State: Uttar Pradesh

Agriculture Contingency Plan for District: Muzaffarnagar

1.0 District Agriculture profile				
1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	Northern Plain, Hot Subhumib (Dry) Eco-Region (9.1)		
	UPPER GANGETIC PLAIN REGION	UPPER GANGETIC PLAIN REGION (V)		
	Agro Climatic Zone (NARP)	BHABAR AND TERAI ZONE (UP-2) & WESTERN PLAIN ZONE(UP-3)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Meerut, Saharanpur, G.B.Nagar, Bulandshhar, Ghaziabad. Bagpat		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		29^0 .46^0 N	77^0 . 31' E	232 mt
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Regional sugarcane research institute, Muzaffar nagar		
	Mention the KVK located in the district with address	Swami Kalyan Dav K.V.K. Begra M. Nagar of S.V.P.U.A.T Meerut		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	S.V.P.U.A.T Meerut		

1.2	**Rainfall**	**Normal RF(mm)**	**Normal Rainy days (number)**	**Normal Onset (specify week and month)**	**Normal Cessation (specify week and month)**
	SW monsoon (June-Sep)	639.5	47	4th Week of June	2nd Week of Sep
	NE Monsoon(Oct-Dec)	32.7	12	3rd Week of Dec	2nd Week of Jan
	Winter (Jan- March)	65.8	13	-	-
	Summer (Apr-May)	20.6	7	-	-

	Annual	785.6	79	-	-

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)	421.473	326.920	27.707	50.003	0.385	2.314	2.207	4.271	5.122	2.544

1. 4	**Major Soils**	**Area ('000 ha)**	**Percent (%) of total**
	1. Sandy Loam	106.32	32.52
	2. Loam	119.59	36.58
	3. Clay Loam	59.27	18.13
	4.Silty Loam	39.23	12.00

1.5	**Agricultural land use**	Area ('000 ha)	Cropping intensity %
	Net sown area	326.920	144.08%
	Area sown more than once	144.118	
	Gross cropped area	471.038	

1.6	**Irrigation**	Area ('000 ha)		
	Net irrigated area	325.453		
	Gross irrigated area	466.916		
	Rainfed area	1.467		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		71.320	21.8 %
	Tanks		0.004	.001 %
	Open wells		3.522	1.077 %
	Bore wells		250.601	76.655 %
	Lift irrigation schemes	NIL		-
	Micro-irrigation			0.22 %
	Other sources (please specify)		0.006	
	Total Irrigated Area		326.18	-
	Pump sets			

	No. of Tractors			
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils Block-13	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)
	Over exploited	-	-	Not reported
	Critical	Shapur 1	10.33	do
	Semi- critical	2	-	do
	Safe	10	-	do
	Wastewater availability and use	-	-	do
	Ground water quality			
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%				

1.7 Area under major field crops & horticulture (as per latest figures, 2008-09)

1.7	**Major field crops cultivated**	**Area ('000 ha)**							
		Kharif			***Rabi***				
		Irrigated	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**	**Summer**	**Grand total**
	Rice	35.635	-	35.635	-	-	-	-	35.635
	Wheat	-	-	-	130.61	-	130.61	-	130.61
	Sugarcane	-	-	-	224.740	-	224.740	-	224.740
	Maize	0.279	-	0.279	-	-	-	-	0.279
	Blackgram/Greengram	-	0.87	0.87	-	-	-	-	0.87
	Mustard	-	-	-	1.939	1.025	2.964	-	2.964

	Horticulture crops - Fruits	**Area ('000 ha)**		
		Total	**Irrigated**	**Rainfed**
	Horticulture crops - Vegetables	**Total**	**Irrigated**	**Rainfed**
	Potato	2.653	2.653	-
	Pea	0.116	0.166	-
	Medicinal and Aromatic crops	**Total**	**Irrigated**	**Rainfed**
	Plantation crops	**Total**	**Irrigated**	**Rainfed**
	Eg., industrial			

	pulpwood crops etc.			
	Fodder crops	**Total**	**Irrigated**	**Rainfed**
	Sorghum	82.536	20.200	62.436
	Pearl millet	3.216	-	3.216
	Berseem	5.235	5.235	-
	Maize	8.215	8.215	-
	Total fodder crop area	99.202	33.56	65.652
	Grazing land	-	-	-
	Sericulture etc	-	-	-

1.8	**Livestock**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Non descriptive Cattle (local low yielding)	30.127	223.313	253.440
	Improved cattle			
	Crossbred cattle	31.654	130.147	161.701
	Non descriptive Buffaloes (local low yielding)	151.012	547.897	698.910
	Descript Buffaloes	64.719	234.813	299.532
	Goat	23.105	45.602	68.707
	Sheep	4.91+0.147=5.057	8.192+0.184=8.376	13.434
	Others (Camel, Pig, Yak etc.)			1126.296
	Commercial dairy farms (Number)			
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
	Commercial	0	0. 231	
	Backyard		26,602+34,360 = 60,962	
1.10	**Fisheries** (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**

	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)			
	Others	-	-	-

1.11 Production and Productivity of major crops (Average of last 5 years: 2008-09)

1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder ('000 tons)
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	
Major Field crops (Crops to be identified based on total acreage)										
	Rice	92.794	2604	-	-	-	-	92.794	2604	64.735
	Wheat	-	-	428.927	3284	-	-	428.927	3284	514.68
	Sugarcane	-	-	15205.908	67660 -	-	-	15205.908	67660	2280.75
	Maize	0.283	1014	-	-	-	-	0.283	1014	0.0483
	Blackgram/Greengram	-	-	-	-	0.501	576	0.501	576	0.742
	Mustard	-	-	3.337	1126	-	-	2.337	1126	

Major Horticultural crops (Crops to be identified based on total acreage)					
		Horticulture crops - Fruits	**Area ('000 ha)**		
			Total	**Irrigated**	**Rainfed**
		Horticulture crops - Vegetables	**Total**	**Irrigated**	**Rainfed**
		Potato	2.653	2.653	-
		Pea	0.116	0.166	-
		Medicinal and	**Total**	**Irrigated**	**Rainfed**

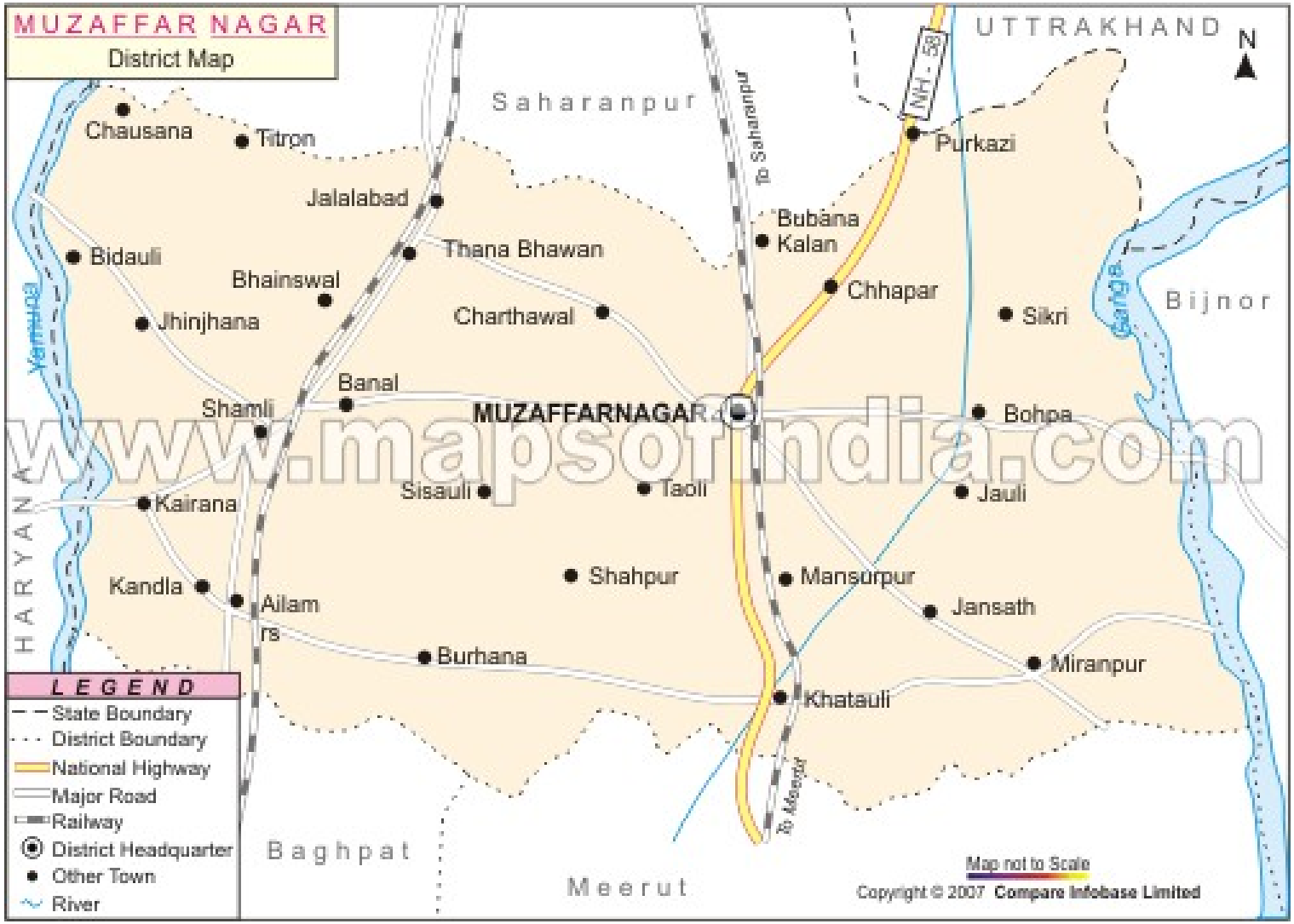
		Aromatic crops			
		Plantation crops	**Total**	**Irrigated**	**Rainfed**
		Eg., industrial pulpwood crops etc.			
		Fodder crops	**Total**	**Irrigated**	**Rainfed**
		Sorghum	82.536	20.200	62.436
		Pearl millet	3.216	-	3.216
		Berseem	5.235	5.235	-
		Maize	8.215	8.215	-
		Total fodder crop area	99.202	33.56	65.652
		Grazing land	**-**	**-**	**-**
		Sericulture etc	**-**	**-**	**-**

1.12	**Sowing window for 5 major field crops** (start and end of normal sowing period)	**Rice**	**Wheat**	**Sugarcane**	**Maize**	**Blackgram/ Greengram**
	Kharif- Rainfed	-	-	-	June	June- July
	Kharif-Irrigated	June- July	-	-	June	March - April
	Rabi- Rainfed	-	Nov-Dec	-	-	-
	Rabi-Irrigated	-	Nov-Dec	April - June	-	-

1.13	**What is the major contingency the district is prone to?** (Tick mark)	**Regular**	**Occasional**	**None**
	Drought	x	√	
	Flood	x	x	√
	Cyclone	x	x	√
	Hail storm	x	√	x
	Heat wave	x	√	x
	Cold wave	x	√	x
	Frost	x	√	x
	Sea water intrusion	x	x	
	Pests and disease outbreak (specify) Pyrilla ,Shoot borer, Sheath Blight, white grub, loose smut etc	√	x	x
	Fog	x		x

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: No
		Soil map as Annexure 3	Enclosed: Yes

Annexure I


MUZAFFAR NAGAR
District Map
UTTRAKHAND
N
Saharanpur
NH - 58
To Saharanpur
Chausana
Titron
Jalalabad
Purkazi
Bubana Kalan
Thana Bhawan
Bidauli
Bhainswal
Chhapar
Sikri
Bijnor
Ganga
Yamuna
Jhinjhana
Charthawal
Banal
Shamli
MUZAFFARNAGAR
Bohpa
Sisauli
Taoli
Jauli
Kairana
HARYANA
Shahpur
Mansurpur
Kandla
Ailam
Jansath
rs
Burhana
Miranpur
Khatauli
To Meerut
Baghpat
Meerut
LEGEND
State Boundary
District Boundary
National Highway
Major Road
Railway
District Headquarter
Other Town
River
Map not to Scale
Copyright © 2007 Compare Infobase Limited
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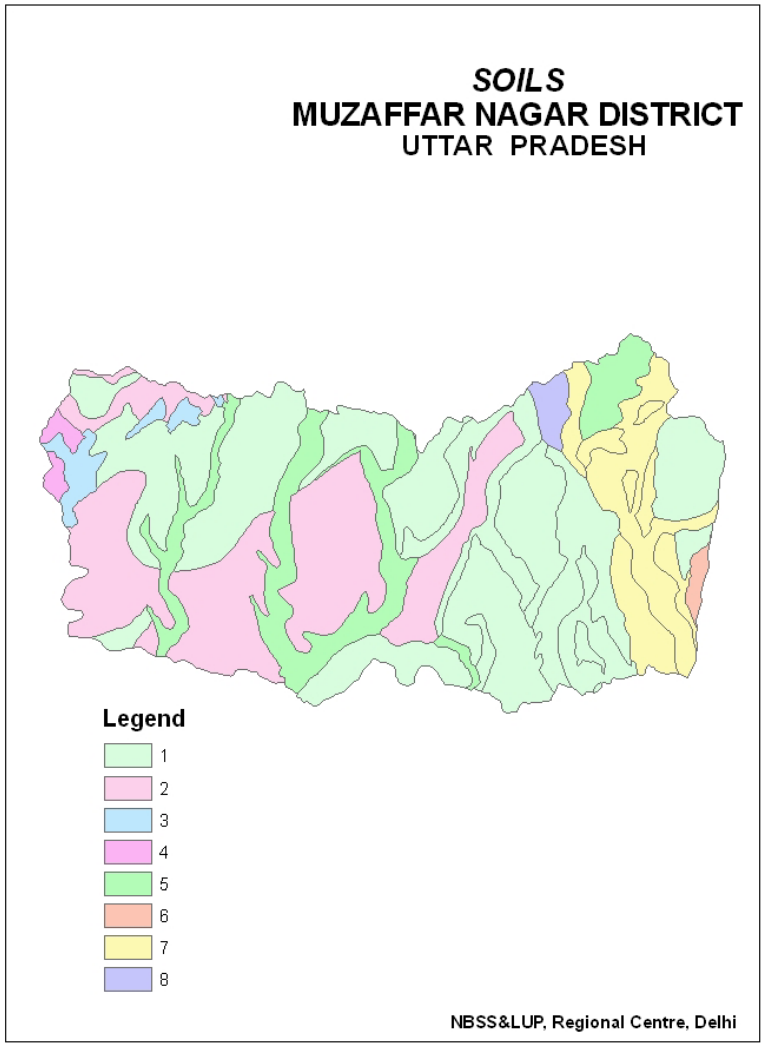
Soil map



Legend	Description
1 &5	Deep, loamy soils (moderately salinity and sodicity)
2	Deep, loamy soils and silty soils
3	Deep, silty soils and loamy soils (slightly saline and slightly sodic).
4	Deep, silty soils and loamy soils
6	Deep, loamy soils and loamy/sandy soils
7	Deep, sandy soils (slightly flooding) and loamy soils
8	Deep, loamy soils and loamy soils (moderate flooding)

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rain fed situation (Rain fed area is negligible, so there is no need of contingencies)

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop / Cropping system**	**Change in crop / cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks 2nd week of July					
Delay by 4 weeks 4th week of July					
Delay by 6 weeks 2nd week of August					
Delay by 8 weeks 4th week of August					

Condition			**Suggested Contingency measures**		
Early season drought **(Normal onset)**	**Major Farming situation**	**Normal Crop / Cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	1) **Farming situation:**				
Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell,	**Major Farming**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation**	**Remarks on Implementation**

consecutive 2 weeks rainless (>2.5 mm) period)	**situation**			**measures**	
At vegetative stage	1) **Farming situation:**				
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	1) **Farming situation:**				
Condition			**Suggested Contingency measures**		
	Major Farming situation	**Normal Crop/cropping system**	**Crop management**	**Rabi crop planning**	**Remarks on Implementation**
Terminal drought (Early withdrawal of monsoon)	1) **Farming situation:**				

1.1.2. Drought Irrigated situation

Condition			**Suggested Contingency measures**		
	Major Farming situation	**Normal Crop/ cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delayed release of water in canals due to low rainfall	Up land sandy loam soils	Rice (Basmati)-Wheat	Replace rice with maize or aerobic rice	• Use short duration varieties e.g. **Rice**: PS 4, 5 PB -1, PRH -10 **Maize**: Kanchan, Sweta, Navin, Surya **Pearl millet**:Wcc-75,Raj-171,Pusa-23,Pusa-322 • Light irrigation with tube well water • Follow alternate wetting and drying schedule of irrigation in rice	• Seed through KSSC and NFSM • Adequate supply of electricity/diesel should be ensured by the Govt. agencies.
		Sorghum (Fodder)/Maize-Potato/ Wheat	Pearl millet/Greengram/ Blackgram - Potato/ Wheat		
		Sugarcane +cucurbits –Ratoon-Wheat	No change required		

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/ cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
				• Alternate Furrow irrigation • Mulching in sugarcane/maize	
	Low land clay loam soils	Rice-wheat	Basmati rice -Wheat	• Use short duration varieties e.g. **Rice**: PS 4, 5, PB 1, PRH 10 **Maize**:Kanchan, Sweta, Navin, Surya **Pearl millet (Fodder):** Wcc-75,Raj-171,Pusa-23,Pusa-322 • Light irrigation with tube well water • Follow alternate wetting and drying schedule of irrigation in rice • Alternate Furrow irrigation • Mulching in sugarcane	• Seed through KSSC and NFSM • Adequate supply of electricity/diesel should be ensured by the Govt. agencies.
		Sorghum Fodder-Wheat	Pearl millet-Wheat		
		Sugarcane-Ratoon-Wheat	No change		
Condition			**Suggested Contingency measures**		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Limited release of water in canals due to low rainfall	Up land sandy loam soils	Rice (Basmati)-Wheat	No change	• Light irrigation with tube well water at critical stages only e.g CRI, Tillering &.Flowering stage • Follow alternate wetting and drying schedule of irrigation in rice • Alternate Furrow irrigation • Mulching in sugarcane/ • maize	• Adequate supply of electricity/ diesel should be ensured by the Govt. agencies.
		Sorghum (Fodder)/Maize-Potato/ Wheat	No change		
		Sugarcane +cucurbits –Ratoon-Wheat	No change		

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/ cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
	Low land clay loam soils	Rice-wheat	No change	• Light irrigation with tube well water at critical stages only e.g CRI, Tillering &.Flowering stage • Follow alternate wetting and drying schedule of irrigation in rice • Alternate Furrow irrigation • Mulching in sugarcane	• Supply of inter cultural implements through RKV • Adequate supply of electricity/diesel should be ensured by the Govt. agencies.
		Sorghum Fodder-Wheat	No change		
		Sugarcane-Ratoon-Wheat	No change		

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delayed release of water in canals due to low rainfall	Up land tube well irrigated canal sandy loam soil	Basmati rice	Maize/Arabic Rice	• Limited irrigation • Alternate Furrow irrigation • Drip irrigation • Mulching	• Seed through KSSC and NFSM • Harvesting and threshing implements through RKVY
		Sorghum/Maize	Pearl millet /Pigeonpea/Blackgram		
		Sugarcane +cucurbits	Sugarcane		
	Low land tube well irrigated canal clay loam soil	Rice	Pearl millet/Blackgram/Greengram	• Limited irrigation • Alternate Furrow irrigation • Drip irrigation • Mulching • Alternate furrow irrigation	• Seed through KSSC and NFSM • Micro/drip/sprinkler irrigation under govt. schemes
		Sorghum Fodder	Pearl millet/Sorghum Fodder		
		Sugarcane + cucurbits	Sugarcane		
Condition			**Suggested Contingency measures**		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Limited release of water in canals due to low rainfall	Up land tube well irrigated canal sandy loam soil	Basmati rice	Maize/Arabic Rice	• Limited irrigation • Alternate Furrow irrigation • Drip irrigation • Mulching	• Seed through KSSC and NFSM
		Sorghum/Maize	Pearl millet /Pigeonpea/Blackgram		
		Sugarcane +cucurbits	Sugarcane		

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
	Lowland tube well irrigated canal clay loam soil	Rice	Pearl millet/Blackgram/Greengram	• Limited irrigation • Alternate Furrow irrigation • Drip irrigation • Mulching • Alternate furrow irrigation	• Seed through KSSC and NFSM • Supply of inter cultural implements through RKV
		Sorghum Fodder	Pearl millet/Sorghum Fodder		
		Sugarcane + cucurbits	Sugarcane		

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal 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	Up land tube well irrigated canal sandy loam soil	Basmati rice	Maize/Arabic Rice	• Limited irrigation • Alternate Furrow irrigation • Drip irrigation • Mulching	• Seed through KSSC and NFSM • Supply of inter cultural implements through RKVY •
		Sorghum/Maize	Pearl millet /Pigeonpea/Blackgram		
		Sugarcane +cucurbits	Sugarcane		
	2) Farming situation: Lowland tube well irrigated canal clay loam soil	Rice	Pearl millet/Blackgram/Greengram	• Limited irrigation • Alternate Furrow irrigation • Drip irrigation • Mulching • Alternate furrow irrigation	• Seed through KSSC and NFSM • Harvesting and threshing implements through RKVY
		Sorghum Fodder	Pearl millet/Sorghum Fodder		
		Sugarcane + cucurbits	Sugarcane		

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal 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			NA	NA	NA

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Insufficient groundwater recharge due to low rainfall	Upland tube well irrigated canal sandy loam soil	Basmati rice	Maize/Arabic Rice /Vegetable (Tomato, Brinjal, cucrbits etc)	• Limited irrigation • Alternate Furrow irrigation • Drip irrigation • Mulching	• Seed through KSSC and NFSM • Harvesting and threshing implements through RKVY
		Sorghum/Maize	Pearl millet / Pigeonpea/ Blackgram		
		Sugarcane +cucurbits	Sugarcane		
	Lowland tube well irrigated canal clay loam soil	Rice	Pearl millet/ Blackgram/ Greengram	• Limited irrigation • Alternate Furrow irrigation • Drip irrigation • Mulching • Alternate furrow irrigation	• Seed through KSSC and NFSM • Micro/drip/sprinkler irrigation under govt. schemes • Supply of inter cultural implements through RKVY
		Sorghum Fodder	Pearl millet/Sorghum Fodder		
		Sugarcane + cucurbits	Sugarcane		

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**
Maize + Blackgram /Greengram / cucurbits	Provide drainage	Provide drainage	Drain out, Harvesting at physiological maturity stage	Shift to safer place
Sugarcane +Cucurbits	Provide drainage	Provide drainage	Drain out, Harvesting at physiological maturity stage and Picking of cucurbits crop.	Shift to safer place
Blackgram/ Greengram	Provide drainage	Provide drainage	Drain out , Harvesting at physiological maturity stage.	Safe storage against storage pest and disease
Horticulture				
Okra	Provide drainage	Provide drainage	Picking of vegetables at physiological maturity stage	Shift to safer place
Cucurbits	Provide drainage	Provide drainage	Drain out & Harvesting at physiological maturity stage and picking of cucurbits crop.	Shift to safer place
Brinjal	Provide drainage	Provide drainage	Picking at physiological maturity stage	Shift to safer place

Tomato	Provide drainage	Provide drainage	Picking at physiological maturity stage	Shift to safer place
Heavy rainfall with high speed winds in a short span				
Heavy rainfall with high speed winds in a short span				
Sugarcane	• Earthing • Tying • Use Wind breaks	Provide drainage Use Wind breaks	Drain out &Harvesting at physiological maturity stage Use Wind breaks	Shift to safer place
Maize/Sorghum	Provide drainage Use Wind breaks	Provide drainage Use Wind breaks	Drain out & Harvesting at physiological maturity stage Use Wind breaks	Shift to safer place
Blackgram/ Greengram	Provide drainage Use Wind breaks	Provide drainage Use Wind breaks	Drain out& Harvesting at physiological maturity stage Use Wind breaks	Shift to safer place
Rice basmati	Provide drainage Use Wind breaks	Provide drainage Use Wind breaks	Drain out & Harvesting at physiological maturity stage Use Wind breaks	Shift to safer place
Pigeonpea	• Provide drainage • Sowing on raised bed • Use Wind breaks	Provide drainage Use Wind breaks	Drain out & Harvesting at physiological maturity stage Use Wind breaks	Shift to safer place
Horticulture				
Okra	• Provide drainage • Sowing on raised bed • Use Wind breaks	Provide drainage Use Wind breaks	Drain out Harvesting at physiological maturity stage Use Wind breaks	Shift to safer place
Brinjal	• Provide drainage • Sowing on raised bed • Use Wind breaks	Provide drainage Use Wind breaks	Drain out Harvesting at physiological maturity stage Use Wind breaks	Shift to safer place
Tomato	• Provide drainage • Sowing on raised bed • Use Wind breaks	Provide drainage Use Wind breaks	Drain out Harvesting at physiological maturity stage Use Wind breaks	Shift to safer place
Cauliflower	• Provide drainage • Sowing on raised bed • Use Wind breaks	Provide drainage Use Wind breaks	Drain out Harvesting at physiological maturity stage Use Wind breaks	Shift to safer place
Outbreak of pests and diseases due to unseasonal rains				
Rice basmati Sugarcane	Need based plant protection IPDM for	Need based plant protection IPDM for	Do not use Hazardous pesticide at maturity stage	Shift to safer place

Sorghum fodder Blackgram/ Greengram Pigeonpea	Rice/pluses	Rice/pluses		
Horticulture				
Okra Brinjal Tomato Cucurbits	Need based plant protection IPDM for Rice/pluses	Need based plant protection IPDM for Rice/pluses	Do not use Hazardous pesticide at maturity stage	Shift to safer place

2.3 Floods

Condition	**Suggested contingency measure[o]**			
Transient water logging/ partial inundation	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Rice basmati	• Re sowing of nursery • Direct sowing of rice • Sowing of nursery on raised bed	• Provide drainage	• Provide drainage	Shift to safer place
Sugarcane	• Direct sowing	• Provide drainage	• Provide drainage •	Shift to safer place
Sorghum fodder	• Direct sowing	• Provide drainage	• Provide drainage •	Shift to safer place
Blackgram/ Greengram	• Direct sowing	• Provide drainage	• Provide drainage •	Shift to safer place
Pigeonpea	• Direct sowing	• Provide drainage	• Provide drainage	Shift to safer place
Horticulture				
Okra	• Re sowing of nursery • Sowing of nursery on raised bed • Re transplanting	• Provide drainage	• Provide drainage	Shift to safer place
Brinjal	• Re sowing of nursery • Sowing of nursery on raised bed	• Provide drainage	• Provide drainage	Shift to safer place

	• Re transplanting			
Tomato	• Re sowing of nursery • Sowing of nursery on raised bed • Re transplanting	• Provide drainage	• Provide drainage	Shift to safer place
Continuous submergence for more than 2 days				
Rice	• Re sowing of nursery • Direct sowing of rice • Sowing of nursery on raised bed	• Provide drainage	• Provide drainage	Shift to safer place
Horticulture	NA	NA	NA	NA
Okra	• Re sowing of nursery • Sowing of nursery on raised bed • Re transplanting	• Provide drainage	• Provide drainage	Shift to safer place
Brinjal	• Re sowing of nursery • Sowing of nursery on raised bed • Re transplanting	• Provide drainage	• Provide drainage	Shift to safer place
Tomato	• Re sowing of nursery • Sowing of nursery on raised bed • Re transplanting	• Provide drainage	• Provide drainage	Shift to safer place
Sea water intrusion	NA	NA	NA	NA

2.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm /Cyclone/Fog

Extreme event type	**Suggested contingency measure[r]**			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Heat Wave				
Rice basmati	• Re sowing of nursery • Light and frequent irrigation during night	• Irrigation interval should be decreased	• Irrigation interval should be decreased	Light and frequent irrigation
Sugarcane	• Mulching	• Irrigation interval should be decreased	• Irrigation interval should be decreased	Light and frequent irrigation
Sorghum fodder	• Re sowing	• Irrigation interval should be decreased	• Irrigation interval should be decreased	Make silage
Blackgram /Greengram	• Re sowing • Mulching	•Light irrigation for survival	•Light irrigation for survival	•Pod picking
	• Re sowing	•Light irrigation for survival	•Light irrigation for survival	•Pod picking

Pigeonpea	• Mulching			
Horticulture				
Okra	• Re sowing of nursery • Re transplanting • Mulching • Light watering during night	•Light irrigation for survival	•Light irrigation for survival	•Harvesting of fruits
Brinjal	• Re sowing of nursery • Re transplanting • Mulching • Light watering during night	•Light irrigation for survival	•Light irrigation for survival	•Harvesting of fruits
Tomato	• Re sowing of nursery • Re transplanting • Mulching of nursery beds • Light irrigation during night	•Light irrigation for survival	•Light irrigation for survival	•Harvesting of fruits
Cold wave				
Wheat	Light irrigation	Light irrigation	Light irrigation	Light irrigation
Sugarcane	• Mulching	•Light irrigation	--	•Harvesting of cane
Horticulture				
Tomato	Grow some inter crop	• Light Sprinkler irrigation	--	•Harvesting of fruits
Pea	Grow some inter crop	• Light Sprinkler irrigation	--	•Harvesting of fruits
Potato	Grow some inter crop	• Light Sprinkler irrigation	--	•Harvesting
Frost				
Sugarcane	• Light irrigation	•Light irrigation	•Light irrigation	•Harvesting of cane
Pigeonpea	• Grow as inter crop • Smoke at night	• Light Sprinkler irrigation • Smoke at night	• Light irrigation for survival • Smoke at night	Smoke at night
Horticulture				
Potato	•Light irrigation for survival •Smoke at night	•Light irrigation for survival •Smoke at night	•Light irrigation for survival •Smoke at night	•Harvesting
Tomato	•Light irrigation for survival •Smoke at night	•Light irrigation for survival •Smoke at night	•Light irrigation for survival •Smoke at night	•De helming
Pea	•Light irrigation for survival •Smoke at night	•Light irrigation for survival •Smoke at night	•Light irrigation for survival •Smoke at night	•Harvesting

Hailstorm				
All the crops	Re sowing	Re sowing of Catch crop	Harvest for fodder	Pre Harvesting
Horticulture				
All the Vegetable crops	Re sowing	Re sowing of Catch crop	Harvest for fodder	Pre Harvesting
Fog				

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
Drought			
Feed and fodder availability	• Fodder crop Insurance • Making of feed blocks • Encourage farmers to allocate some lands for cultivating perennial fodder (Napier grass, Subabul), specially on bunds and wasteland • Establishing fodder banks, encouraging fodder crops in irrigated area • Making silage or hay of excess fodder. • Statistics regarding feed/fodder availability and requirement should be updated by the concerned deptt. • Seed production and development of drought resistant crops and their varieties of fodder crops. • Encourage farmers to adopt sprinkler irrigation system. • Training to the farmers and extension functionaries for production and long term storage of feed and fodder.	• Utilizing fodder from perennial trees/shrubs/fodder bank reserves for small ruminant. • Utilizing stored fodder as silage, hay, feed blocks & mixture etc. • Migration of herd /flock to other places. • Establishment of communication and linkage with other state agencies.	• Availing crop insurance • Cultivation of fast growing green fodder crops. • Development of drought resistance fodder. • Increase the no. of Fodder Banks for future use.
Drinking water	• Preserving water in the pond/tank for drinking purpose. • Excavation of bore well/creation of tanks or	• Using preserved water in the tanks for drinking • Available ground water should be used for	•Recharge of well/ Tanks etc.

	ponds. • De-silting of village ponds on regular basis and adopt water harvesting techniques through water shed approach. • Filling of the ponds with canal/tube well water during lean period.	drinking on priority basis.	
Health and disease management	• Farmers should be encouraged to avail Livestock insurance • Training to livestock owners regarding natural calamities. • Veterinary preparedness with medicines and vaccines. • Vaccination	• Conduction mass animal health camp and treating the effected animals. • Mass campaigning though different media regarding possible outbreak of diseases and their management.	• Availing insurance benefits. • Followed standard Livestock management practices. • Proper health care & treatment.
Floods			
Feed and fodder availability	• Fodder crop Insurance • Making of feed blocks • Encourage farmers to allocate some lands for cultivating perennial fodder (Napier grass, Subabul), specially on bunds and wasteland • Establishing fodder banks, encouraging fodder crops. • Making silage or hay of excess fodder and that should be stored on up land. • Statistics regarding feed/fodder availability and requirement should be updated by the concerned deptt. • Seed production and development of crops and their varieties of fodder crops for water logged conditions. • Training to the farmers and extension functionaries for production and long term storage of feed and fodder.	• Utilizing fodder from perennial tress/shrubs/fodder bank reserves. • Use of feed mixture/block hay etc • Migration of flock /herds • Establishment of communication and linkage with other state agencies	• Availing crop insurance • Cultivation of fast growing green fodder crops
Drinking water	• Making suitable provision for safe drinking surface water including excavation of bore well/hand pump (India mark—II) at community level. • Make farmers aware not to use contaminated/ flood water for drinking purpose.	• Contaminated flood water should not be used for drinking.	• Open sources of drinking water (tank/well) should be further treated with potassium per magnate.

Health and disease management	• Live stock Insurance • Training to livestock owners regarding natural calamities. • Veterinary preparedness with medicines and vaccines. • Vaccination •	• Conduction mass animal health camp and treating the effected animals. • Training to livestock owners regarding natural calamities. • Establishment of Co-ordination with other Agencies. • Use of mass media to spread expat advice • .	• Culling sick animals • Availing insurance benefits. • Culling unproductive livestock • Proper disposal of corpse of dead bodies to prevent the spread of contagious diseases.
Cyclone **N.A**	**N.A**	**N.A**	**N.A**
Heat wave and cold wave			
Shelter/environment management	• Avoid use of GI sheet for roofing in the animal shed • Create adequate sources for additional supply of water to protect the animals from heat waves. • Establishment of modern shelter sheds. • As far as possible grow shade trees such as Neem, Pilkhan, Karanj etc near the animal sheds. • Make provision for adequate no. of fans/coolers /heaters according to the situation, if possible	• Provide the thatches/ tarpaulins/ rags in the animal sheds to protect against direct entry of hot/ cold waves • Provide proper bedding to prevent from cold and proper ventilation to prevent from heat. • Provide drinking water to animal frequently during heat wave • Watch the forecast of weather department. • As for as possible the animal should be allowed to wallow in pounds/ canals/ river or give bath once or twice in a day during heat waves	• Repair and maintenance of additional facilities
Health and disease management	• Insure the animals • Training to livestock owners/ para-vets regarding preventive measure against extreme weather conditions • Veterinary preparedness with medicines and vaccines etc. • Vaccination against FMD &Cold	• Organize village level animal health camps • Consult veterinary officer immediately if any adverse symptoms are noticed • Use of ITKs for food supplements	• Proper after care of animals. • Availing insurance benefits. • Proper disposal of corpse of dead bodies to prevent the spread of contagious diseases.

[s] based on forewarning wherever available

2.5.2 Poultry

	Suggested contingency measures			Convergence/linkages with ongoing programs, if any
	Before the event[a]	**During the event**	**After the event**	
Drought				
Shortage of feed ingredients	• Making and storage of feed concentrates • Awareness regarding traditional feed banks. • Feed requirement data should be generated • Prepare the feed requirement data base of poultry farm. • Store the feed ingredients	• Use of feed concentrates/ mixture/blocks etc •Establishment of communication with other state agencies. • Use of locally available feed recourses. •Import the feed recourse form other states.	• Availing insurance • Increase the no. of feed banks for future use	
Drinking water	• Making extra facility for drinking water. • Repair & maintenance of water resources	• Frequent supply of drinking water		
Health and disease management	• Veterinary preparedness with medicines and vaccines. • Vaccination • Training to poultry Growers regarding natural calamities.	• Treatment of affected poultry birds	• Culling of flock • Availing insurance benefits • Proper disposal of corpse of dead bodies to prevent the pared of contagious diseases	
Floods				
Shortage of feed ingredients	• Sufficient quantity of feed ingredients should be stored	• Use of stored feed in balanced form • Prevent the feed from moisture.	• Cleaning of feed store & repair if any. • Moist feed should be dried &treated as per requirement	

Drinking water	• Make provision of ground water for drinking	• Use only Ground water obtained from India Mrka II or Tubewell	•Repair, maintenance and cleaning of water recourse •Sanitation of open Wells	
Health and disease management	• Veterinary preparedness with medicines and vaccines • Vaccination	• Migration of flock if required • Treatment	• Availing insurance benefits. • Culling of unproductive flock	
Cyclone	NA	NA	NA	
Shortage of feed ingredients	• Storage and making of feed concentrates • Proper feed requirement data base	• Establishment of communication with other state agencies • Use of stored feed ingredient • Import of feed from other areas	• Repair and maintenance of feed store	
Drinking water	• Make provision of ground water for drinking	• Use only Ground water obtained from India Mrka II or Tubewell	• Repair and maintenance of water recourse	
Health and disease management	• Training to poultry growers regarding natural calamities. • Veterinary preparedness with medicines and vaccines.	• Treatment of injured poultry birds.	• Culling of flock • Availing insurance benefits. • Proper disposal of corpse of dead bodies to prevent the pared of contagious diseases.	
Heat wave and cold wave				
Shelter/environment management	• Making sufficient provision of shelter to protect live stock from heat and cold waves • Establishment of alternate resource for water supply. • Modern shelter sheds.	• Keep the birds in appropriate shelter • Provide proper bedding to prevent from cold and proper ventilated to prevent from heat • Provide drinking water to birds frequently. • Adopted proper management practices. • Watch the fore cast of weather department.	• Making of modern shelter sheds • Increase the plantation of trees	
Health and disease management	• Insurance • Veterinary preparedness with medicines and vaccines	• Provide proper treatment as per requirement • Treatment of injured poultry	• Availing insurance benefits • Culling of unproductive flock • Proper disposal of corpse of dead	•

	• Training to poultry growers regarding natural calamities		bodies to prevent the pared of contagious diseases	

[a] based on forewarning wherever available

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
1) Drought			
A. Capture			
(i) Shallow water depth due to insufficient rains/inflow	• Adopt appropriate measures to reduce water seepage or infiltration	• Harvest the crop partially	• Re stock
(ii) Changes in water quality	• Regular observation to check the water quality and remove the pollutants if any.	• Add oxy-flow to improve oxygen • Churning of pond water	• Maintain appropriate level of water if possible • Check the water quality and remove the pollutants if any.
(iii) Any other	_	_	_
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	• Adopt appropriate measures to reduce water seepage or infiltration from ponds • Avoid any kinds of water pollution and maintain water pH	• Ensure the Oxygen availability into ponds for the survival of fish • Avoid any kind of water pollution • Add oxy-flow to improve oxygen into ponds. • Churning of pond water	• Maintain appropriate level of water in ponds • Check the water quality and remove the pollutants if any.
(ii) Impact of salt load build up in ponds / change in water quality	• Add some fresh water from other source like cannel etc	• Add oxy-flow to improve oxygen into ponds. • Churning of pond water • Add fresh water into pond for life saving and to reduce salt load	• Add fresh water into pond for life saving and to reduce salt load • Maintain appropriate level of water in ponds • Check the water quality and remove the pollutants if any.
(iii) Any other	_	–	--
2) Floods			
A. Capture			
(i) No. of boats / nets/damaged	• Boats, nets etc should be taken out from water bodies	• Close supervision of flood condition	• Damaged boat or nets should be repaired

(ii) No. of houses damaged	–	–	• Repair the damaged house.
(iii) Loss of stock	–	–	• Sanitation and proper disposal of corpse
(iv) Changes in water quality	• Increase the hight of bunds.	--	--
(v) Health and diseases	--	• Treatment if possible	--
B. Aquaculture			
(i) Inundation with flood water	• Repair the bunds to prevent the inflow of water • If inflow water is not polluted then place the net at inlet and outlet • Raise the height of bunds • Plan a proper drainage system at farm • Plantation of soil binding plants at bund	• Avoid inflow of flood water from outside. • If inflow water is not polluted that can be permitted to flow through net placed at inlet and outlet of pond. • Fencing of net required in case of overflow to avoid the migration of fish	• Repair the damaged bunds • Check water quality • Change the water if it is polluted
(ii) Water contamination and changes in water quality	• Limeing @300 kg/ha	• Stop inflow of contaminated water	• Maintain appropriate level of water in ponds • Check the water quality and remove the pollutants if any.
(iii) Health and diseases	• Limeing @300 kg/ha • Vaccination	• Diagnostic measures and provide appropriate medicines	• Limeing and medication as per requirement • Use Cifex to control ulcerative syndromes
(iv) Loss of stock and inputs (feed, chemicals etc)	• Marketable stock should be sold	• Immediately remove the dead fishes from ponds and do sanitation	• After sanitation add new stock
(v) Infrastructure damage (pumps, aerators, huts etc)	• Damageable infrastructures should be secured	• Do not supplié Electric in flood éd area	• Repaire and service the damage infrastructure
(vi) Any other			
3. Cyclone / Tsunami	NA	NA	NA
4. Heat wave and cold wave			
A. Capture			
B. Aquaculture			

(i) Changes in pond environment (water quality)	• Maintain appropriate level of water in ponds *i.e.* 1.75m in 2m deep ponds • Check the water quality and remove the pollutants if any	• Maintain appropriate level of water in ponds *i.e.* 1.75m in 2m deep ponds • Check the water quality and remove the pollutants if any	• Maintain appropriate level of water in ponds *i.e.* 1.75m in 2m deep ponds • Check the water quality and remove the pollutants if any
i) Health and Disease management	• Limeing@300kg/ha	• Medication as per requirement	• Remove the dead fishes from ponds and add new stocks to compensate • the production