State: Uttar Pradesh

Agriculture Contingency Plan for District: Meerut

1.0 District Agriculture profile				
1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	Northern Plain (And Central Highlands) Including Aravallis, Hot Semi-Arid Eco-Region (4.1)		
	Agro-Climatic Zone (Planning Commission)	Upper Gangetic Plain Region (V)		
	Agro Climatic Zone (NARP)	Western Plain Zone (UP-3)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Muzaffarnagar, Meerut, Baghpat, Ghaziabad, G.B. Nagar and Bulandshahar.		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		28^0 98’	77^0 07’	218 Mt
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	ZRS, Modipuram, Meerut, S.V.Patel University of Agriculture & Technology, Meerut - 250110		
	Mention the KVK located in the district with address	Swami Kalyan Dev Krishi Vigyan Kendra, Hastinapur of S.V.P.U.A. & T, Meerut.		
	Name and address of the nearest Agro met Field Unit (AMFU, IMD) for agro-advisories in the Zone	College of Agricultural sciences, S.V.Patel University of Agriculture & Technology, Meerut - 250110		

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)	598	46	3rd week of July	2nd week of September
	NE / Post Monsoon (Oct-Dec)	31	12	3rd week of December	-
	Winter (Jan- March)	66	14	-	-
	Summer (Apr-May)	24	07	-	-

	Annual	719	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)	273.005	198.941	21.314	39.336	0.376	2.596	2.012	2.859	2.997	2.574

1. 4	**Major Soils**	**Area (‘000 ha)**	**Percent (%) of total**
	Very deep Loam soils	69.6	35%
	Very deep Sandy Loam soils	55.7	28%
	Very deep Sandy soils	67.6	34%
	Very deep Silty Loam soils	5.9	3%

1.5	**Agricultural land use**	Area (‘000 ha)	Cropping intensity %
	Net sown area	198.941	152.67%
	Area sown more than once	104.783	
	Gross cropped area	303.724	

1.6	**Irrigation**	Area (‘000 ha)		
	Net irrigated area	191.827		
	Gross irrigated area	303.706		
	Rainfed area	7.114		
	Sources of Irrigation	Number	Area (‘000 ha)	Percentage of total irrigated area
	Canals	-	35.608	18.56%
	Tanks		0.141	0.073%

	Open wells		0	-
	Bore wells		155.949	81.3%
	Lift irrigation schemes		-	
	Micro-irrigation		-	
	Other sources (Sewage water/ drains)		0.129	0.067%
	Total Irrigated Area		191.827	
	Pump sets			
	No. of Tractors			
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils Block-12	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)
	Over exploited	0	-	Not reported
	Critical	1 (Kharkhauda)	8.357	do
	Semi- critical	3	-	do
	Safe	8	-	do
	Wastewater availability and use	Daurala, Meerut	-	do
	Ground water quality	Good		
*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 of 2008-09)

1.7	**Major field crops cultivated**	**Area ('000 ha)**							
		Kharif			***Rabi***			**Summer**	
		Irrigated	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**		**Grand total**
	Rice	17.629	-	17.629	-	-	-	-	17.629
	Maize	0.329	-	0.329	-	-	-	-	0.339
	Sugarcane	-	-	-	8.365	-	8.365	121.258	129.623
	Wheat	-	-	-	87.795	-	87.795	-	87.795

	Pulses	-	0.253	0.253	0.30	0.446	0.746	0.245	1.244

	Horticulture crops - Fruits	**Area ('000 ha)**		
		Total	**Irrigated**	**Rainfed**
	Mango	18	12	6
	Guava	3.5	3.050	0.450
	Other Fruits Crops	3.232	2.262	0.969
	Horticulture crops - Vegetables	**Total**	**Irrigated**	**Rainfed**
	Potato	8.768	8.768	-
	Other Vegetable Crops	32.815	32.815	-
	Medicinal and Aromatic crops	**Total**	**Irrigated**	**Rainfed**
	Flowers	0.850	0.850	-
	Plantation crops	**Total**	**Irrigated**	**Rainfed**
	Popular	0.456	0.456	-
	Fodder crops	**Total**	**Irrigated**	**Rainfed**
	Sorghum	16.538	11.325	5.213
	Berseem /oat	1.321	1.321	-

	Total fodder crop area	17.859	12.646	5.213
	Grazing land	0.123	-	0.123
	Sericulture etc	Nil	-	-

1.8	**Livestock**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Non descriptive Cattle (local low yielding)	15.126	65.0796	80.205
	Improved cattle	10.084	43.386	53.470
	Crossbred cattle	25.210	108.466	133.676
	Non descriptive Buffaloes (local low yielding)	146.560	610.177	756.737
	Descript Buffaloes	62.811	261.504	324.316
	Goat	16.801	32.243	49.044
	Sheep Indio + Exotic	3.067+.098	3.643+0.173	6.981
	Camel, Pig, Yak etc.	--	--	1115.090
	Commercial dairy farms (Number)			
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
	Commercial		14.806	
	Backyard		16.300	

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)	
	Nil	-	-	-	-	-

ii) Inland (Data Source: Fisheries	**No. Farmer owned ponds**	**No. of Reservoirs**	**No. of village tanks**

Department)	06	-	818

B. Culture

	Water Spread Area (ha)	Yield (t/ha)	Production ('000 tons)
i) **Brackish water** (Data Source: MPEDA/ Fisheries Department)	-	-	215
ii) **Fresh water** (Village tanks)(Data Source: Fisheries department)	797.60	-	-

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

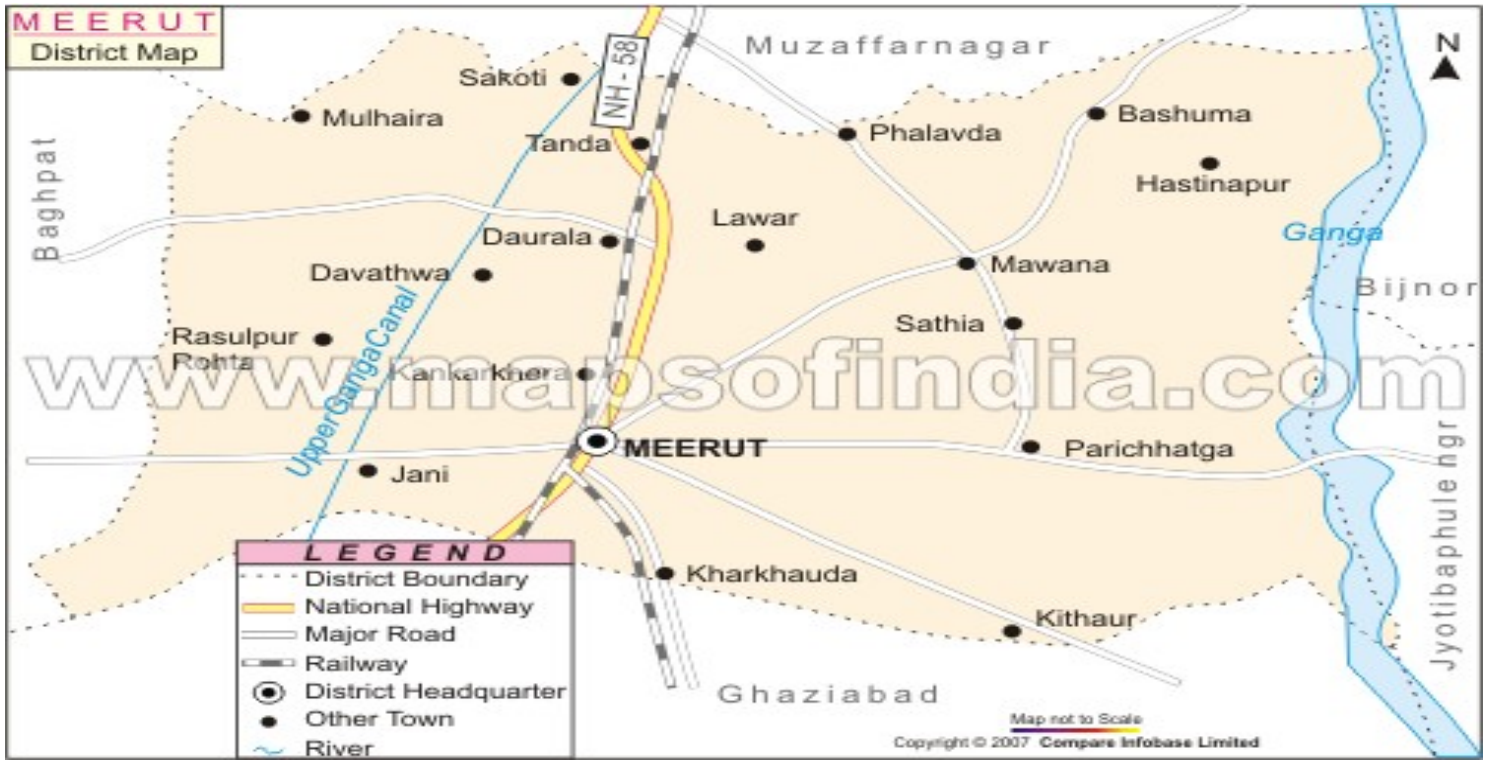
1.11	Name of crop	Kharif		Rabi		Summer		Total		Crop residue as fodder ('000 tons)
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	
Major Field crops (Crops identified based on total acreage)										
	Rice	45.113	2559	-	-	-	-	45.113	2559	54.14
	Maize	0.645	1903	-	-	-	-	0.645	1903	0.015
	Pulses	0.120	442	0.234	872	0.118	6.28	0.472	679	0.216
	Wheat	-	-	314.833	3586	-	-		3870	
	Sugarcane	-	-	533.69	63800	-	-	533.69	63800	122.7
	Mustard	-	-	4.105	1105	-	-	4.105	1105	-
Major Horticultural crops (Crops identified based on total acreage)										
	All Fruits	-	-	-	-	-	-	220.150	106.19	
	All Vegetables	-	-	-	-	-	-	613.449	186.94	
	Potato	-	-	-	-	-	-	206.311	235.3	
	Flowers	-	-	-	-	-	-	0.900	105.88	

1.12	**Sowing window for 5 major field crops**	**Rice**	**Wheat**	**Sugarcane**	**Pulses**	**Potato**
	Kharif- Rainfed	-	-	-	July – August	-
	Kharif-Irrigated	June – July	-	March – May	May – June	-
	Rabi- Rainfed	-	-	-	October – November	-
	Rabi-Irrigated	-	November – December	October – November	November – December	October – November

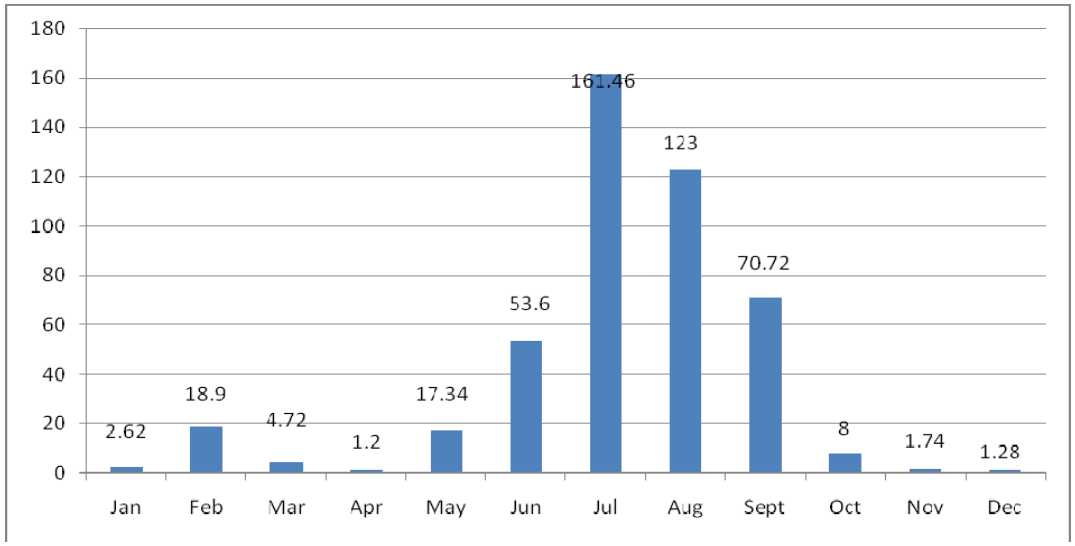
1.13	**What is the major contingency the district is prone to?** (Tick mark)	**Regular**	**Occasional**	**None**
	Drought			√
	Cyclone			√
	Hail storm		√	
	Heat wave		√	
	Cold wave	√		
	Frost			√
	Sea water intrusion			√
	Sheath blight & Hopper in rice		√	
	Fog	√		

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 II	Enclosed: Yes
		Soil map as Annexure III	Enclosed: Yes

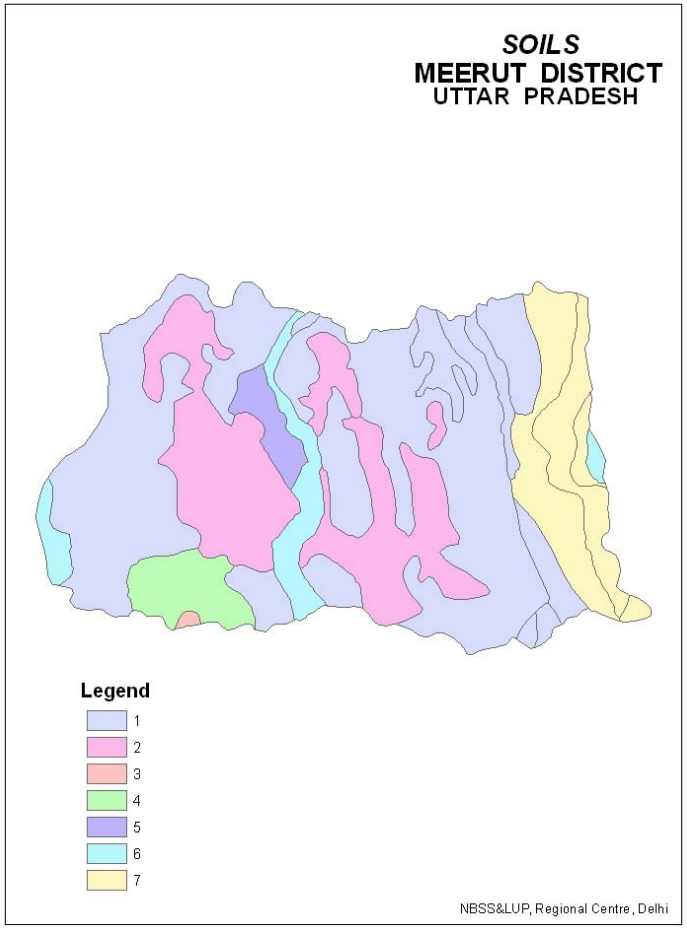
Annexure I


MEERUT
District Map
Muzaffarnagar
Baghpat
Bijnor
Ghaziabad
Jyotibaphule ngr
Ganga
NH - 58
Upper Ganga Canal
Sakoti
Mulhaira
Tanda
Phalavda
Bashuma
Hastinapur
Lawar
Daurala
Davathwa
Mawana
Sathia
Rasulpur
Rohta
Kankarkhera
MEERUT
Parichhatga
Jani
Kharkhauda
Kithaur
N
LEGEND
District Boundary
National Highway
Major Road
Railway
District Headquarter
Other Town
River
Map not to Scale
Copyright © 2007 Compare Infobase Limited
www.mapsofindia.com

Annexure II


180
160
140
120
100
80
60
40
20
0
2.62
18.9
4.72
1.2
17.34
53.6
161.46
123
70.72
8
1.74
1.28
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
Dec

Annexure III



Alluvial plain (0-1% slope)

1. Deep, loamy soils and slightly eroded .
2. Deep, loamy soils and slightly eroded associated with silty soils .
3. Deep, fine soils moderately saline and sodic associated with loamy soils, slightly eroded .
4. Deep, loamy soils, moderate salinity and sodicity associated with loamy soils with moderate salinity and strong sodicity
5. Deep, silty soils associated with loamy soils slightly eroded .

Old Alluvial plain with river left out channels/Oxbows/point bars (1-3%slope)

6. Deep, loamy soils and slightly eroded associated with stratified loamy soils slightly eroded

Active Flood Plain (1-3% slope)

7. Deep, sandy soils with moderate flooding associated with stratified loamy soils and slight flooding .

2.0 Strategies for weather related contingencies

2.1 Drought

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

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation[a]**	**Normal Crop / Cropping system[b]**	**Change in crop / cropping system[c] including variety**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
Delay by 2 weeks	Not applicable				
Delay by 4 weeks	Not applicable				
Delay by 6 weeks	Not applicable				
Delay by 8 weeks	Not applicable				

Condition			**Suggested Contingency measures**		
Early season drought (Normal onset)	**Major Farming situation[a]**	**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.	Not applicable				
At vegetative stage	Not applicable				
At flowering/ fruiting stage	Not applicable				
Terminal drought	Not applicable				

2.1.2 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	Upland sandy loam soils	Rice (Basmati)-Wheat	Replace rice with maize or aerobic rice Use short duration varieties of Rice: PS 4, 5, PB 1, PRH 10 Maize: Kanchan, Sweta, Navin, Surya	Light irrigation with tube well water, Follow alternate wetting and drying schedule of irrigation in rice, Alternate Furrow irrigation, Mulching in sugarcane / maize	Seed through KSSC and NFSM, Adequate supply of electricity/diesel should be ensured by the Govt. agencies.
		Sorghum (Fodder)/Maize-Potato/ Wheat	Bajra/Greengram/ Blackgram - Potato/ Wheat Bajra:Wcc-75,Raj-171,Pusa-23,Pusa-322		
		Sugarcane +cucurbits –Ratoon-Wheat	No change		
	Lowland clay loam soils	Rice-wheat	Basmati rice –Wheat Use short duration varieties of Rice: PS 4, 5, PB 1, PRH 10	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	Bajra-Wheat Bajra:Wcc-75,Raj-171,Pusa-23,Pusa-322		
		Sugarcane-Ratoon-Wheat	No change		

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Normal Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
Limited release	Upland sandy loam soils	Rice (Basmati)-Wheat	No change	Follow alternate wetting and	Adequate supply of

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Normal Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
of water in canals due to low rainfall		Sorghum (Fodder)/Maize-Potato/ Wheat	No change	drying schedule of irrigation in rice, Alternate Furrow irrigation, Mulching in sugarcane/ maize	electricity/diesel should be ensured by the Govt. agencies.
		Sugarcane +cucurbits – Ratoon-Wheat	No change		
	Lowland clay loam soils	Rice-wheat	No change	Follow alternate wetting and drying schedule of irrigation in rice, Alternate Furrow irrigation, Mulching in sugarcane/ maize	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 required		

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Normal Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
Non release of water in canals under delayed onset of monsoon in catchment	Upland 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	Sorghum /Bajra /Pigeonpea/Blackgram		
		Sugarcane +cucurbits	Sugarcane		
	Lowland tube well irrigated canal clay loam soil	Rice	Bajra/ Blackgram/Greengram	Limited irrigation, Alternatefurrow irrigation, Drip irrigation, Mulching	Seed through KSSC and NFSM, Harvesting and threshing implements through RKVY
		Sorghum Fodder	Bajra/Sorghum Fodder		
		Sugarcane + cucurbits	Sugarcane		

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Normal Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Normal Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
Lack of inflows into tanks due to insufficient /delayed onset of monsoon			Not Applicable		

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Normal Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
Insufficient groundwater recharge due to low rainfall	Upland tube well irrigated canal sandy loam soil	Basmati rice	Maize/Aerobic Rice /Vegetable (cucurbits)/Blackgram	Limited irrigation, Alternatefurrow irrigation, Drip irrigation, Mulching	Seed through KSSC and NFSM, Harvesting and threshing implements through RKVY
		Sorghum/Maize	Bajra /Pigeonpea/ Blackgram		
		Sugarcane +cucurbits	Sugarcane		
	Lowland tube well irrigated canal clay loam soil	Rice	Bajra/Greengram/ Blackgram	Limited irrigation, Alternatefurrow irrigation, Drip irrigation, Mulching	Seed through KSSC and NFSM, Micro/drip/sprinkler irrigation under govt. schemes, Supply of inter cultural implements through RKVY
		Sorghum Fodder	Bajra 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[k]**	**Flowering stage[l]**	**Crop maturity stage[m]**	**Post harvest[n]**
Maize + Blackgram / Greengram /cucurbits	Provide drainage	Provide drainage	Drain out excess water, Harvesting at physiological maturity stage	Shift to safer place & dispose of produce as early as possible

Sugarcane	Provide drainage		Drain out excess water and harvest the lodged crop as early as possible	Supply to sugar mills /crusher as early as possible or shift to safer place and cover the cane with trash materials
Blackgram or Greengram	Provide drainage	Provide drainage	Drain out excess water 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 & dispose of produce as early as possible
Cucurbits	Provide drainage	Provide drainage	Drain out excess water & Harvesting at physiological maturity stage and picking of cucurbits crop.	Shift to safer place & dispose of produce as early as possible
Brinjal	Provide drainage	Provide drainage	Picking at physiological maturity stage	Shift to safer place & dispose of produce as early as possible
Tomato	Provide drainage	Provide drainage	Picking at physiological maturity stage	Shift to safer place & dispose of produce as early as possible
Mango	-	-	Spray of 2% urea + Carbendazim 0.02% solution	-
Guava	-	-	Spray of 2% urea + Carbendazim 0.02% solution	-
Heavy rainfall with high speed winds in a short span[2]				
Sugarcane	Earthing up, Tying		Drain out excess water and harvest the lodged crop as early as possible	Supply to sugar mills /crusher as early as possible or shift to safer place and

				cover the cane with trash materials
Maize/Sorghum	Provide drainage	Provide drainage, Use Wind breaks	Drain out excess water & Harvesting at physiological maturity stage	Shift to safer place & dispose of produce as early as possible
Blackgram/ Greengram	Provide drainage	Provide drainage, Use Wind breaks	Drain out excess water & Harvesting at physiological maturity stage	Shift to safer place & dispose of produce as early as possible
Rice (basmati)	Provide drainage	Provide drainage	Drain out excess water & Harvesting at physiological maturity stage	Shift to safer place & dispose of produce as early as possible
Pigeonpea	Provide drainage Sowing on raised bed	Provide drainage	Drain out excess water & Harvesting at physiological maturity stage	Shift to safer place & dispose of produce as early as possible
Horticulture				
Okra	Provide drainage, Sowing on raised bed	Provide drainage	Drain out excess water, Harvesting at physiological maturity stage	Shift to safer place & dispose of produce as early as possible
Brinjal	Provide drainage, Sowing on raised bed	Provide drainage	Drain out excess water, Harvesting at physio-logical maturity stage	Shift to safer place & dispose of produce as early as possible
Tomato	Provide drainage Sowing on raised bed Stacking	Provide drainage, Use Wind breaks, Stacking	Drain out excess water, Harvesting at physio-logical maturity stage Stacking	Shift to safer place & dispose of produce as early as possible
Cauliflower	Provide drainage, Sowing on raised bed	Provide drainage	Drain out excess water, Harvesting at physio-	Shift to safer place & dispose of produce as early as

			logical maturity stage	possible
Cucurbits	Provide drainage, Sowing on raised bed	Provide drainage	Drain out excess water , Harvesting at physio-logical maturity stage	Shift to safer place & dispose of produce as early as possible
Mango	Use of wind breaks	Use of NAA spray	Use of NAA spray	-
Guava	Use of wind breaks	Use of NAA spray	Use of NAA spray	
Outbreak of pests and diseases due to unseasonal rains				
Rice (basmati)	Need based plant protection IPDM for Rice/pluses	Need based plant protection IPDM for Rice/pluses	Avoid use of pesticide at maturity stage	Shift to safer place & dispose of produce as early as possible
Sugarcane				
Sorghum fodder				
Blackgram/ Greengram				
Pigeonpea				
Horticulture				
Okra	Need based plant protection IPDM for Rice/pluses	Need based plant protection IPDM for Rice/pluses	Avoid use of pesticide at maturity stage	Shift to safer place & dispose of produce as early as possible
Brinjal				
Tomato				
Cucurbits				
Cauliflower				

2.3. Floods

Condition	**Suggested contingency measure[o]**			
Transient water logging/ partial inundation[1]	**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 & dispose of produce as early as possible
Sugarcane	• Direct sowing	• Provide drainage	• Provide drainage	Shift to safer place & dispose of produce as early as possible
Sorghum fodder	• Direct sowing	• Provide drainage	• Provide drainage	Shift to safer place & dispose of produce as early as possible
Blackgram/ Greengram	• Direct sowing	• Provide drainage	• Provide drainage	Shift to safer place & dispose of produce as early as possible
Pigeonpea	• Direct sowing	• Provide drainage	• Provide drainage	Shift to safer place & dispose of produce as early as possible
Horticulture				
Okra	• Re sowing of nursery • Sowing of nursery on raised bed • Re transplanting	• Provide drainage	• Provide drainage	Shift to safer place & dispose of produce as early as possible
Brinjal	• Re sowing of nursery • Sowing of nursery on raised bed • Re transplanting	• Provide drainage	• Provide drainage	Shift to safer place & dispose of produce as early as possible
Tomato	• Re sowing of nursery • Sowing of nursery on raised bed • Re transplanting	• Provide drainage	• Provide drainage	Shift to safer place & dispose of produce as early as possible
Continuous submergence for more than 2 days				
Rice	• Re sowing of nursery	• Provide drainage	• Provide drainage	Shift to safer place & dispose of

	• Direct sowing of rice • Sowing of nursery on raised bed			produce as early as possible
Horticulture				
Okra	• Re sowing of nursery • Sowing of nursery on raised bed • Re transplanting	• Provide drainage	• Provide drainage	Shift to safer place & dispose of produce as early as possible
Brinjal	• Re sowing of nursery • Sowing of nursery on raised bed • Re transplanting	• Provide drainage	• Provide drainage	Shift to safer place & dispose of produce as early as possible
Tomato	• Re sowing of nursery • Sowing of nursery on raised bed • Re transplanting	• Provide drainage	• Provide drainage	Shift to safer place & dispose of produce as early as possible
Mango	• Re sowing of nursery • Sowing of nursery on raised bed • Re transplanting	• Provide drainage	• Provide drainage	Shift to safer place & dispose of produce as early as possible
Sea water intrusion[3]	Not Applicable			

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
Pigeonpea	• Re sowing • Mulching	• Light irrigation for survival	• Light irrigation for survival	• Pod picking
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
Mango	• Spray of water	• Spray of water	• Spray of water	• -
Guava	• Spray of water	• Spray of water	• Spray of water	• -
Cold wave[q]				
Wheat	Light irrigation	Light irrigation	Light irrigation	Light irrigation
Sugarcane		• Light irrigation for survival	--	• Harvesting of cane
Horticulture				
Tomato		• Light Sprinkler irrigation	• Light Sprinkler irrigation	• Harvesting of fruits
Pea		• Light Sprinkler irrigation	• Light Sprinkler irrigation	• Harvesting of fruits
Potato		• Light Sprinkler irrigation	--	• Harvesting
Frost				
Sugarcane	• Light irrigation	• Light irrigation	• Light irrigation	• Harvesting of cane

Pigeonpea	• Smoke at night	• Light irrigation • Smoke at night	• Light irrigation • 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 halming
Pea	•Light irrigation for survival •Smoke at night	•Light irrigation for survival •Smoke at night	•Light irrigation for survival •Smoke at night	• Harvesting
Mango	• Irrigation &Smoking during night	•Irrigation &Smoking during night	•Irrigation &Smoking during night	--
Guava	•Irrigation &Smoking during night	•Irrigation &Smoking during night	•Irrigation &Smoking during 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
All the Fruit crops	Use anti hail net Spray of fungicide with 2% urea solution	Use anti hail net Spray of fungicide with 2% urea solution	Use anti hail net Spray of fungicide with 2% urea solution	Harvest the damaged fruits Spray of fungicide with 2% urea solution
Fog	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	• 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 ponds. • De-silting of village ponds on regular basis and adopt water harvesting techniques through water shed	• Using preserved water in the tanks for drinking • Available ground water should be used for drinking on priority basis.	• Recharge of well/ Tanks etc.

	approach. • Filling of the ponds with canal/tube well water during lean period.		
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.
and Health 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	Not Applicable		
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 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 allow in pounds/ canals/ river or give bath once or twice in a day	• Repair and maintenance of additional facilities

		during heat waves	
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	Not Applicable			
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 • Training to poultry growers regarding natural calamities	• Provide proper treatment as per requirement • Treatment of injured poultry	• Availing insurance benefits • Culling of unproductive flock • Proper disposal of corpse of dead 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[a]	**During the event**	**After the event**
1) Drought			
A. Capture			
Marine	_	_	_
Inland			
(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.
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.
2) Floods			

A. Capture			
Marine	--	--	--
Inland			
(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 height 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)	• Dommageable infrastructures should be secured	• Do not supplié Electric in flood éd area	• Repaire and service the damage infrastructure
3. Cyclone / Tsunami	Not applicable		
4. Heat wave and cold wave			
A. Capture			
Marine	--	--	--
Inland			
B. Aquaculture			
(i) Changes in pond environment (water quality)	• Maintain appropriate level of water in ponds *ie.* 1.75m in 2m deep ponds • Check the water quality and remove the pollutants if any	• Maintain appropriate level of water in ponds *ie.* 1.75m in 2m deep ponds • Check the water quality and remove the pollutants if any	• Maintain appropriate level of water in ponds *ie.* 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

[a] based on forewarning wherever available