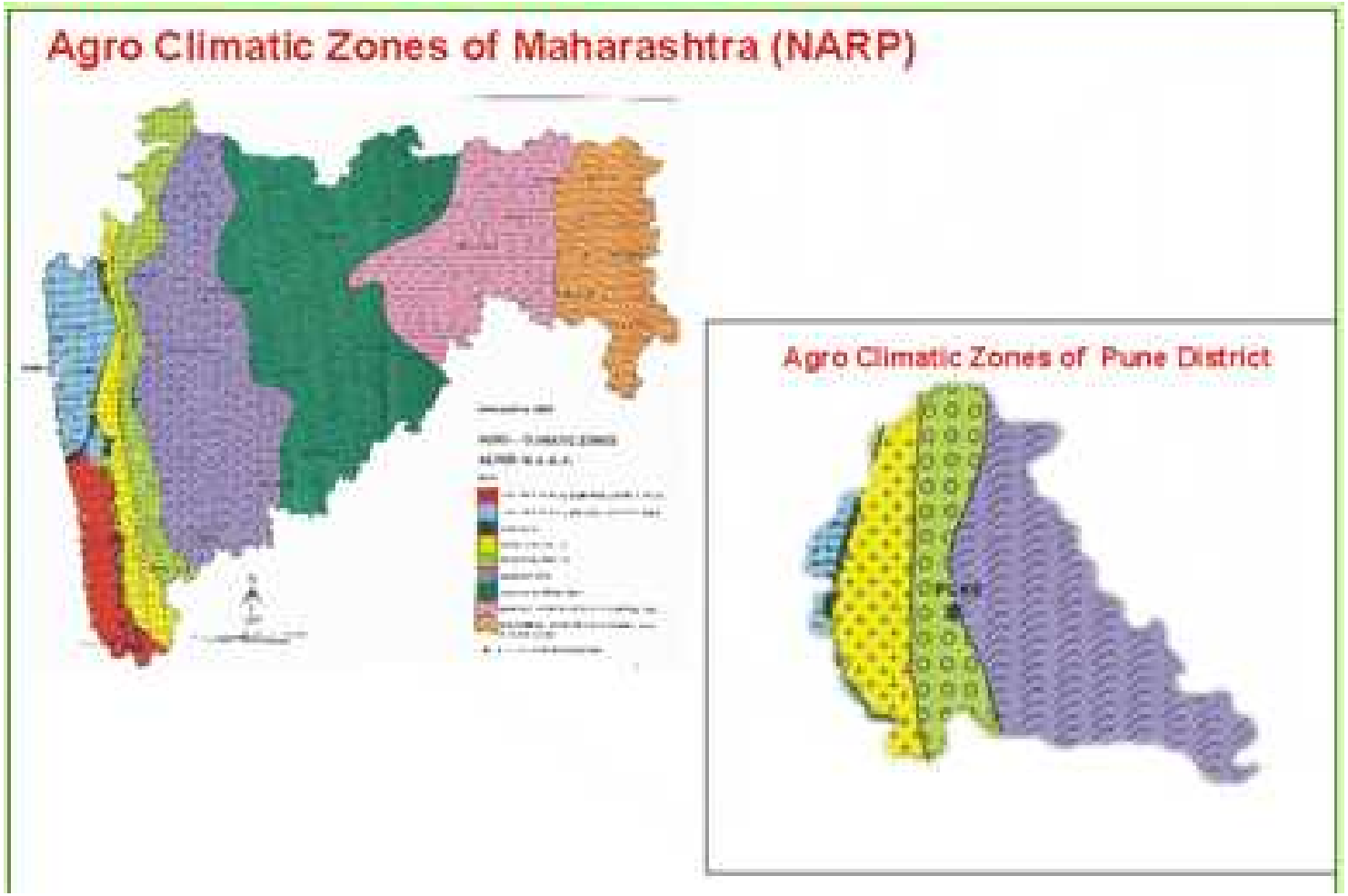
(Source: SAO area and productivity projection for Pune 2010-11)

1.12	**Sowing window for 5 major field crops**	Lowland Paddy	Pearl millet	Groundnut	Sorghum	Chick pea	Wheat
	Kharif- Rainfed	2nd week of June	15th June to 15th July	15th June to 7th July	15th June to 15th July	--	--
	Kharif-Irrigated	--	--	--	--	--	--
	Rabi- Rainfed	--	--	--	15th September to 15th October	20th October to 10th November	15th October to 15th November
	Rabi-Irrigated	--	--	--	15th October to 30th October		15th October to 15th November

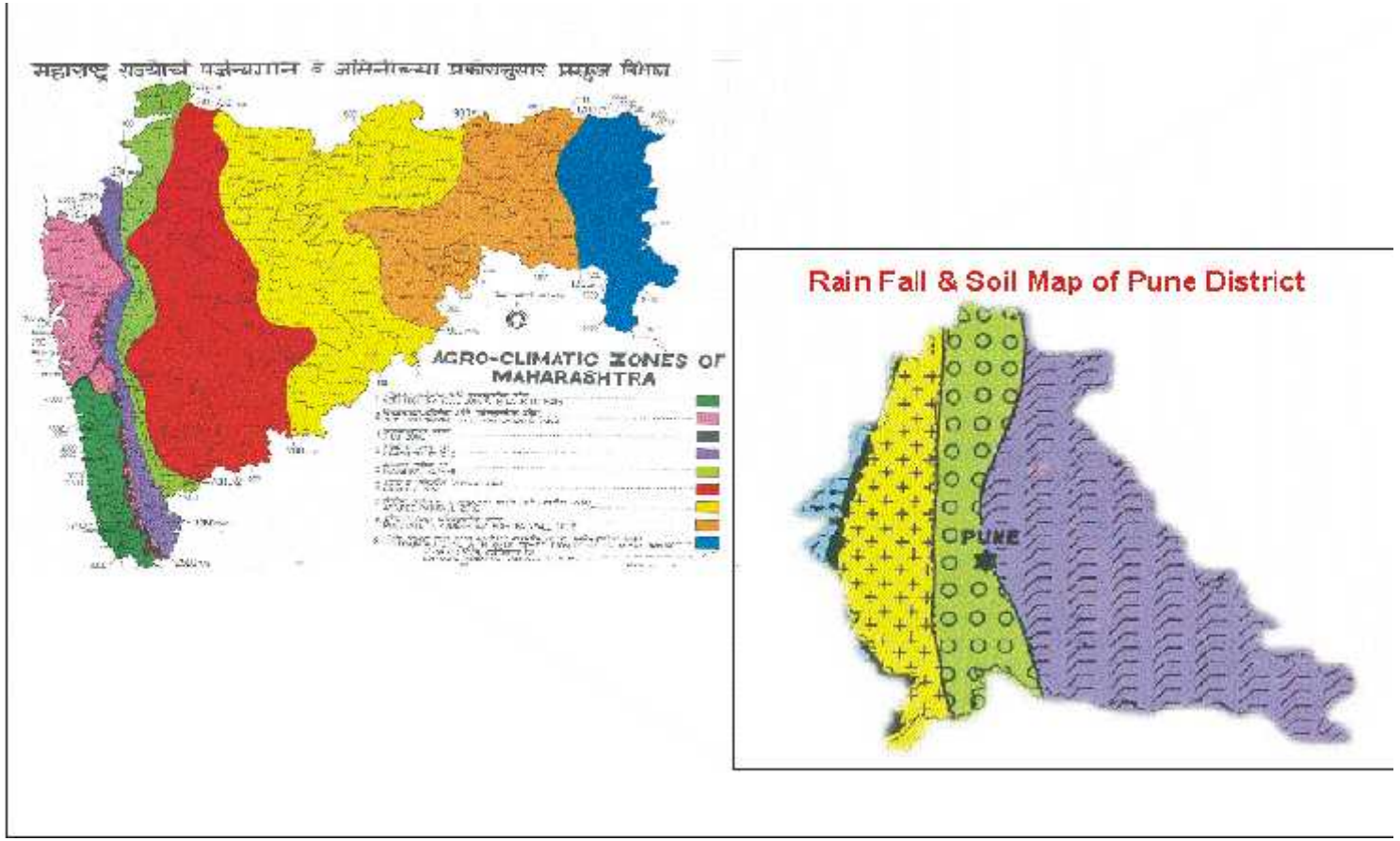
1.13	**What is the major contingency the district is prone to?**	Regular	Occasional	None
	Drought	--	√	--
	Flood	--	--	√
	Cyclone	--	--	√
	Hail storm	--	--	√
	Heat wave	--	--	√
	Cold wave	--	--	√
	Frost	--	--	√
	Sea water intrusion	--	--	√
	Pests and disease outbreak (specify)	--	√	--

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

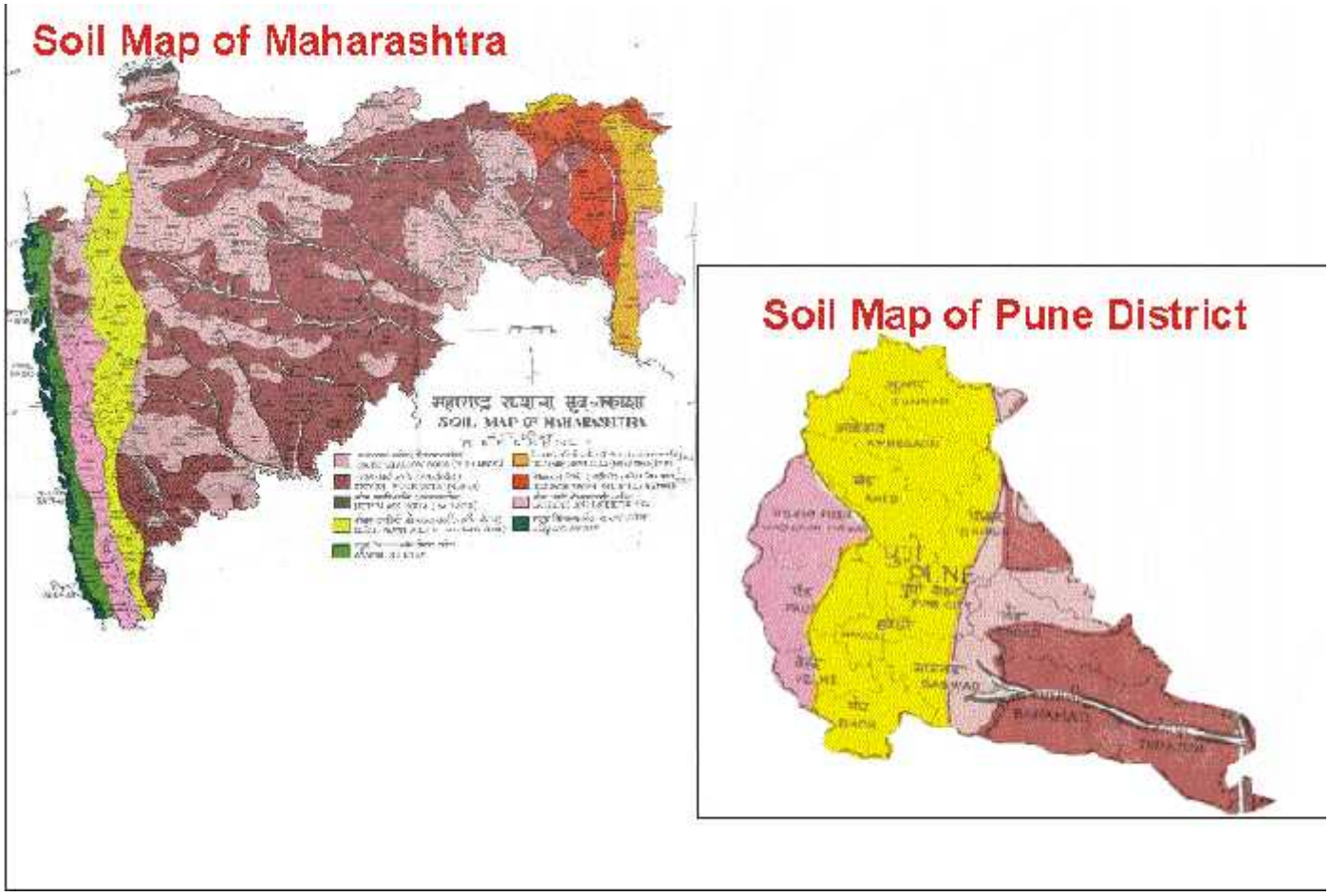
Annexure I


Agro Climatic Zones of Maharashtra (NARP)
Agro Climatic Zones of Pune District

Annexure II


AGRO-CLIMATIC ZONES OF MAHARASHTRA
Rain Fall & Soil Map of Pune District
PUNE

Annexure 1II-Soil map-(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	Shallow red / grey soils	Low land Paddy	Indrayani, Pavana, Phule Samrudhi	Staggered planting in nurseries for timely availability of seedlings	Seed Source: MPKV, Rahuri, College of Agriculture, Pune, Kolhapur, Dhule, NSC, MSSC, Private Co., Distributors. The self help groups should be involved
		Groundnut	JL-24, JL-501, JL-286	Hoeing and weeding	
		Pearl millet	Shraddha, Saburi, Shanti	As above	
	Medium deep black Soils	Sorghum	CSH-14, CSH-16, CSH-17	Frequent intercultivations	
		Low land paddy	Indrayani, Pavana, Phule Samrudhi	Staggered planting in nurseries for timely availability of seedlings	
		Groundnut	JL-24, JL-501, JL-286	Hoeing and weeding up to 30 DAS	
		Soybean	JS-335, JS-9305	Hoeing and weeding	
		Pearl millet	Shraddha, Saburi, Shanti	Hoeing and weeding	
	Deep black soils	Sorghum	CSH-14, CSH-16, CSH-17	Frequent intercultivations	
		Groundnut	JL-24, JL-501, JL-286	Hoeing and weeding up to 30 DAS	
		Pigeon pea	Vipula, BDN-708, ICPL-87	Hoeing and weeding Opening of conservation furrows after every two rows	

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop / Cropping system**	**Change in crop / cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 weeks July 2nd week	Shallow red / grey soils	Low land Paddy	Indrayani, Pavana, Phule Samrudhi	Staggered planting in nurseries for timely availability of seedlings	Seed Source: MPKV, Rahuri, College of Agriculture, Pune , Kolhapur, Dhule, NSC, MSSC, Private Co., Distributors.
		Groundnut	JL-24, JL-501, JL-286 Groundnut + Pigeon pea (Vipula, BDN 708) (6:2)	Hoeing and weeding Protective irrigation	
		Pearl millet	Shraddha, Saburi, Shanti	As above	
	Medium deep	Sorghum	CSH-14, CSH-16, CSH-	For shootfly control ,seed treatment with Carbosulphan @	

	black Soils		17	2 g / kg Intercultivation at 20 DAS and 40 DAS	The self help groups should be involved
		Low land paddy	Indrayani, Pavana, Phule Samrudhi	Staggered planting in nurseries for timely availability of seedlings	
		Groundnut	JL-24, JL-501, JL-286	Hoeing and weeding up to 30 DAS	
		Soybean	JS-335, JS-9305	Hoeing and weeding at 30 DAS	
		Pearl millet	Shraddha, Saburi, Shanti	Hoeing and weeding 20 DAS and 40 DAS	
	Deep black soils	Sorghum	CSH-14, CSH-16, CSH-17	Hoeing and weeding 20 DAS and 40 DAS	
		Groundnut	JL-24, JL-501, JL-286	Hoeing and weeding up to 30 DAS	
		Pigeon pea	Vipula, BDN-708, ICPL-87	Hoeing and weeding at 20 DAS Opening of conservation furrows after every two rows	

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 weeks July 4 th week	Shallow red / grey soils	Low land Paddy	Indrayani, Pavana, Phule Samrudhi	Staggered planting in nurseries for timely availability of seedlings	Seed Source: MPKV, Rahuri, College of Agriculture, Pune , Kolhapur, Dhule, NSC, MSSC, Private Co., Distributors. The self help groups should be involved
		Groundnut	Pearlmillet (Shraddha, Saburi, Shanti)	Hoeing and weeding at 20 DAS Protective irrigation	
		Pearl millet	Shraddha, Saburi, Shanti	As above	
	Medium deep black Soils	Sorghum	CSH-14, CSH-16, CSH-17 or Sunflower (Bhanu)	For shootfly control , seed treatment with Carbosulphan @ 2 g / kg and Intercultivation at 20 DAS and 40 DAS in sorghum Hoeing and weeding in sunflower at 20 DAS	
		Low land paddy	Indrayani, Pavana, Phule Samrudhi	Staggered planting in nurseries for timely availability of seedlings	
		Groundnut	Sunflower (Bhanu)	Hoeing and weeding in sunflower at 20 DAS	
		Soybean	Sunflower (Bhanu)	Hoeing and weeding in sunflower at 20 DAS	
		Pearl millet	Sunflower (Bhanu) Or pigeonpea (Vipula/ BDN-708)	Hoeing and weeding in sunflower at 20 DAS Hoeing and weeding at 20 DAS Opening of conservation furrows after every two rows	
	Deep black soils	Sorghum	CSH-14, CSH-16, CSH-17	Protective irrigation Hoeing and weeding 20 DAS and 40 DAS	

		Groundnut	Sunflower (Bhanu)	Hoeing and weeding in sunflower at 20 DAS	
		Pigeonpea	Vipula, BDN-708, ICPL-87	Hoeing and weeding at 20 DAS Opening of conservation furrows after every two rows	

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 2nd week of August	Shallow red / grey soils	Low land Paddy	Dolichus sp	-	Seed Source: MPKV, Rahuri, College of Agriculture, Pune , Kolhapur, Dhule, NSC, MSSC, Private Co., Distributors. The self help groups should be involved
		Groundnut	Sunflower (Bhanu)	Hoeing, thinning and weeding before 30 DAS Protective irrigation	
		Pearl millet	As above	As above	
	Medium deep black Soils	Sorghum	Sunflower (Bhanu) Pigeonpea (Vipula)	Hoeing, thinning and weeding before 30 DAS and protective irrigation in sunflower Hoeing and weeding at 20 DAS Opening of conservation furrows after every two rows in pigeonpea	
		Low land paddy	Dolichus sp	-	
		Groundnut	Sunflower (Bhanu)	Hoeing and weeding in sunflower at 20 DAS	
		Soybean	Sunflower (Bhanu)	Hoeing and weeding in sunflower at 20 DAS	
		Pearl millet	Sunflower (Bhanu) Or Pigeonpea (Vipula/ BDN-708)	Hoeing and weeding in sunflower at 20 DAS Hoeing and weeding at 20 DAS Opening of conservation furrows after every two rows	
	Deep black soils	Sorghum	CSH-14, CSH-16, CSH-17	Protective irrigation Hoeing and weeding 20 DAS and 40 DAS	
		Groundnut	Sunflower (Bhanu)	Hoeing and weeding in sunflower at 20 DAS	
		Pigeonpea	Vipula, BDN-708, ICPL-87	Hoeing and weeding at 20 DAS Opening of conservation furrows after every two rows	

Condition			**Suggested Contingency measures**		
Early season	**Major Farming**	**Normal Crop /**	**Crop management**	**Soil nutrient & moisture conservation masures**	**Major Farming**

drought (Normal onset)	situation	Cropping system			situation
followed by 15-20 days dry spell after sowing leading to poor germination / crop stand etc	Shallow red / grey soils	Low land Paddy	-	Seedlings by Dapog method for resowing if needed	For hoeing, prefer slit and entire blade hoe. Can be popularized through Govt. programmes
		Groundnut	Resowing if needed	Intercultivation, weeding and hoeing	
		Pearl millet	As above	As above	
	Medium deep black soils	Sorghum	Resowing if needed	Intercultivation, weeding and hoeing	
		Low land paddy	-	Seedlings by Dapog method for resowing if needed	
		Groundnut	Resowing if needed	Intercultivation, weeding and hoeing	
		Soybean	As above	As above	
		Pearl millet	As above	As above	
	Deep black soils	Sorghum	-	Intercultivation, weeding and hoeing	
		Groundnut	-	Intercultivation, weeding and hoeing	
		Pigeonpea	-	Intercultivation, weeding and hoeing	

Condition			Suggested Contingency measures		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	**Major Farming situation**	**Normal Crop / Cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At vegetative stage	Shallow red / grey soils	Low land Paddy	Protective irrigation	Apply urea brickets	Rainwater harvesting through farm ponds
		Groundnut	As above	Hoeing/Weeding Use of 8 % kaolin spray 2 % urea spray	
		Pearl millet	As above	As above Removal of every third row for fodder	
	Medium deep black Soils	Sorghum		Hoeing/Weeding Use of 8 % kaolin spray 2 % urea spray Removal of every third row and use for mulching	
		Low land paddy	Protective irrigation	Apply urea brickets	
		Groundnut	Protective irrigation	Hoeing/Weeding Use of 8 % kaolin spray 2 % urea spray	

		Soybean	As above	As above	
		Pearl millet	As above	As above Removal of every third row for fodder	
	Deep black soils	Sorghum	Protective irrigation	Hoeing/Weeding Use of 8 % kaolin spray, 2 % urea spray Removal of every third row and use for mulching	
		Groundnut	As above	Hoeing/Weeding Use of 8 % kaolin spray 2 % urea spray	
		Pigeonpea	As above	As above	

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell)	**Major Farming situation**	**Normal Crop / Cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At flowering/ fruiting stage	Shallow red / grey soils	Low land Paddy	Protective irrigation	Foliar spray of 2% urea	Rainwater harvesting through farm ponds
		Groundnut	As above	• Apply 8 % kaolin spray 2 % urea spray	
		Pearl millet	As above	As above	
	Medium deep black Soils	Sorghum			
		Low land paddy	Protective irrigation	Foliar spray of 2% urea	
		Groundnut	Protective irrigation	• Apply 8 % kaolin spray 2 % urea spray	
		Soybean	As above	As above	
		Pearl millet	As above	As above	
	Deep black soils	Sorghum	Protective irrigation	• Use of 8 % kaolin spray 2 % urea spray	
		Groundnut	As above	• Use of 8 % kaolin spray 2 % urea spray	

		Pigeonpea	As above	As above	

Condition	**Suggested Contingency measures**	**Condition**	**Suggested Contingency measures**		
Terminal drought (Early withdrawal of monsoon)	**Major Farming situation**	**Terminal drought (Early withdrawal of monsoon)**	**Major Farming situation**	**Terminal drought (Early withdrawal of monsoon)**	**Major Farming situation**
	Shallow red / grey soils	Low land Paddy			Rainwater harvesting through farm ponds
		Groundnut			
		Pearl millet			
	Medium deep black Soils	Sorghum			
		Low land paddy			
		Groundnut			
		Soybean			
		Pearl millet			
	Deep black soils	Sorghum			
		Groundnut			
		Pigeonpea			

2.1.2 Irrigated situation

Condition	Major farming situation	Normal crop/ cropping system	Suggested contingency measures		Remarks on implemantation
			Change in crop/cropping system	Agronomic measures	
Delayed release of water in canals due to low rainfall	Shallow red / grey soils	No crop			Seed source, MPKV, Rahuri, College of Agriculture, Pune, Kolhapur, Dhule, NSC, MSSC, Pvt. Companies ,distributors, the self help groups be involved
	Medium deep black Soils	Sugarcane	No change	Alternate furrow irrigation	
		Soybean	Pearl millet	Life saving irrigation Hoeing Weeding	
		Maize (Rajarshee)	No change	As above	
		Wheat (Triambak,Tapovan)	No change or gram (Vijay,Digvijay)	Irrigation at critical stages	
		Chickpea (Vijay,Digvijay)	No change	Life saving irrigation Hoeing, Weeding	
		Groundnut	Sunflower (Bahnu,Phule Raviraj)+pigeonpea (Vipula) (2:1)	Life saving irrigation Hoeing, Weeding	
		Sunflower	Pearl millet (Shradda,Saburi,Shanti)+ Pigeonpea (Vipula,BDN-708,ICPL-87))(2:1)	As above	
		Onion	N-2-4-1, Baswavant-780, Phule Samarth	As above	
		Tomato	Dhanasree, Baghyasree, Phule Raja	As above	
		Brinjal	Hybrid Krishna	As above	
		Potato	Kufri Pokhraj,Kufri Laukar	As above	
		Tuberose	Phule Rajani	As above	
		Aster	-	As above	
	Deep black soils	Sugarcane	No change	Alternate furrow irrigation	
		Onion	N-2-4-1, Baswavant-780, Phule Samarth	Life saving irrigation Hoeing, Weeding	
		Tomato	Dhanasree,Baghyasree,Phule Raja	As above	
		Brinjal	Hybrid Krishna	As above	
		Tuberose	Phule Rajani	As above	
		Aster	-	As above	

Condition	Major farming situation	Normal crop/ cropping system	Suggested contingency measures		Remarks on implemantation
			Change in crop/cropping system	Agronomic measures	
Limited release of water in canals due to low rainfall	Shallow red / grey soils	No crop			Seed source, MPKV, Rahuri, College of Agriculture, Pune, Kolhapur, Dhule, NSC, MSSC, Pvt. Companies ,distributors, the self help groups be involved
	Medium deep black Soils	Sugarcane	No change	Alternate furrow irrigation	
		Soybean	Pearl millet	Life saving irrigation Hoeing Weeding	
		Maize (Rajarshee)	No change	As above	
		Wheat (Triambak,Tapovan)	No change or gram (Vijay,Digvijay)	Irrigation at critical stages	
		Chickpea (Vijay,Digvijay)	No change	Life saving irrigation Hoeing, Weeding	
		Groundnut	Sunflower (Bahnu,Phule Raviraj)+pigeonpea (Vipula) (2:1)	Life saving irrigation Hoeing Weeding	
		Sunflower	Pearl millet (Shradda,Saburi,Shanti)+ Pigeonpea (Vipula,BDN-708,ICPL-87))(2:1)	As above	
		Onion	N-2-4-1, Baswavant-780, Phule Samarth	As above	
		Tomato	Dhanasree,Baghyasree,Phule Raja	As above	
		Brinjal	Hybrid Krishna	As above	
		Potato	Kufri Pokhraj,Kufri Laukar	As above	
		Tuberose	Phule Rajani	As above	
		Aster	-	As above	
	Deep black soils	Sugarcane	No change	Alternate furrow irrigation	
		Onion	N-2-4-1, Baswavant-780, Phule Samarth	Life saving irrigation Hoeing Weeding	
		Tomato	Dhanasree,Baghyasree,Phule Raja	As above	
		Brinjal	Hybrid Krishna	As above	
		Tuberose	Phule Rajani	As above	
		Aster	-	As above	

Condition	Major farming situation	Normal crop/ cropping system	Suggested contingency measures		Remarks on implemantation
			Change in crop/cropping system	Agronomic measures	
Non release of water in canal under delayed onset of monsoon in catchment	Shallow red / grey soils	No crop			
	Medium deep black Soils	Sugarcane	No change	Alternate furrow irrigation	
		Soybean	Pearl millet	Life saving irrigation Hoeing, Weeding	
		Maize (Rajarshee)	No change	As above	
		Wheat (Triambak,Tapovan)	No change or gram (Vijay,Digvijay)	Irrigation at critical stages	
		Chickpea (Vijay,Digvijay)	No change	Life saving irrigation Hoeing, Weeding	
		Groundnut	Sunflower (Bahnu,Phule Raviraj)+pigeonpea (Vipula) (2:1)	Life saving irrigation Hoeing, Weeding	
		Sunflower	Pearl millet (Shradda,Saburi,Shanti)+ Pigeonpea (Vipula,BDN-708,ICPL-87))(2:1)	As above	
		Onion	N-2-4-1, Baswavant-780, Phule Samarth	As above	
		Tomato	Dhanasree,Baghyasree,Phule Raja	As above	
		Brinjal	Hybrid Krishna	As above	
		Potato	Kufri Pokhraj,Kufri Laukar	As above	
		Tuberose	Phule Rajani	As above	
		Aster	-	As above	
	Deep black soils	Sugarcane	No change	Alternate furrow irrigation	
		Onion	N-2-4-1, Baswavant-780, Phule Samarth	Life saving irrigation Hoeing, Weeding	
		Tomato	Dhanasree,Baghyasree,Phule Raja	As above	
		Brinjal	Hybrid Krishna	As above	
		Tuberose	Phule Rajani	As above	
		Aster	-	As above	

Condition	Major farming situation	Normal crop/ cropping system	Suggested contingency measures		Remarks on implementation
			Change in crop/cropping system	Agronomic measures	
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Shallow red / grey soils	No crop			
	Medium deep black Soils	Sugarcane	No change	Alternate furrow irrigation	
		Soybean	No change	Life saving irrigation Hoeing, Weeding	
		Maize (Rajarshee)	No change	As above	
		Wheat (Triambak,Tapovan)	No change or gram (Vijay,Digvijay)	Irrigation at critical stages	
		Chickpea (Vijay,Digvijay)	No change	Life saving irrigation Hoeing, Weeding	
		Groundnut	Sunflower (Bahnu,Phule Raviraj)+pigeonpea (Vipula) (2:1)	Life saving irrigation Hoeing, Weeding	
		Onion	N-2-4-1, Baswavant-780, Phule Samarth	As above	
		Tomato	Dhanasree,Baghyasree,Phule Raja	As above	
		Brinjal	Hybrid Krishna	As above	
		Potato	Kufri Pokhraj,Kufri Laukar	As above	
		Tuberose	Phule Rajani	As above	
		Aster	-	As above	
	Deep black soils	Sugarcane	No change	Alternate furrow irrigation	
		Onion	N-2-4-1, Baswavant-780, Phule Samarth	Life saving irrigation Hoeing, Weeding	
		Tomato	Dhanasree,Baghyasree,Phule Raja	As above	
		Brinjal	Hybrid Krishna	As above	
		Tuberose	Phule Rajani	As above	
		Aster	-	As above	

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

Condition	Crops	Suggested contingency measure			
		Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Continuous high rainfall in a short span leading to water logging	Low land paddy	--	-	Harvest at physiological maturity	Sorting, drying, cleaning , marketing
	Pearl millet	Drain excess water from field. 2 % urea spray	Drain excess water from field	As above	As above
	Groundnut	As above	As above	As above	As above
	Pigeon pea	As above	As above	As above	As above
	Sunflower	As above	As above	As above	As above
	Sugarcane	As above	As above	As above	As above
	Onion	Planting of border row crops viz. Maize, Mustard, Pearl millet. Application of nitrogen 25% more than recommended dose to avoid leaching losses.	As above	As above	As above
	Tomato	As above	As above	As above	As above
	Cole crop	As above	As above	As above	As above
	Leafy vegetable	As above	As above	As above	As above
	Aster	Drain excess water from field	As above	As above	As above
	Tuberose	As above	As above	As above	As above
	Grape	Drain excess water from field. micro site improvement	As above Drain excess water from field. Micro site improvement	As above	As above
	Fig	As above	As above	As above	As above
	Custard. apple	As above	As above	As above	As above

2.2 Unusual rains (Untimely, unseasonal, etc) rainfed/irrigated - Condition Heavy rainfall with high speed winds in short span : Not applicable

Out break of pests and diseases due to unseasonal rains

Condition	Major farming situation	Crop/ cropping system	Suggested contingency measures			
			Vegetative stage	Flowering stage	Crop maturity	Post harvest
	Shallow red / grey soils	Rice	Blast & Leaf scald: - Carbendazim 0.1% Army worm - Carbaryl 2.5 kg/ha., Stem borer: Soil application Phorate 10G @ 10 kg/ha.	Sheath rot - Carbendazim 0.1% Brown plant hopper- Dust Carbaryl 10% @20 kg/ha.	-	
		Pearl millet	Downy mildew - Metalaxyl 8 % + Mancozeb 64% @ 0.2% Army worm- Dust Methyl parathion 2% @ 20 kg/ha	Downy mildew	-	
		Groundnut	Tikka- Mancozeb @ 2.5 g/l Leaf roller- Carbaryl 50 WP @ 2 Kg/500 lit water/ha.	Tikka - Mancozeb @ 2.5 g/l Leaf roller- Carbaryl 50 WP @ 2 Kg/500 lit water/ha.		
	Medium deep and deep black soils	Pigeon-pea	Wilt: *T. viride* 2.5 Kg/ha.	Wilt: *T. viride* 2.5 Kg/ha.	Pod borer- Spraying of quinalphos @ 2 ml/lit	
		Sunflower	Downy mildew- Metalaxyl 8 % + Mancozeb 64% @ 0.2% Hairy caterpiller & Leaf eating caterpillar: Spray quinalphos @ 2 ml/lit	Downy mildew- Metalaxyl 0.1 %		
		Sugarcane	White grub - Drenching Chloropyriphos @ 2.5ml/l Internode borer - Application of 3-4 Trichocards/ha.	White grub - renching Chloropyriphos @ 2.5ml/l		
		Grape	Downy mildew - Metalaxyl 8 % + Mancozeb 64% @ 0.2% Anthracnose - Carbendazim 0.1 % Flea beetle: Malathion 50% 500ml/500ml/ha.	Downy mildew - Metalaxyl 0.1 %, Anthracnose - Carbendazim 0.1 %	Thrips - Methyl dimeton 25% 400ml/500ml/ha.	
		Onion	Blight - Dithane M-45 @ 0.25%, Thrips - Methyl dimeton 25% 400ml/500ml/ha.	Blight - Dithane M-45 @ 0.25%, Thrips - Methyl dimeton 25% 400ml/500ml/ha.		
		Tomato	Early blight - Dithane M-45 @ 0.25%,		Buck eye spot -	

			Late blight - Metalaxyl @ 0.25%		Metalaxyl 8 %	
		Cole crop	Downy mildew - of Metalaxyl 8 % + Mancozeb 64% @ 0.2% Dimond black moth - Quionl phos @ 2ml./l.			
		Leafy vegetable	Blight - Dithane M-45 @ 0.25%			
		Aster	Blight - Dithane M-45 @ 0.25%			
		Tuberose	Blight - Dithane M-45 @ 0.25%, Stem rot - Drenching Captan 0.3%, Thrips- Methyl dimeton 25% 1ml / l.			

2.3 Unusual rains (Untimely, unseasonal, etc) rain fed / irrigated

Condition	**Suggested contingency measures**			
Flood : Transient water logging / partial inundation	**Seedling/nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
1. Sorghum/cereals	• .Resowing due to high mortality. • Extend the period of transplanting • Open trench or increase aeration of nursery area by increasing drainage or infiltration rate • Plant control measures to be taken up in onside ration of outbreak of pest/disease • Fore warning • Use of polythene sheet on nursery to avoid damage	• Forewarning to farmers regarding abnormal situation to get prepared for abnormality. • Open trench to drain out the excess water from field. • Increase infiltration rate of the cropped area to increase aeration, intake or root system of plants. • Adopt plant protection measures in regards out break of pest/disease. • Input availability against pest/disease out breaks	• Forewarning to farmers regarding ensuing situation • Harvest the produce if it is ready for harvesting • Proper drying and storage of produce. • Send the good quality produce to the market for sale. • Open trench to drain out excess water from field. • Increase infiltration rate of field & increase the aeration of field to improve	• For warning should be given of situation. • Harvest the produce dry it properly and store good place. • If possible, send it to the market for sale, • Adopt plant protection measures. • Arrange for help to farmers through State /central schemes.
2. Rice/Sugarcane	As above	As above	As above	As above
3. Groundnut	As above	As above	As above	As above
4. Pulses	As above	As above	As above	As above
5. Oilseeds	As above	As above	As above	As above

Horticultural				
1. Vegetable leafy	As above	As above	As above	As above
2. Fruit vegetables	As above	As above	As above	As above
3. Tuber vegetable	As above	As above	As above	As above
4. Flower crops	As above	As above	As above	As above
5. Cole crops	As above	As above	As above	As above
Horticultural	As above	As above	As above	As above

2.4 Unusual rains (Untimely, unseasonal, etc) rain fed/irrigated

Condition	**Suggested contingency measures**			
Flood : Continuous submergence for more than two days	**Seedling/nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Not applicable				
Condition Flood : Sea water intrusion	Not applicable			

2.4 Extreme events

Condition : Heat wave	Not applicable
Condition : Cold wave	Not applicable
Condition : Hail storm	Not applicable
Condition : 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 groundnut 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 Establishment of fodder bank at village level with available dry fodder (paddy /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	Harvest and use biomass of dried up crops (Sorghum, Paddy, wheat, Pearl millet, Groundnut, Maize, Soyabean, Chick pea ettc.,) material as fodder Use of unconventional and locally available cheap feed ingredients especially groundnut cake and haulms as protein supplement 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 as supplement for 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	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

		Unproductive livestock should to be culled 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	Adopt various water conservation methods at village level to improve the ground water level for adequate water supply. Identification of water resources Desilting of ponds 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 Community drinking water trough can be arranged in shandies /community grazing areas	Adequate supply of drinking water. Restrict wallowing of animals in water bodies/resources Add alum in stagnated water bodies	Watershed management practices shall be promoted to conserve the rainwater. Bleach (0.1%) drinking water / water sources Provide clean drinking water
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 Surveillance and disease monitoring network to be established at Joint Director (Animal Husbandry) office in the district Adequate refreshment training on draught management to be given to VAS, Jr.VAS, LI with regard to health & management measures Procure and stock multivitamins & area specific mineral mixture	Carryout deworming to all animals entering into relief camps Identification and quarantine of sick animals Constitution of Rapid Action Veterinary Force Performing ring vaccination (8 km radius) in case of any outbreak Restricting movement of livestock in case of any epidemic Tick control measures be undertaken to prevent tick borne diseases in animals Rescue of sick and injured animals and their treatment Organize with community, daily lifting of dung from relief camps	Keep close surveillance on disease outbreak. Undertake the vaccination depending on need Keep the animal houses clean and spray disinfectants Farmers should be advised to breed their milch animals during July-September so that the peak milk production does not coincide with mid summer

Floods	**NA**		
Cyclone	**NA**		
Heat & Cold wave	**NA**		
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 house hold grain like maize, broken rice etc, in to use as feed in case of severe drought	Supplementation only for productive birds with house hold grain Supplementation of shell grit (calcium) for laying birds Culling of weak birds	Supplementation to all survived birds
Drinking water		Use water sanitizers or offer cool hygienic drinking water	
Health and disease management	Culling of sick birds. Deworming and vaccination against RD and IBD	Mixing 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	NA
Cyclone	NA
Heat wave & Cold wave	**NA**

2.5.3 Fisheries/ Aquaculture

Condition	**Suggested contingency measures**		
	Before the event[a]	**During the event**	**After the event**
1) Drought :A. Capture- Marine /Inland			
(i) Shallow water depth due to insufficient rains/inflow	1. Proper planning of water storage 2. Conservation & development of water resources by construction of reservoirs & dams. 3. Avoid seepage losses by lining the canals. 4. Adopt rain water harvest techniques. 5. Farmer's organizations, water users & private sectors should be involved in construction, operation & maintenance of irrigation system. 6. To make people aware about conservation of water. 7. Critical analysis of long range a Forecast data.	1. Maintenance of dams & reservoirs to avoid leakage & to control theft of water. 2. Proper use of water resources on priority base. 3. Add water in shallow water pond. 4. Use stored water. 5. Use surface water flow. 6. Utilize canal water.	1. Regular desiltation of reservoirs & dams. 2. Govt. should make laws on water conservation. 3. To develop demand oriented system. 4. Need based monitoring through research plan. 5. Intensive forestation program. 6. Strengthening of water reservoirs. 7. Rain water harvesting .
(ii) Changes in water quality	1. Storage of water disinfectant such as chlorine, alum etc. at district level. 2. Prohibit dumping of solid, liquid and waste in water sources.	1. Provision of water filtration system for the ponds to overcome the water contamination- 2. Use disinfectants and therapeutic drugs. 3. Adoption of bio-remedial measures	1. Removal of runoff from land by proper means before decomposition. 2. Supply of water filtration

			system even after the event & creating awareness in farmers.
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	1. Available resources will be identified and need to be kept ready for each district on the basis of forecasting of insufficient rain. 2. To avoid loss due to seepage, infiltration & leakage by using bentonite, ash, polythene liners etc. 3. Maintain the level of water by pumping water into pond. 4. Critical analysis of long range Forecast data.	1. Water resources of the areas will be exploited with planning of proper transport facilities in affected areas. 2. Maintain the level of water to the required depth. 3. Add stored water in shallow water depth. 4. Harvesting of fishes as early as possible to avoid mortality. 5. Use surface water flow. 6. Utilize canal water.	1. Available resources need to be listed with adequate transport arrangement. 2. Desiltation of pond bottom. 3. Maintenance of tanks & ponds 4. Intensive a forestation program. 5. Construction of water reservoirs. 6. Adoption of rain harvesting methods.
(ii) Impact of salt load build up in ponds / change in water quality	1. Minimize evaporation losses. 2. Dilution of water if salt load is high. 3. Harvesting of marketable fish. 4. Prohibit dumping of waste material in water sources.	1. Dilution of water or exchange water to avoid salt builds up. 2. Harvesting the marketable fish to reduce the density. 3. Use disinfectants and therapeutic drugs. 4. Adoption of bio-remedial measures	1. Trapping the water resources 2. Need based research data should be generated on water quality. 3. Dumping of solid, liquid and waste should be stopped through enactment of legislation.
(iii) Any other			
2) Floods :A. Capture- Marine/ Inland			
(i) Average compensation paid due to loss of human life	1. Fishermen will be given forewarning regarding heavy rains and advised not to go for fishing in rivers/reservoirs. 2. Areas need to be identified in each district prone for flood. 3. Maintenance of water drainages in proper way to avoid blockage.	1. Fishermen will be advised on use of Life saving jackets and life boats. The life saving appliances/machinery shall be kept ready for rescue operation. 2. Sufficient stock of food, medicine etc. should be available. 3. Human evacuation from the area. 4. Coordination of assistance.	1. Rehabilitation of people. 2. Identify the causes of flood affected area & take necessary preventive measures. 3. Arrangement for rescue and casualty care.

	4. Proper forecasting information should be available. 5. Preparation of flood control action plan. 6. Warning dissemination and precautionary response. 7. Insurance for the life of people/fishermen.	5. Damage and need assessment. 6. Immediate management of relief supplies.	4. Arrangement for burial control room. 5. Restoration of essential services, security and protection of property. 6. Support to rehabilitation, logistics, training and awareness build up & testing and updating the plan. 7. Insurance and compensation claim.
(ii) No. of boats / nets/damaged	1. The prior information on safe keeping of boats and nets will be provided to the fishermen. 2. Annual repair of boats/nets and gears. 3. Insurance of boats/nets/gears.	1. Fishermen will be advised to stop fishing during the floods and heavy rainfall. 2. Continuous monitoring on water level is required. 3. Immediate management of relief supplies.	1. Education and training for the repair of boats/nets and gears. 2. Loss assessment & insurance claim.
(iii) No.of houses damaged	1. Forewarning regarding heavy rainfall, sudden downpour and floods will be spread in the fishermen villages on the banks of rivers. 2. Shift the people to safer places.	1. Temporary shelter to the affected families will be provided. 2. Arrangement of temporary shelters for homeless people. 3. Immediate management of relief supplies.	1. The housing facilities on higher elevation shall be provided to affected families . 2. Provide compensation from Govt. to build/repair houses. 3. Loss assessment & insurance claim.
(iv) Loss of stock	1. Harvesting the existing fish stock 2. Keep boats, nets/gears ready for emergency use. 3. Develop flood control management plans. 4. .Stock material insurance.	1. Search/locate the tock/input. 2. Mobilize local people for protection. 3. Hire stock/inputs from distant areas/company/ farmers who are not affected by flood	1. Provided subsidy on seeds by Govt. 2. Implementation of Insurance policy. 3. Locate backup stocks and verify its usability time. 4. Follow flood control management plan.
(v) Changes in	1.Storage of water disinfectant such as chlorine, alum etc. at district level.	1.Provision of water filtration system for the ponds to overcome the water contamination-	1.Removal of runoff from land by proper means

water quality	2. Store chemicals, disinfectants and therapeutic drugs. 3. Develop flood control management plan.	2. Do not use contaminated water 3. Use appropriate amount of disinfectants, chemicals and therapeutic drugs. 4. Immediate support of Govt./industrial organizations for maintaining the purity and quality of water bodies.	before decomposition. 2.Supply of water filtration system even after the event & creating awareness in farmers. 3. Need based research data should be generated to maintain water quality, 4. Dumping of solid, liquid and waste should be stopped through enactment of legislation. 5. Regular water monitoring and bio-monitoring of water bodies for formulation of management plan
(vi) Health and diseases	1. Water filtration system & control measures for diseases should be available. 2. Advance planning and preparedness. 3. Store chemicals, disinfectants and therapeutic drugs. 4. Stock sufficient stores of medicines	1.Periodical checking particularly with respective fish mortality should be done during flood & dead fishes disposed properly. 2. Prompt action or immediate removal of disease causing agents/ dead fish, followed by sterile or landfill disposal. 3. Use appropriate amount of disinfectants, chemicals and therapeutic drugs. 4. Emergency aeration or splashing in water bodies.	1.Setting health & disease management training centre at district level for fisherman community by Govt. or with the help of NGO. 2. Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread. 3. Eradicating the disease where possible. 4. Follow up surveillance and monitoring after disease outbreak. 5. Need based research data should be generated. 6. Loss assessment & insurance claim.
B. Aquaculture			

(i) Inundation with flood water	1.In the flood prone areas proper draining system from ponds need to be developed and planned in flood situation before forecasting of flood. . Site should be away from flood prone area. . Proper channels to be provided to pass surplus water & to avoid breakage to the bunds. 4. Proper facility construction for ponds and its stock safety. 5. Development of flood control management plan. 6. Stock insurance. 7. Preventive measures against entry of alien/wild organisms through flood water.	1. On the basis of forecasting information to farmers for sale of marketable fish . 2. On the basis of forecasting, information to farmers for sale of marketable fish with sufficient transport facility through various media. 3. Proper drainage should be adopted so that inundation with flood water should be minimized. Excess water should be drained from pond by providing screen outlets or using pumps. 4. Arrangement for evacuation. 5. Arrangement for rescue and casualty care. 6. Immediate management of relief supplies.	). Planning even after the event should be made for proper drainage and creating awareness and trainings in flood situations.). Pinning even after the event should be made for proper drainage & creating awareness & training in flood situation. 3) Support to rehabilitation, logistics, training and awareness build up & testing and updating the plan 4) Strengthening of water bodies/ponds. 5) Loss assessment & insurance claim.
(ii) Water contamination and changes in water quality	1. Availability of water purifier i.e., chlorine, alum etc at district level. 2. Store chemicals, disinfectants and therapeutic drugs 3. Develop flood control management plan	1. Supply of water purifier for the ponds 2. Supply of water filtration system for ponds to overcome the contamination. Use of KMno4 for bath of fish as prophylactics 3. Use appropriate amount of disinfectants, chemicals and therapeutic drugs. 4. Maintaining the purity and quality of water bodies. 5. Need based bioremediation.	1. Supply of water purifier even after the event and creating awareness in farmers. 2. Supply of water filtration system even after the event & crating awareness in farmers. 3. Lime treatment for oxidation 4. To maintain water quality, need based research data should be generated 5. Dumping of solid, liquid and waste should be stopped through enactment of legislation. 6. Immediate remedy and cleaning of water bodies. 7. Regular water monitoring and bio-monitoring of water bodies for formulation of

			management plan.
(iii) Health and diseases	1. Storage of water purifiers and control measures for diseases should be available. 2. Adequate stock of medicine should be available at each district level. 3. Antibiotics fortified feeding as prophylactics 4. Advance planning and preparedness. 5. Store chemicals, disinfectants and therapeutic drugs.	1. Periodical checking particularly with respective fish mortality should be done during flood. 2. Disinfectants formalin treatments as prophylactics 3. Identification of type of disease outbreak, immediate removal of disease causing agents/ dead fish. 4. Use appropriate amount of disinfectants, chemicals and therapeutic drugs. 5. Emergency aeration or splashing in water bodies	1. Setting health and disease management training centre at district level for fishermen and government officials. 2. Lime treatment for oxidation 3. Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread. 4. Eradicating the disease. 5. Follow up surveillance and monitoring. 6. Proper disposal of dead fish. 7. Loss assessment & insurance claim
(iv) Loss of stock and inputs (feed, chemicals etc)	1. Harvestable sized fishes shall be marketed before the event to avoid losses. The inputs like feed and chemical etc. shall be stored at safe places. 2. Flood situation going to exist then move the feed, chemicals & other accessories to safer places. 3. Keep the stock/input at safe place for emergency purpose. 4. Stock material insurance.	1. The pond embankments will be fenced with netting to avoid fish losses. The store rooms for inputs like feed, chemicals etc. shall be created. 2. Available fish stock should be recovered. Stock of inputs must be stored in well protected area. 3. Purchase/hire valuable stock/inputs from distant areas not affected by flood.	1. The fish farmers shall be provided with fish seed and feed at concessional rates. 2. Feeds, chemicals etc required for the culture operation should be purchased. 3. Strengthening of stocks. 4. Assessment of total loss. 5. Insurance claims
(v) Infrastructure damage (pumps, aerators, huts etc)	1. Prior information regarding removal of Pumps and aerators shall be given to the fish farmers. 2. Flood situation going to exist then move the pumps, aerators & other accessories to safer places. 3. Educate and provide training for the repair of infrastructure. 4. Follow flood control management plan. 5. Store raw materials for repairing of pumps aerators, huts etc.	1. Pumps, aerator and generators shall be removed from the pond before the event. 2. Use manual techniques for aeration or make substitute arrangement for the same. 3. Notify utilities of the critical demand. 4. Coordination of assistance. 5. Immediate management of relief supplies.	1. Suitable Compensation for the damaged machinery shall be given to the fish farmers. 2. Install the equipments during flood. 3. Damaged infrastructure enumeration and need assessment.

	6. Infrastructure insurance.		4. Locate backup equipment and verify its operation. 5. Repair of damaged infrastructure. 6. Loss assessment & insurance claim.
3. Cyclone / Tsunami : A. Capture - Marine			
(i) Average compensation paid due to loss of fisher men lives			
(ii) Avg. no. of boats / nets/ damaged			
(iii) Avg. no. of houses damaged			
Inland			
B. Aquaculture			
(i) Overflow / flooding of ponds	1. If intensity of cyclone with heavy rain fall exists then harvest existing fish stock. 2. Dike should be stable in all weather condition & not liable to collapse during flood.	1. On the basis of forecasting information to farmers for sale of marketable fish with sufficient transport facility through various media. Proper drainage should be adopted. 2. . Enhancement of dykes height by sand bags	1. Planning even after the event should be made for proper drainage & creating awareness & training in storm situation.
(ii) Changes in water quality (fresh water / brackish water ratio)	1. Supply of water for correcting the changes in fresh water & brackish water. 2.Maintain salinity by addition of fresh water up to 20-25 ppt.	1. Supply of water for correcting the changes in fresh water & brackish water. 2. Use euryhaline species	1. Water storage facility needs to be developed to overcome the problem of changes in fresh & brackish water ratio. 2. use Euryhaline species for culture
(iii) Health and diseases	1. Water filtration system & control measures for disease should be available. 2. Adequate stock of medicine should be available at each district level.	1. Periodically checking particularly in respective of fish mortality & water parameter during flood. 2. Disinfectants treatments	1. Settling health & disease management training centre at district level for fishermen & Govt.

	3. Liming and formalin treatment		official.
(iv) Loss of stock and inputs (feed, chemicals etc)	1. Cyclone with heavy rain fall situation going to exist then move the feed, chemicals & other accessories to safer places. 2. Stock cover under insurance	1. Available fish stock should be recovered.	1. Feeds, chemicals etc required for the culture operation should be purchased. 2. Seed and feed to be supplied through Deptt of fisheries,
(v) Infrastructure damage (pumps, aerators , shelters/ huts etc)	1) Cyclone with heavy rain fall situation going to exist then shifted the pumps, aerators & other accessories to safer places.	1) Use manual techniques for aeration or make substitute arrangement for the same.	Compensation on losses & damage of pumps, aerators, shelters/huts given through RKVY, NCDC, NREGSui
(vi) Any other			
4. Heat wave and cold wave			
A. Capture:Marine/Inland			
B. Aquaculture			
(i) Changes in pond environment (water quality)	1)If intensity of heat wave high, add water from other source. 2)Harvest existing fish stock. 3)Adequate facility should be ready for heat wave & system for changing water temperature during cold wave. 4)Listen to local weather forecasts and stay aware of upcoming temperature changes. 5) Arrange the aerators. 6) Ensure sufficient water quantity in water bodies. 7)Formulate strategic fishing management for the heat /cold waves. 8) Tree plantation around fish ponds	1) Adequate facility should be ready for heat wave & system for changing water temperature during cold wave. 2) Monitor fishing sites frequently to ensure that they are not affected by heat or cold waves. 3) Use dark materials to cover the water bodies during excessive heat waves. 4) Stay hydrated by drinking plenty of fluids during fishing/field work. 5) Adopt proper care and management during the fishing period of cold/heat wave like keeping stock of drinking water and extra cloths. 6) Educating the farmers through electronic or print media 7) Maintain Water level in pond	1)Adequate facility should be ready for heat wave & system for changing water temperature during cold wave. 2) Intensive afforestation program for reducing heat waves. 3) Collect basic weather data and incidence of extreme and physical data of water bodies, water chemistry and seasonal changes, plankton profile and

			seasonal blooms, topography and soil composition. 4) Gather information about history of catch per unit effort as well as fish yield rate during heat wave and cold wave and accordingly simulate future plan for sustainable fishing. 5) Loss assessment & insurance claim.
(ii) Health and Disease management	1) Adequate stock of medicine should be available at each district level. 2) Advance planning and preparedness. 3) Store chemicals, disinfectants and therapeutic drugs. 4) Develop heat/ cold wave control management plan. 5) Stock sufficient emergency medicines.	1)Periodical checking particularly with respective fish mortality should be done. 2)Identification of type of disease outbreak, immediate removal of disease causing agents/ dead fish. 3) Use appropriate amount of disinfectants, chemicals and therapeutic drugs. 4) Determination of nature and speed of transmission of diseases. 5)Emergency aeration or splashing in water bodies 6)Bleaching powder 1 to 2 % , formalin treatment to prevent disease	1)Setting health & disease management training centre at district level for fishermen & Govt. official. 2) Laboratory diagnosis of diseased fish, generation of data about type or kind of disease spread. 3) Eradicating the disease. 4) Follow up surveillance and monitoring. 5) Proper disposal of dead fish. 6) Loss assessment & insurance claim. 7)KMNO4 2 % to maintain oxygen level