

**State: RAJASTHAN**  
**Agriculture Contingency Plan for District: Bhilwara**

| 1.0 District Agriculture profile        |  |  |  |   |   |
|---|--|--|--|---|---|
| 1.1                                     | <b>Agro-Climatic/Ecological Zone</b>                               |  |  |   |   |
|   | Agro Ecological Sub Region (ICAR)                                  |  | Northern Plain (And Central Highlands) Including Aravallis, Hot Semi-Arid Eco-Region (4.2)                           |   |   |
|   | Agro-Climatic Zone (Planning Commission)                           |  | Central Plateau & Hills Region (VIII)  |   |   |
|   | Agro Climatic Zone (NARP)  |  | Sub Humid Southern Plain Zone (RJ-7)   |   |   |
|   | List all the districts or part thereof falling under the NARP Zone |  | Bhilwara, Bundi, Chittorgarh and Udaipur   |   |   |
|   | Geographic coordinates of district headquarters                    |  | Latitude   | Longitude                                   | Altitude                                  |
|   |  |  | 25 <sup>0</sup> 0' to 27 <sup>0</sup> 50'N   | 74 <sup>0</sup> 30' to 75 <sup>0</sup> 25'E | 432                                       |
|   | Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS      |  | Agricultural Research Station , Maharana Pratap university of Agriculture and technology RCA campus , Udaipur-313001 |   |   |
| Mention the KVK located in the district |  | Krishi Vigyan Kendra, P.Box No.56 Distt. Bhilwara-311001 |  |   |   |
| 1.2                                     | <b>Rainfall</b>  | Normal RF(mm)  | Normal Rainy days (number)   | Normal Onset ( specify week and month)      | Normal Cessation (specify week and month) |
|   | SW monsoon (June-Sep):   | 597.16   | 25.8   | 4 <sup>th</sup> Week (25 SMW) of June       | 3 <sup>rd</sup> week (38 SMW) of Sept.    |
|   | NE Monsoon(Oct-Dec):   | 12.33  | 0.9  |   |   |
|   | Winter (Jan- March)  | 22.20  | 1.3  | -   | -   |
|   | Summer (Apr-May)   | 25.28  | 1.0  | -   | -   |
|   | Annual   | 656.97   | 29.0   | -   | -   |

| 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 |
|-----|--|-------------------|-----------------|-------------|---------------------------------|--------------------|----------------------|--|------------------------------|-----------------|---------------|
|     | <b>Area ('000 ha) (2006-07)</b>                      | 1047.441          | 505.44          | 74.888      | 67.321                          | 120.353            | 135.222              | 0.283                                  | 143.973                      | 47.842          | 55.531        |

| 1.4 | Major Soils (common names like red sandy loam deep soils (etc.,))* | Area ('000 ha) | Percent (%) of total |
|-----|--|----------------|----------------------|
|     | Inceptisols (Red & Brown)  | 719.83         | 68.85                |
|     | Entisols (Red & Brown)   | 107.89         | 10.32                |

|                                  |        |       |
|----------------------------------|--------|-------|
| Vertisols (Black soils)          | 38.40  | 3.67  |
| Rockout (Yellow foot hill soils) | 143.52 | 13.73 |

\* mention colour, depth and texture (heavy, light, sandy, loamy, clayey etc) and give vernacular name, if any, in brackets

|            |  |                |                      |
|------------|--|----------------|----------------------|
| <b>1.5</b> | <b>Agricultural land use (2006-07)</b> | Area ('000 ha) | Cropping intensity % |
|            | Net sown area                          | 402.067        | 135.10               |
|            | Area sown more than once               | 141.147        |                      |
|            | Gross cropped area                     | 543.214        |                      |

|                |  |                           |  |   |
|----------------|--|---------------------------|--|---|
| <b>1.6</b>     | <b>Irrigation</b>  | Area ('000 ha)            |  |   |
|                | Net irrigated area   | 154.187                   |  |   |
|                | Gross irrigated area   | 170.318                   |  |   |
|                | Rainfed area   | 247.88                    |  |   |
|                | <b>Sources of Irrigation</b>   | Number                    | Area ('000 ha)                           | Percentage of total irrigated area  |
|                | Canals   |                           | 33.447                                   | 29.79   |
|                | Tanks  | 1931                      | 24.450                                   | 1.72  |
|                | Open wells   | 86334                     | 142.434                                  | 37.23   |
|                | Bore wells   | --                        | 15.660                                   | 30.16   |
|                | Lift irrigation schemes  | --                        | --                                       | --  |
|                | Micro-irrigation   |                           | 1.875                                    | 1.10  |
|                | Other sources (please specify)   | --                        | --                                       | --  |
|                | Total Irrigated Area   |                           | 217.776                                  |   |
|                | Pump sets  | 2336                      |  |   |
|                | No. of Tractors  | 14870                     |  |   |
|                | <b>Groundwater availability and use* (Data source: State/Central Ground water Department /Board)</b> | No. of blocks/<br>Tehsils | (%) area                                 | Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc) |
| Over exploited | 11   | 100                       | K.M. – Potable to semi saline and saline |   |

\*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) (2007-2008)

| 1.7 | Major field crops cultivated | Area ('000 ha) |         |         |             |         |        |        |             |
|-----|------------------------------|----------------|---------|---------|-------------|---------|--------|--------|-------------|
|     |                              | <i>Kharif</i>  |         |         | <i>Rabi</i> |         |        | Summer | Grand total |
|     |                              | Irrigated      | Rainfed | Total   | Irrigated   | Rainfed | Total  |        |             |
|     | <b>Kharif</b>                |                |         |         |             |         |        |        |             |
|     | Maize                        | -              | -       | 182.170 | -           | -       | -      | -      | 182.170     |
|     | Blackgram                    | -              | -       | 39.237  | -           | -       | -      | -      | 39.237      |
|     | Sorghum                      | -              | -       | 30.933  | -           | -       | -      | -      | 30.933      |
|     | Cluster bean                 | -              | -       | 36.921  | -           | -       | -      | -      | 36.921      |
|     | Sesame                       | -              | -       | 26.195  | -           | -       | -      | -      | 26.195      |
|     | <b>Rabi</b>                  |                |         |         |             |         |        |        |             |
|     | Wheat                        | -              | -       | -       | -           | -       | 81.579 | -      | 81.579      |
|     | Mustard                      | -              | -       | -       | -           | -       | 35.967 | -      | 35.967      |
|     | Barley                       | -              | -       | -       | -           | -       | 13.989 | -      | 13.989      |
|     | Gram                         | -              | -       | -       | -           | -       | 12.095 | -      | 12.095      |

|  | Horticulture crops - Fruits | Area ('000 ha) |           |         |
|--|-----------------------------|----------------|-----------|---------|
|  |                             | Total          | Irrigated | Rainfed |
|  | Aonla                       | 0.690          | -         | -       |
|  | Orange                      | 0.749          | -         | -       |
|  | Citrus                      | 0.374          | -         | -       |
|  | Guava                       | 0.236          | -         | -       |
|  | Pomegranate                 | 0.289          | -         | -       |

|             | Horticulture crops - Vegetables | Total  | Irrigated | Rainfed |
|-------------|---------------------------------|--------|-----------|---------|
|             |                                 | Tomato | 0.260     | -       |
| Onion       | 0.204                           | -      | -         |         |
| Brinjal     | 0.149                           | -      | -         |         |
| Bhindi      | 0.203                           | -      | -         |         |
| Cauliflower | 0.160                           | -      | -         |         |
| Pea         | 0.142                           | -      | -         |         |

|            | Medicinal and Aromatic crops | Total   | Irrigated | Rainfed |
|------------|------------------------------|---------|-----------|---------|
|            |                              | Isabgol | 0.024     | -       |
| Aswagandha | 0.031                        | -       | -         |         |

|  |              |         |           |         |
|--|--------------|---------|-----------|---------|
|  | Sona Mukhi   | 0.019   |           |         |
|  | Spices       | Total   | Irrigated | Rainfed |
|  | Cumin        | 2.200   | -         | -       |
|  | Chilli       | 0.500   | -         | -       |
|  | Fenugreek    | 0.500   | -         | -       |
|  | Garlic       | 0.600   | -         | -       |
|  | Coriander    | 0.102   | -         | -       |
|  | Fodder crops | Total   | Irrigated | Rainfed |
|  | Lucern       | 2.682   | -         | -       |
|  | Grazing land | 120.341 | -         | -       |

|  |  |                        |                        |                                  |                                    |  |                                      |
|--|--|------------------------|------------------------|----------------------------------|------------------------------------|--|--------------------------------------|
| <b>1.8</b>   | <b>Livestock</b>                                       |                        | <b>Male ('000)</b>     | <b>Female ('000)</b>             | <b>Total ('000)</b>                |  |                                      |
|  | Non descriptive Cattle (local low yielding)            |                        | 203.112                | 345.094                          | 548.208                            |  |                                      |
|  | Crossbred cattle                                       |                        | 7.932                  | 46.678                           | 54.610                             |  |                                      |
|  | Buffaloes total  |                        | 35.042                 | 275.044                          | 310.086                            |  |                                      |
|  | Goat   |                        | -                      | -                                | 740.026                            |  |                                      |
|  | Sheep  |                        | -                      | -                                | 446.701                            |  |                                      |
|  | Others (Camel, Pig, Horse etc.)                        |                        | -                      | -                                | 21.593                             |  |                                      |
|  | Commercial dairy farms (Number)                        |                        |                        |                                  |                                    |  |                                      |
| <b>1.9</b>   | <b>Poultry</b>   |                        | <b>No. of farms</b>    | <b>Total No. of birds ('000)</b> |                                    |  |                                      |
|  | Backyard   |                        | -                      | 163.513                          |                                    |  |                                      |
| <b>1.10</b>  | <b>Fisheries</b> (Data source: Chief Planning Officer) |                        |                        |                                  |                                    |  |                                      |
|  | <b>A. Capture</b>                                      |                        |                        |                                  |                                    |  |                                      |
|  | 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                             |                                      |
|  |  | -                      |                        | 144                              |                                    | 985  |                                      |
|  | <b>B. Culture</b>                                      |                        |                        |                                  |                                    |  |                                      |
|  |  |                        | 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)          |  | 40378                  | -                      | 426                              |                                    |  |                                      |

**1.11 Production and Productivity of major crops** (Average of last 5 years: 2003 – 04 to 2007 – 08)

| 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) |                                    |  |
| <b>Major Field crops (Crops to be identified based on total acreage)</b>                    |                     |                      |                     |                      |                     |                      |                     |                      |                                    |  |
| Maize   | 270.012             | 1500                 | -                   | -                    | -                   | -                    | 270.012             | 1500                 | -                                  |  |
| Sorghum   | 19.121              | 618                  | -                   | -                    | -                   | -                    | 19.121              | 618                  | -                                  |  |
| Sesame  | 7.958               | 304                  | -                   | -                    | -                   | -                    | 7.958               | 304                  | -                                  |  |
| Guar  | 8.572               | 463                  | -                   | -                    | -                   | -                    | 8.572               | 463                  | -                                  |  |
| Blackgram   | 13.791              | 381                  | -                   | -                    | -                   | -                    | 13.791              | 381                  | -                                  |  |
| Wheat   | -                   | -                    | 198.027             | 2531                 | -                   | -                    | 198.027             | 2531                 | -                                  |  |
| Barley  | -                   | -                    | 28.625              | 2046                 | -                   | -                    | 28.625              | 2046                 | -                                  |  |
| Mustard   | -                   | -                    | 243.496             | 1048                 | -                   | -                    | 243.496             | 1048                 | -                                  |  |
| Gram  | -                   | -                    | 8.46                | 700                  | -                   | -                    | 8.46                | 700                  | -                                  |  |
| <b>Major Horticultural crops (Crops to be identified based on total acreage)(2007-2008)</b> |                     |                      |                     |                      |                     |                      |                     |                      |                                    |  |
| <b>Fruits</b>   |                     |                      |                     |                      |                     |                      |                     |                      |                                    |  |
| Aonla   | 0.142               | 21000                | -                   | -                    | -                   | -                    | 0.142               | 21000                | -                                  |  |
| Orange  | 0.048               | 10000                | -                   | -                    | -                   | -                    | 0.048               | 10000                | -                                  |  |
| Nimbu   | 0.005               | 20000                | -                   | -                    | -                   | -                    | 0.005               | 20000                | -                                  |  |
| Ber   | 2.221               | 14000                | -                   | -                    | -                   | -                    | 2.221               | 14000                | -                                  |  |
| Guava   | 0.389               | 25000                | -                   | -                    | -                   | -                    | 0.389               | 25000                | -                                  |  |
| Pomegranate   | 0.161               | 15000                | -                   | -                    | -                   | -                    | 0.161               | 15000                | -                                  |  |
| <b>Vegetables</b>   |                     |                      |                     |                      |                     |                      |                     |                      |                                    |  |
| Tomato  | 2.059               | 22800                | -                   | -                    | -                   | -                    | 2.059               | 22800                | -                                  |  |
| Bhindi  | 0.675               | 7500                 | -                   | -                    | -                   | -                    | 0.675               | 7500                 | -                                  |  |
| Onion   | 1.881               | 20900                | -                   | -                    | -                   | -                    | 1.881               | 20900                | -                                  |  |
| Cauliflower   | 0.993               | 11000                | -                   | -                    | -                   | -                    | 0.993               | 11000                | -                                  |  |
| Brinjal   | 1.059               | 11700                | -                   | -                    | -                   | -                    | 1.059               | 11700                | -                                  |  |
| Pea   | 0.639               | 7100                 | -                   | -                    | -                   | -                    | 0.639               | 7100                 | -                                  |  |
| <b>Spices</b>   |                     |                      |                     |                      |                     |                      |                     |                      |                                    |  |
| Cumin   | 0.880               | 400                  | -                   | -                    | -                   | -                    | 0.880               | 400                  | -                                  |  |
| Garlic  | 2.340               | 3900                 | -                   | -                    | -                   | -                    | 2.340               | 3900                 | -                                  |  |
| Chilli  | 0.475               | 900                  | -                   | -                    | -                   | -                    | 0.475               | 900                  | -                                  |  |
| Methi   | 0.500               | 1000                 | -                   | -                    | -                   | -                    | 0.500               | 1000                 | -                                  |  |

|             |   |  |  |  |  |   |
|-------------|---|--|--|--|--|---|
| <b>1.12</b> | <b>Sowing window for 5 major field crops</b><br>(start and end of normal sowing period) | Crop 1: <b>Maize</b>   | <b>2: Sorghum</b>  | <b>3: Blackgram</b>                                  | <b>4: Wheat</b>  | <b>5: Mustard</b>   |
|             | Kharif- Rainfed   | 4 <sup>th</sup> week of June to 2 <sup>nd</sup> week of July | 4 <sup>th</sup> week of June to 2 <sup>nd</sup> week of July | 2 <sup>nd</sup> week to 4 <sup>th</sup> week of July | -  | -   |
|             | Kharif-Irrigated  | 2 <sup>nd</sup> to 4 <sup>th</sup> week of June              | -  | -  | -  | -   |
|             | Rabi- Rainfed   | -  | -  | -  | 3 <sup>rd</sup> week of Oct. to 2 <sup>nd</sup> week of Nov. | 4 <sup>th</sup> week of Sept. to 2 <sup>nd</sup> week of Oct. |
|             | Rabi-Irrigated  | -  | -  | -  | 1 <sup>st</sup> to 3 <sup>rd</sup> week of Nov.              | 1 <sup>st</sup> to 3 <sup>rd</sup> week of Oct                |

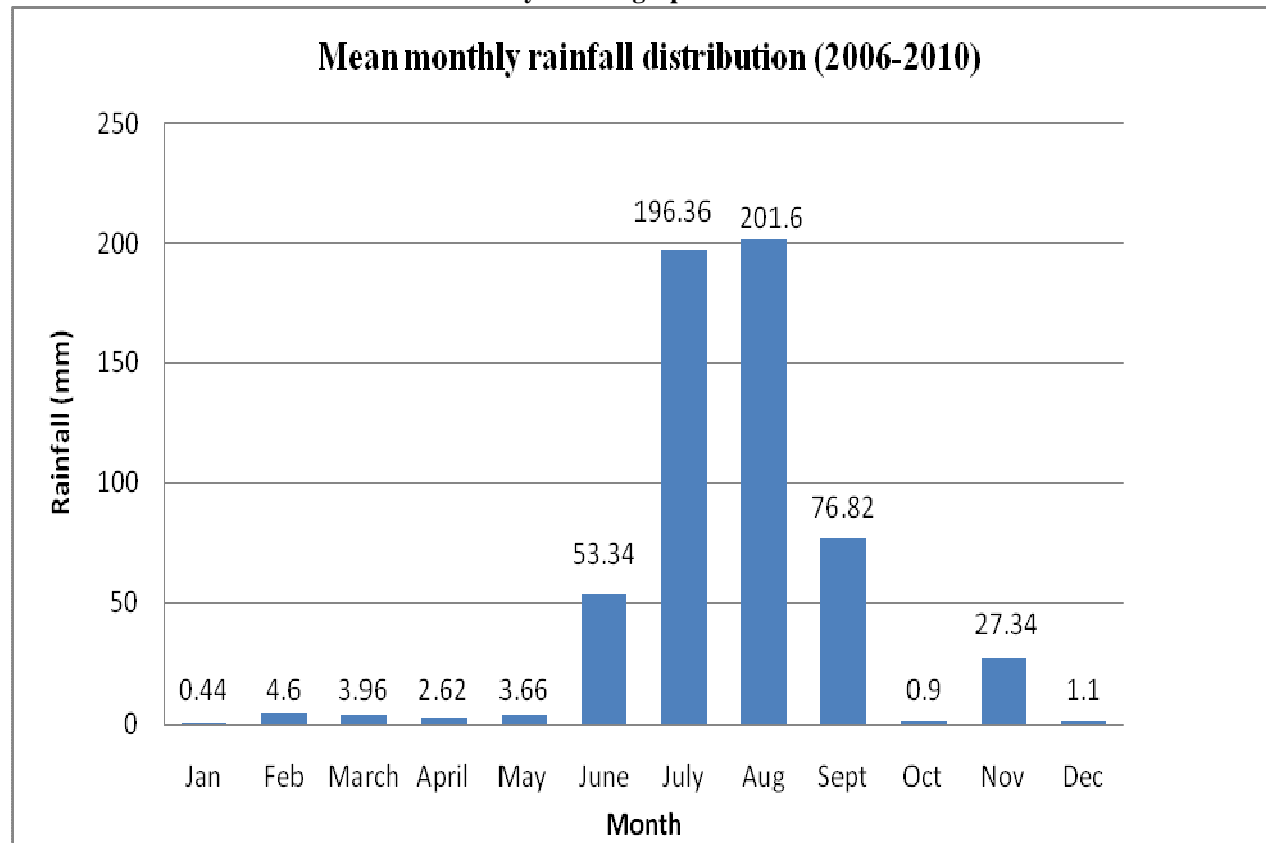
|             |  |                |                   |             |
|-------------|--|----------------|-------------------|-------------|
| <b>1.13</b> | <b>What is the major contingency the district is prone to? (Tick mark)</b> | <b>Regular</b> | <b>Occasional</b> | <b>None</b> |
|             | Drought  | ✓              | -                 | -           |
|             | Flood  | -              | -                 | ✓           |
|             | Cyclone  | -              | -                 | ✓           |
|             | Hail storm   | -              | -                 | ✓           |
|             | Heat wave  | -              | ✓                 | -           |
|             | Cold wave  | -              | ✓                 | -           |
|             | Frost  | -              | ✓                 | -           |
|             | Sea water intrusion  | -              | -                 | ✓           |
|             | Pests and disease outbreak (specify)                                       | -              | -                 | ✓           |

|             |   |   |               |
|-------------|---|---|---------------|
| <b>1.14</b> | <b>Include Digital maps of the district for</b> | 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  
Location map of Bhilwara district

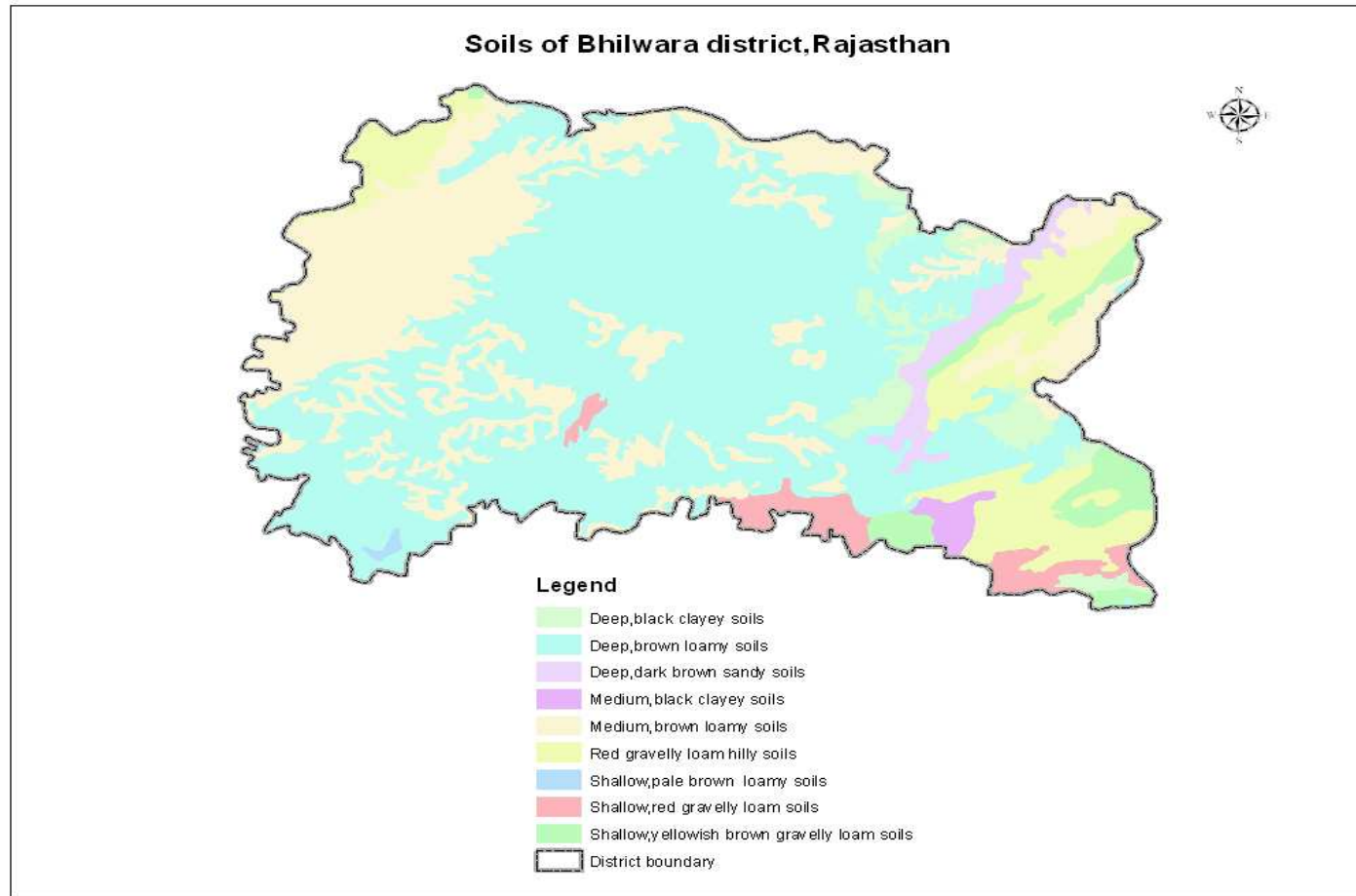


**Annexure 2**  
**Mean monthly rainfall graph of Bhilwara district**





**Annexure 3**  
**Soil map**



Source: NBSS&LUP, Regional Centre, Udaipur

## 2.0 Strategies for weather related contingencies

### 2.1 Drought

#### 2.1.1 Rainfed situation

| Condition   |                                      |   | Suggested Contingency measures  |  |  |
|---|--------------------------------------|---|---|--|--|
| Early season drought (delayed onset)<br><br>Delay by 2 weeks (July 2 <sup>nd</sup> wk) (28 SMW) | Major Farming situation <sup>a</sup> | Normal Crop / Cropping system <sup>b</sup>  | Change in crop / cropping system <sup>c</sup> including variety   | Agronomic measures <sup>d</sup>  | Remarks on Implementation <sup>e</sup>                     |
|   | Black Clayey medium to deep soil     | Maize: PEHM- 2, Pratap Hybrid Maize-1, Pratap Makka-5, Pratap Makka-3, Navjot     | <ul style="list-style-type: none"> <li>Maize: Pratap Makka-3, Him – 129, Pratap Hybrid Maize-1</li> <li>Maize + blackgram (2:2) intercropping</li> </ul>                        | <ul style="list-style-type: none"> <li>Dry sowing/ sowing by rota-till-drill</li> <li>Seed priming of maize (0.1% thiourea) for 6 hours</li> </ul>   | Link RSSC/ NSC/SAU for good seed and RKVY ,for seed drills |
|   |                                      | Groundnut: JL-24, TAG-24, Pratap Moongphali-1 & Pratap Moongphali-2 and TG-37A    | <ul style="list-style-type: none"> <li>Groundnut: JL-24, TG-37A,Pratap Moongphali-2</li> <li>Groundnut + sesame intercropping (6:2)</li> </ul>                                  | -  |  |
|   |                                      | Soybean: JS–335, MACS–13, PK – 472, MACS–58, PS – 16, JS – 71 – 05, Pratap Soya-1 | Soybean: MACS–58, PS – 16, JS-335, JS – 71 – 05, Pratap Soya-1  | -  |  |
|   |                                      | Sorghum: CSH–6, CSH – 14, CSH – 9, Pratap jowar-1430, CSV-17, CSV-15              | <ul style="list-style-type: none"> <li>Sorghum: CSH – 6, CSH – 14, Pratap jowar-1430, CSV-17</li> <li>Grow sorghum with green gram in 1:1 row ratio at 30 cm spacing</li> </ul> | <ul style="list-style-type: none"> <li>Increase seed rate by 25%</li> <li>Dry sowing by Roto till drill</li> <li>Apply 20 kg of carbofuron or phorate (3g) granules in the seed row before sowing to check infestation of shoot fly</li> </ul> |  |
|   |                                      | Blackgram: T-9, RBU-38, TAU-2, PU-19, PU-30                                       | Blackgram: T– 9, RBU-38   | Normal sowing time   |  |
|   |                                      | Sesame: RT – 46, RT – 125, RT-127   |   |  |  |
|   | Brown loamy Deep to medium soil      | Maize: PEHM- 2, Pratap Hybrid Maize-1, Pratap Makka-5, Pratap Makka-3, Navjot     | <ul style="list-style-type: none"> <li>Maize: Pratap Makka-3, Him – 129, Pratap Hybrid Maize-1</li> <li>Maize + blackgram (2:2) intercropping</li> </ul>                        | <ul style="list-style-type: none"> <li>Dry sowing/ sowing by rota-till-drill</li> <li>Seed priming of maize (0.1% thiourea) for 6 hours</li> </ul>   |  |
|   |                                      | Blackgram: T-9, RBU-38,   | Blackgram: T– 9, RBU-38   | Normal sowing time   |  |

|  |                              |  |   |  |
|--|------------------------------|--|---|--|
|  |                              | TAU-2, PU-19, PU-30  |   |  |
|  |                              | Sorghum: CSH-6, CSH – 14, CSH – 9, Pratap jowar-1430, CSV-17, CSV-15           | <ul style="list-style-type: none"> <li>• Sorghum: CSH – 6, CSH – 14, Pratap jowar-1430, CSV-17</li> <li>• Grow sorghum with green gram in 1:1 row ratio at 30 cm spacing</li> </ul> | <ul style="list-style-type: none"> <li>• Increase seed rate by 25%</li> <li>• Dry sowing by Roto till drill</li> <li>• Apply 20 kg of carbofuron or phorate (3g) granules in the seed row before sowing to check infestation of shoot fly</li> </ul> |
|  |                              | Clusterbean: RGC-936, RGC-986, RGC-1003  | Clusterbean: RGC-936, RGC-1003  | Normal sowing time   |
|  |                              | Greengram: K-851, RMG-62   | Greengram: K-851, RMG-62  | Normal sowing time   |
|  |                              | Groundnut: JL-24, TAG-24, Pratap Moongphali-1 & Pratap Moongphali-2 and TG-37A | <ul style="list-style-type: none"> <li>• Groundnut: JL-24, TG-37A, Pratap Moongphali-2</li> <li>• Groundnut + sesame intercropping (6:2)</li> </ul>                                 | -  |
|  | Red gravelly loam hilly soil | Maize: PEHM- 2, Pratap Hybrid Maize-1, Pratap Makka-5, Pratap Makka-3, Navjot  | <ul style="list-style-type: none"> <li>• Maize: Pratap Makka-3, Him – 129, Pratap Hybrid Maize-1</li> <li>• Maize + blackgram (2:2) intercropping</li> </ul>                        | <ul style="list-style-type: none"> <li>• Dry sowing/ sowing by rota-till-drill</li> <li>• Seed priming of maize (0.1% thiourea) for 6 hours</li> </ul>   |
|  |                              | Sorghum: CSH-6, CSH – 14, CSH – 9, Pratap jowar-1430, CSV-17, CSV-15           | <ul style="list-style-type: none"> <li>• Sorghum: CSH – 6, CSH – 14, Pratap jowar-1430, CSV-17</li> <li>• Grow sorghum with green gram in 1:1 row ratio at 30 cm spacing</li> </ul> | <ul style="list-style-type: none"> <li>• Increase seed rate by 25%</li> <li>• Dry sowing by Roto till drill</li> <li>• Apply 20 kg of carbofuron or phorate (3g) granules in the seed row before sowing to check infestation of shoot fly</li> </ul> |
|  |                              | Clusterbean: RGC-936, RGC-986, RGC-1003  | -   | Normal sowing time   |
|  |                              | Greengram: : K-851, RMG-62, MUM-2, SML-668                                     | -   | Normal sowing time   |
|  |                              | Sesame: RT – 46, RT – 125, RT-127  | -   | Normal sowing time   |

| Condition  | Major Farming situation <sup>a</sup> | Normal Crop/cropping system <sup>b</sup> | Suggested Contingency measures   |   |  |
|--|--------------------------------------|--|--|---|--|
|  |                                      |  | Change in crop/cropping system including variety   | Agronomic measures <sup>d</sup>                                     | Remarks on Implementation <sup>e</sup>                   |
| Early season drought (delayed onset)<br><br>Delay by 4 weeks (4 <sup>th</sup> week of July) (30 SMW) | Black Clayey medium to deep soil     | Maize                                    | Maize (fodder): African Tall, Pratap Makka Chari-6   | Increase in seed rate by 10-15% of sesame and green gram            | Link RSSC/ NSC/SAU for good seed and RKVY for seed drill |
|  |                                      | Sorghum                                  | Sorghum (Fodder): Raj Chari-1, Raj Chari-2, Pratap Char-1080, SSG-59-3                         | -   |  |
|  |                                      | black gram                               | Blackgram: T- 9, RBU-38  | -   |  |
|  |                                      | Green gram,                              | Greengram: : K-851, RMG-62, MUM-2, SML-668   | Increase in seed rate by 10-15% of green gram                       |  |
|  |                                      | sesame,                                  | Sesame: RT – 46, RT – 125, RT-127  | Increase in seed rate by 10-15%                                     |  |
|  | Brown loamy Deep to medium soil      | Sorghum for fodder                       | Sorghum (Fodder): Raj Chari-1, Raj Chari-2, Pratap Char-1080, SSG-59-3                         | Increase in seed rate by 10-15% of sesame ,green gram and blackgram |  |
|  |                                      | Sesame                                   | Sesame: RT – 46, RT – 125, RT-127  | Increase in seed rate by 10-15% of sesame                           |  |
|  |                                      | Blackgram                                | Blackgram: T- 9, RBU-38  | Increase in seed rate by 10-15% of blackgram                        |  |
|  |                                      | Green gram                               | Greengram: : K-851, RMG-62, MUM-2, SML-668   | Increase in seed rate by 10-15% of green gram                       |  |
|  |                                      | Horsegram:                               | Horsegram: AK-21, Pratap Kulthi-1  | -   |  |
|  | Red gravelly loam hilly soil         | Sorghum for fodder                       | Sorghum (Fodder): Raj Chari-1, Raj Chari-2, Pratap Char-1080, SSG-59-3<br>Clusterbean: RGC-936 | • Increase seed rate by 10-15%                                      |  |
|  |                                      | sesame,                                  | Greengram: : K-851, RMG-62, MUM-2, SML-668<br>Horsegram: AK-21, Pratap Kulthi-                 | • Increase seed rate by 10-15%                                      |  |

| Condition  |                                      |  | Suggested Contingency measures   |   |   |
|--|--------------------------------------|--|--|---|---|
| Early season drought (delayed onset)   | Major Farming situation <sup>a</sup> | Normal Crop/cropping system <sup>b</sup> | Change in crop/cropping system Including variety   | Agronomic measures <sup>d</sup>   | Remarks on Implementation <sup>e</sup>                    |
| Delay by 6 weeks ( 2 <sup>nd</sup> week of August)<br><br>6-12 <sup>th</sup> August (32 SMW) | Black Clayey medium to deep soil     | Sorghum for fodder/                      | Sorghum (Fodder): Raj Chari-1, Raj Chari-2, Pratap Char-1080, SSG-59-3<br>Pearlmillet Fodder | -   | Link RSSC/ NSC/SAU for good seed and RKVY for seed drills |
|  |                                      | Horsegram,                               | Horsegram: AK-21, Pratap Kulthi-1  | <ul style="list-style-type: none"> <li>Increase seed rate by 20-25% of Horsegram</li> </ul> |   |
|  | Brown loamy Deep to medium soil      | Sorghum for fodder/                      | Sorghum (Fodder): Raj Chari-1, Raj Chari-2, Pratap Char-1080, SSG-59-3<br>Pearlmillet Fodder | -   |   |
|  |                                      | Horsegram                                | Horsegram: AK-21, Pratap Kulthi-1  | <ul style="list-style-type: none"> <li>Increase seed rate by 20-25% of Horsegram</li> </ul> |   |
|  | Red gravelly loam hilly soil         | Sorghum for fodder/                      | Sorghum (Fodder): Raj Chari-1, Raj Chari-2, Pratap Char-1080, SSG-59-3                       | -   |   |
|  |                                      | Horsegram,                               | Horsegram: AK-21, Pratap Kulthi-1  | <ul style="list-style-type: none"> <li>Increase seed rate by 20-25% of Horsegram</li> </ul> |   |

| Condition  |                                      |  | Suggested Contingency measures  |  |   |
|--|--------------------------------------|--|---|--|---|
| Early season drought (delayed onset)   | Major Farming situation <sup>a</sup> | Normal Crop/cropping system <sup>b</sup> | Change in crop/cropping system <sup>c</sup>                           | Agronomic measures <sup>d</sup>  | Remarks on Implementation <sup>e</sup>                    |
| Delay by 8 weeks (4 <sup>th</sup> week of August)<br>20-26 <sup>th</sup> August (34 SMW) | Black Clayey medium to deep soil     | Fallow mustard/ Taramira/ Lentil/gram    | Fallow-Mustard (Bio-902 and Laxmi)/gram(Dahod Yellow and ICCV-10)     | Conserve moisture by run of bakhar after every rain fall<br>Sowing preferably by Rota till drill | Link RSSC/ NSC/SAU for good seed and RKVY for seed drills |
|  | Brown loamy Deep to medium soil      | Fallow –mustard/gram                     | Fallow-Mustard (Bio-902 and Laxmi)/gram(Dahod Yellow and ICCV-10)     | Conserve moisture by run of bakhar after every rain fall<br>Sowing preferably by Rota till drill |   |
|  | Red gravelly loam hilly soil         | Fallow –mustard/barley                   | Fallow-Mustard (Bio-902 and Laxmi)/barley (RD-2052, RD-2552, RD-2035) | Conserve moisture by run of bakhar after every rain fall<br>Sowing preferably by Rota till drill |   |

| Condition  |                                      |   | Suggested Contingency measures   |   |  |
|--|--------------------------------------|---|--|---|--|
|  |                                      |   | Crop management <sup>c</sup>   | Soil nutrient & moisture conservation measures <sup>d</sup>   | Remarks on Implementation  |
| Early season drought (Normal onset)  | Major Farming situation <sup>a</sup> | Normal Crop/cropping system <sup>b</sup>                              |  |   |  |
| Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc. | Black Clayey medium to deep soil     | Maize, Groundnut, Soybean, Sorghum, sesame                            | <ul style="list-style-type: none"> <li>• If germination is less than 50% then farmers should go for re-sowing except groundnut with early maturing varieties with 25% higher seed rate</li> <li>• If plant population is more than 75% go for gap filling.</li> <li>• In groundnut gap filling can be done by sesame and in maize by blackgram or sesame</li> </ul>  | <ul style="list-style-type: none"> <li>• Hoeing by hand hoe to develop soil mulch for conservation of soil moisture.</li> <li>• Removal of Weeds in time.</li> <li>• Use organic material for mulching</li> </ul> | Link RKVY for wheel hoe/power weeder for Inter-culture operation |
|  | Brown loamy Deep to medium soil      | Maize, blackgram, green gram, clusterbean, sorghum, sesame, groundnut | <ul style="list-style-type: none"> <li>• If germination is less than 50% then farmers should go for re-sowing except groundnut with early maturing varieties with 25% higher seed rate</li> <li>• If plant population is more than 75% go for gap filling.</li> <li>• In maize gap filling can be done by sesame or blackgram</li> <li>• In groundnut gap filling can be done by sesame and in maize by blackgram or sesame</li> </ul> | <ul style="list-style-type: none"> <li>• Hoeing by hand hoe to develop soil mulch for conservation of soil moisture.</li> <li>• Removal of Weeds in time.</li> <li>• Use organic material for mulching</li> </ul> |  |
|  | Red gravelly loam hilly soil         | Maize, clusterbean, green gram, sorghum, sesame                       | <ul style="list-style-type: none"> <li>• If germination is less than 50% then farmers should go for re-sowing with early maturing varieties with 25% higher seed rate</li> <li>• If plant population is more than 75% go for gap filling.</li> <li>• In maize and sorghum gap filling can be done by sesame or greengram</li> </ul>  | <ul style="list-style-type: none"> <li>• Hoeing by hand hoe to develop soil mulch for conservation of soil moisture.</li> <li>• Removal of Weeds in time.</li> <li>• Use organic material for mulching</li> </ul> |  |

| Condition   |   |  | Suggested Contingency measures   |  |  |
|---|---|--|--|--|--|
| Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)<br><br>At vegetative stage | Major Farming situation <sup>a</sup>              | Normal Crop/cropping system <sup>b</sup>   | Crop management <sup>c</sup>   | Soil nutrient & moisture conservation measures <sup>d</sup>  | Remarks on Implementation <sup>e</sup>   |
|   | Black Clayey medium to deep soil                  | Maize, Groundnut, Soybean, Sorghum, sesame   | <ul style="list-style-type: none"> <li>• Thinning of plants by 30 to 50%</li> <li>• Weed control</li> </ul>  | <ul style="list-style-type: none"> <li>• Earthing at 30 to 35 days after sowing.</li> <li>• Life saving irrigation from harvested rain water</li> <li>• Mulching in crop rows.</li> <li>• Life saving irrigation from harvested rain water</li> <li>• Spray of kaolin @ 5%</li> <li>• Spray of 1000 ppm of thiourea.</li> <li>• Apply stover of sesame, cotton as mulch</li> <li>• Foliar spray of 2% urea on maize, sorghum and soybean.</li> </ul> | Link RKVY for wheel hoe/power weeder for Inter-culture operation and watersheds for farm pond technology |
|   | Brown loamy Deep to medium soil                   | Maize, blackgram, green gram, clusterbean, sorghum, sesame, groundnut                                  | <ul style="list-style-type: none"> <li>• Thinning of plants by 30 to 50%</li> <li>• Weeding</li> <li>• Insitu mulching of weeds.</li> </ul>  | <ul style="list-style-type: none"> <li>• Ridging in maize.</li> <li>• Life saving irrigation from harvested rain water</li> <li>• Mulching in crop rows.</li> <li>• Spray of kaolin @ 5%</li> <li>• Spray of 1000 ppm of thiourea.</li> <li>• Apply stover of sesame, cotton as mulch</li> <li>• Foliar spray of 2% urea on maize and sorghum.</li> </ul>  |  |
| Red gravelly loam hilly soil  | Maize, clusterbean, , green gram, sorghum, sesame | <ul style="list-style-type: none"> <li>• Thinning of plants by 30 to 50%</li> <li>• Weeding</li> </ul> | <ul style="list-style-type: none"> <li>• Ridging in maize.</li> <li>• Life saving irrigation from harvested rain water</li> <li>• mulching in crop rows.</li> <li>• Spray of kaolin @ 5%</li> <li>• Spray of 1000 ppm of thiourea.</li> <li>• Apply stover of sesame, cotton as mulch</li> <li>• Foliar spray of 2% urea on maize and sorghum</li> </ul> |  |  |

| Condition                           |                                      |   | Suggested Contingency measures   |   |  |
|-------------------------------------|--------------------------------------|---|--|---|--|
| Mid season drought (long dry spell) | Major Farming situation <sup>a</sup> | Normal Crop/cropping system <sup>b</sup>                              | Crop management <sup>c</sup>   | Soil nutrient & moisture conservation measures <sup>d</sup>   | Remarks on Implementation <sup>e</sup>               |
| At flowering/<br>fruiting stage     | Black Clayey medium to deep soil     | Maize, Groundnut, Soybean, Sorghum, sesame                            | <ul style="list-style-type: none"> <li>• Life saving irrigation should be done from harvested rain water except sesame</li> <li>• Removal of lower leaves for fodder in maize and sorghum.</li> <li>• Detasseling in maize</li> <li>• Harvest maize for baby corn if market is available</li> <li>• Harvesting of maize for green cobs and green fodder</li> <li>• Mulching of crop rows.</li> </ul> | <ul style="list-style-type: none"> <li>• Spray of kaolin @ 5%</li> <li>• Spray of 1000 ppm of thiourea.</li> <li>• Apply stover of sesame, cotton as mulch</li> </ul> | Crop Insurance and Farm Pond construction under RKVY |
|                                     | Brown loamy Deep to medium soil      | Maize, blackgram, green gram, clusterbean, sorghum, sesame, groundnut | <ul style="list-style-type: none"> <li>• Life saving irrigation should be done from harvested rain water except sesame</li> <li>• Removal of lower leaves for fodder in maize and sorghum.</li> <li>• Detasseling in maize</li> <li>• Harvest maize for baby corn if market is available</li> <li>• Harvesting of maize for green fodder</li> <li>• Mulching in crop rows.</li> </ul>                | <ul style="list-style-type: none"> <li>• Spray of kaolin @ 5%</li> <li>• Spray of 1000 ppm of thiourea.</li> <li>• Apply stover of sesame, cotton as mulch</li> </ul> |  |
|                                     | Red gravelly loam hilly soil         | Maize, clusterbean, , green gram, sorghum, sesame                     | <ul style="list-style-type: none"> <li>• Life saving irrigation should be done from harvested rain water except sesame</li> <li>• Removal of lower leaves for fodder in maize and sorghum.</li> <li>• Detasseling in maize</li> <li>• Harvest maize for baby corn if market is available</li> <li>• Harvesting of maize for green cobs and green fodder</li> <li>• Mulching in crop rows</li> </ul>  | <ul style="list-style-type: none"> <li>• Spray of kaolin @ 5%</li> <li>• Spray of 1000 ppm of thiourea.</li> <li>• Apply stover of sesame, cotton as mulch</li> </ul> |  |



| Condition                                      |                                      |   | Suggested Contingency measures  |   |   |
|--|--------------------------------------|---|---|---|---|
| Terminal drought (Early withdrawal of monsoon) | Major Farming situation <sup>a</sup> | Normal Crop/cropping system <sup>b</sup>                              | Crop management <sup>c</sup>  | Rabi Crop planning <sup>d</sup>   | Remarks on Implementation <sup>e</sup>                            |
|  | Black Clayey medium to deep soil     | Maize, Groundnut, Soybean, Sorghum, sesame                            | <ul style="list-style-type: none"> <li>• Harvest maize for green cobs</li> <li>• Life saving irrigation with harvested rain water.</li> <li>• Harvest groundnut for green pods</li> </ul> | If late season rains are there, after failure of Kharif crops, Rabi crops i.e. Taramira/ Toria etc. can be sown | Crop Insurance and Construction of Farm Pond under NREGA and RKVY |
|  | Brown loamy Deep to medium soil      | Maize, blackgram, green gram, clusterbean, sorghum, sesame, groundnut | <ul style="list-style-type: none"> <li>• Harvest maize for green cobs</li> <li>• Life saving irrigation with harvested rain water.</li> <li>• Harvest groundnut for green pods</li> </ul> | If late season rains are there, after failure of Kharif crops, Rabi crops i.e. Taramira/ Toria etc. can be sown |   |
|  | Red gravelly loam hilly soil         | Maize, clusterbean, , green gram, sorghum, sesame                     | <ul style="list-style-type: none"> <li>• Harvest maize for green cobs</li> <li>• Life saving irrigation with harvested rain water.</li> <li>• Harvest groundnut for green pods</li> </ul> | If late season rains are there, after failure of Kharif crops, Rabi crops i.e. Taramira/ Toria etc. can be sown |   |

### 2.1.2 Drought - Irrigated situation

| Condition  |                                      |  | Suggested Contingency measures   |   |  |
|--|--------------------------------------|--|--|---|--|
| Delayed release of water in canals due to low rainfall | Major Farming situation <sup>f</sup> | Normal Crop/cropping system <sup>g</sup> | Change in crop/ cropping system <sup>h</sup>   | Agronomic measures <sup>i</sup>   | Remarks on Implementation                                  |
|  | Brown loamy Deep to medium soil      | Maize-wheat/mustard                      | Short Duration Varieties<br>Wheat- HI-1531, HI-1500, HI-8627, Raj-3777, HI-8498, Mustard: Laxmi, Bio-902 | <ul style="list-style-type: none"> <li>• Sowing of short duration varieties.</li> <li>• 25% increase in seed rate in wheat</li> <li>• Irrigation by pressurized irrigation systems.</li> <li>• Irrigation at critical stages.</li> <li>• Thiourea spray at reproductive stage.</li> </ul> | If pond is available sowing can be done by harvested water |
|  |                                      | Soybean-wheat                            | Soybean-wheat  | -do-  |  |
|  |                                      | Groundnut-wheat                          | Groundnut-wheat  | -do-  |  |

| Condition | Major Farming situation <sup>f</sup> | Normal Crop/cropping system <sup>g</sup> | Change in crop/ cropping system <sup>h</sup>   | Suggested Contingency measures   |                           |
|-----------|--------------------------------------|--|--|--|---------------------------|
|           |                                      |  |  | Agronomic measures <sup>i</sup>  | Remarks on Implementation |
| Delayed   | Red gravelly loam hilly soil         | Maize-wheat/mustard/<br>Barley           | Short Duration Varieties<br>Wheat- HI-1531, HI-1500,<br>HI-8627, Raj-3777, HI-8498,<br>Mustard: Laxmi, Bio-902<br>Barley: RD-2052, RD-2035,<br>RD-2552 | <ul style="list-style-type: none"> <li>• Sowing of short duration varieties.</li> <li>• 25% increase in seed rate in wheat and barley</li> <li>• Irrigation by pressurized irrigation systems.</li> <li>• Irrigation at critical stages.</li> <li>• Thiourea spray at reproductive stage.</li> </ul> |                           |
|           |                                      | Groundnut-wheat                          | Groundnut-wheat  | -do-   |                           |

| Condition  | Major Farming situation <sup>f</sup> | Normal Crop/cropping system <sup>g</sup> | Change in crop/ cropping system <sup>h</sup>   | Suggested Contingency measures  |  |
|--|--------------------------------------|--|--|---|--|
|  |                                      |  |  | Agronomic measures <sup>i</sup>   | Remarks on Implementation                                  |
| Limited release of water in canals due to low rainfall | Brown loamy Deep to medium soil      | Maize-wheat/mustard                      | Replace wheat by mustard, lentil and gram<br>Intercropping of gram+mustard (one row of mustard across the 4 m spacing)   | <ul style="list-style-type: none"> <li>• Weed free environment</li> <li>• Use of weeds as mulch.</li> <li>• Irrigation by pressurized irrigation systems.</li> <li>• Irrigation at critical stages.</li> <li>• Thiourea spray at reproductive stage.</li> <li>• Spray of Kaolin @ 5%</li> </ul>                   | If pond is available sowing can be done by harvested water |
|  |                                      | Soybean-wheat                            |  |   |  |
|  |                                      | Groundnut-wheat                          |  |   |  |
|  | Red gravelly loam hilly soil         | Maize-wheat/mustard/<br>Barley           | Replace wheat by Barley, Mustard and Taramira,<br><br>Mustard: Laxmi, Bio-902<br>Barley: RD-2052, RD-2035, RD-2552<br>Taramira: T-27, RTM-314  | <ul style="list-style-type: none"> <li>• 25% increase in seed rate in barley</li> <li>• Spray of 2% urea in barley</li> <li>• Irrigation by pressurized irrigation systems.</li> <li>• Irrigation at critical stages.</li> <li>• Thiourea spray at reproductive stage.</li> <li>• Spray of Kaolin @ 5%</li> </ul> |  |
|  | Groundnut-wheat                      | Groundnut-wheat                          | <ul style="list-style-type: none"> <li>• Irrigation by pressurized irrigation systems.</li> <li>• Irrigation at critical stages.</li> <li>• Thiourea spray at reproductive stage.</li> <li>• Spray of Kaolin @ 5%</li> </ul> |   |  |

| Condition  | Major Farming situation <sup>f</sup>                            | Normal Crop/cropping system <sup>g</sup> | Suggested Contingency measures  |   |  |
|--|---|--|---|---|--|
|  |   |  | Change in crop/cropping system <sup>h</sup>   | Agronomic measures <sup>i</sup>   | Remarks on Implementation <sup>j</sup>                     |
| Non release of water in canals under delayed onset of monsoon in catchment | Brown loamy Deep to medium soil<br>Red gravelly loam hilly soil | Maize-wheat/mustard                      | Only Gram, Mustard, Taramira can be grown if conserved moisture is available due to late season rain fall | <ul style="list-style-type: none"> <li>• Soil mulch by stirring</li> <li>• Weed free environment</li> <li>• Spray of Kaolin @ 5%</li> </ul> | If pond is available sowing can be done by harvested water |
|  |   | Soybean-wheat                            |   |   |  |
|  |   | Groundnut-wheat                          | Only Gram, Mustard, Taramira can be grown if conserved moisture is available due to late season rain fall | <ul style="list-style-type: none"> <li>• Soil mulch by stirring</li> <li>• Weed free environment</li> <li>• Spray of Kaolin @ 5%</li> </ul> |  |
|  |   | Maize-wheat/mustard/ Barley              |   |   |  |
|  |   | Groundnut-wheat                          | -do-  | -do-  |  |

| Condition  | Major Farming situation <sup>f</sup> | Normal Crop/cropping system <sup>g</sup> | Suggested Contingency measures  |   |  |
|--|--------------------------------------|--|---|---|--|
|  |                                      |  | Change in crop/cropping system <sup>h</sup>   | Agronomic measures <sup>i</sup>   | Remarks on Implementation <sup>j</sup>                     |
| Lack of inflows into tanks due to insufficient /delayed onset of monsoon | Brown loamy Deep to medium soil      | Maize-wheat/mustard                      | Only Gram, Mustard, Taramira can be grown if conserved moisture is available due to late season rain fall | <ul style="list-style-type: none"> <li>• Soil mulch by stirring</li> <li>• Weed free environment</li> <li>• Spray of Kaolin @ 5%</li> </ul> | If pond is available sowing can be done by harvested water |
|  |                                      | Soybean-wheat                            |   |   |  |
|  |                                      | Groundnut-wheat                          |   |   |  |
|  | Red gravelly loam hilly soil         | Maize-wheat/mustard/ Barley              | Only Gram, Mustard, Taramira can be grown if conserved moisture is available due to late season rain fall | <ul style="list-style-type: none"> <li>• Soil mulch by stirring</li> <li>• Weed free environment</li> <li>• Spray of Kaolin @ 5%</li> </ul> |  |
| Groundnut-wheat  |                                      |  |   |   |  |

| Condition   | Major Farming situation <sup>f</sup> | Normal Crop/cropping system <sup>g</sup> | Suggested Contingency measures   |  |   |
|---|--------------------------------------|--|--|--|---|
|   |                                      |  | Change in crop/cropping system <sup>h</sup>                                | Agronomic measures <sup>i</sup>  | Remarks on Implementation <sup>j</sup>                  |
| Insufficient groundwater recharge due to low rainfall | Black Clayey medium to deep soil     | Maize-wheat/mustard                      | Sowing of early maturing and drought tolerant varieties of different crops | <ul style="list-style-type: none"> <li>• Thinning of excess plants in mustard</li> <li>• Weed free environment</li> <li>• In-situ mulching by weeds</li> <li>• Irrigation by MIS</li> <li>• Irrigation at critical stages</li> </ul> | Percolation tanks may be dugout through NREGA or NABARD |
|   |                                      | Soybean-wheat                            |  |  |   |
|   |                                      | Groundnut-wheat                          |  |  |   |

| Condition                       | Suggested Contingency measures       |  |  |  |  |
|---------------------------------|--------------------------------------|--|--|--|--|
|                                 | Major Farming situation <sup>f</sup> | Normal Crop/cropping system <sup>g</sup> | Change in crop/cropping system <sup>h</sup>                                | Agronomic measures <sup>i</sup>  | Remarks on Implementation <sup>j</sup> |
| Brown loamy Deep to medium soil |                                      |  |  | <ul style="list-style-type: none"> <li>• Spray of Kaolin @ 5%</li> </ul>   |  |
|                                 | Brown loamy Deep to medium soil      | Maize-wheat/mustard                      | Sowing of early maturing and drought tolerant varieties of different crops | <ul style="list-style-type: none"> <li>• Thinning of excess plants in mustard</li> <li>• Weed free environment</li> <li>• In-situ mulching by weeds</li> <li>• Irrigation by MIS</li> <li>• Irrigation at critical stages</li> <li>• Spray of Kaolin @ 5%</li> </ul> |  |
|                                 |                                      | Groundnut-wheat/Taramira                 |  |  |  |
|                                 |                                      | Maize-gram/Mustard/ Taramira             |  |  |  |
|                                 | Red gravelly loam hilly soil         | Maize-wheat/mustard                      | Sowing of early maturing and drought tolerant varieties of different crops | <ul style="list-style-type: none"> <li>• Thinning of excess plants in mustard</li> <li>• Weed free environment</li> <li>• In-situ mulching by weeds</li> <li>• Irrigation by MIS</li> <li>• Irrigation at critical stages</li> <li>• Spray of Kaolin @ 5%</li> </ul> |  |
|                                 |                                      | Maize-Barley/Taramira                    |  |  |  |

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

| Condition   | Suggested contingency measure   |  |   |   |
|---|---|--|---|---|
|   | Vegetative stage <sup>k</sup>   | Flowering stage <sup>l</sup>   | Crop maturity stage <sup>m</sup>  | Post harvest <sup>n</sup>   |
| Continuous high rainfall in a short span leading to water logging |   |  |   |   |
| Maize   | <ul style="list-style-type: none"> <li>• Drain excess water by proper drainage</li> <li>• Earthing up of crop for anchorage</li> <li>• Intercultivation with hoe to improve the aeration and to control weeds</li> <li>• Apply 20kg N/ha at optimum moisture content</li> </ul> | <ul style="list-style-type: none"> <li>• Drain excess water by proper drainage</li> <li>• Earthing up of crop for anchorage</li> <li>• Intercultivation with hoe to improve soil aeration and to control weeds</li> <li>• Apply multi nutrient or hormonal spray to promote flowering</li> </ul> | <ul style="list-style-type: none"> <li>• Drain excess water by proper drainage as early as possible</li> <li>• Harvest green cobs from dislodged plants for immediate marketing(Maize, sorghum)</li> <li>• Shift the produce into the shed</li> </ul> | <p>Harvest the cobs after they are dried up properly</p> <p>Dry the grains up to 10-12% moisture level before storage</p> |

|            |  |   |  |   |
|------------|--|---|--|---|
| Sorghum    | Drain out excess water-do-<br>Take up plant protection measures<br>Apply 20kg N/ha at optimum<br>moisture content  | <ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Intercultivation with hoe to improve soil aeration and to control weeds</li> <li>• Timely plant protection measures are to be taken up</li> </ul>  | <ul style="list-style-type: none"> <li>• Drain out excess water</li> <li>• Shift the produce into the shed</li> </ul>  | Harvest the panicles after they are dried up, properly<br>Shifting of grain immediately after drying  |
| Soybean    | <ul style="list-style-type: none"> <li>• Drain excess water by proper drainage</li> <li>• Intercultivation with hoe to improve the aeration and to control weeds</li> <li>• Apply 20kg N/ha at optimum moisture content</li> </ul>     | <ul style="list-style-type: none"> <li>• Drain excess water by proper drainage</li> <li>• Intercultivation with hoe to improve soil aeration and to control weeds</li> <li>• Apply multi nutrient or hormonal spray</li> <li>• Planofix to promote flowering</li> </ul>   | <ul style="list-style-type: none"> <li>• Drain excess water by proper drainage as early as possible</li> <li>• Harvest at physiological maturity on clear sunny day</li> </ul>                     | Dry the produce up to 10-12% moisture level before storage /bagging   |
| Green gram | -do-   | -do-  | -do-   | Dry the produce up to 10-12% moisture level before storage /bagging   |
| Black gram | -do-   | -do-  | -do-   | Dry the produce up to 10-12% moisture level before storage /bagging   |
| Sesame     | -do-   | -do-  | -do-   | -   |
| Groundnut  | Drain out the excess water at the earliest<br><br>Take-up the gap filling at the earliest<br><br>Apply 10-15 kg N/ha after draining excess water<br><br>Take up plant protection measures against possible pests and disease incidence | Drain out the excess water at the earliest<br><br>Apply 4-5 kg N/acre after draining excess water<br><br>spray KNO <sub>3</sub> 1 % or Urea 2% water soluble fertilizers like 19-19- or 19, 20-20-20, 21-21-21 at 1% to support nutrition<br><br>Take up plant protection measures against possible pests and disease incidence<br><br>Incorporate. Gypsum 200 kg/ acre at flowering. | Drain out the excess water at the earliest<br><br>Spray KNO <sub>3</sub> 1 % or 2% Urea to support nutrition<br><br>Take up plant protection measures against possible pests and disease incidence | Drain the field immediately.<br><br>Harvest the produce after the event.<br><br>Dry the pods to safe moisture level to prevent storage pests. |
| Rabi crops | Avoid irrigation in irrigated situation  | Avoid irrigation in irrigated situation   | Avoid irrigation in irrigated situation  | Drying of the produce immediately after stop of rain  |
|            |  |   |  |   |

| <b>Horticulture</b>   |   |   |   |   |
|---|---|---|---|---|
| <b>Vegetables</b>   | Removal of excess water from field by formation of small channels   | Removal of excess water from field by formation of small channels   | Removal of excess water and harvest vegetables  |   |
| <b>Heavy rainfall with high speed winds in a short span<sup>2</sup></b> |   |   |   |   |
| <b>Crops</b>  |   |   |   |   |
| Maize   | <ul style="list-style-type: none"> <li>• Drain excess water by proper drainage</li> <li>• Earthing up of crop for anchorage</li> <li>• Intercultivation with hoe to improve the aeration and to control weeds</li> <li>• Apply 20kg N/ha at optimum moisture content</li> </ul> | <ul style="list-style-type: none"> <li>• Drain excess water by proper drainage</li> <li>• Earthing up of crop for anchorage</li> <li>• Intercultivation with hoe to improve soil aeration and to control weeds</li> <li>• Apply multi nutrient or hormonal spray to promote flowering</li> <li>• Tie the fallen plants in to bundles with the help of leaves</li> </ul> | <ul style="list-style-type: none"> <li>• Drain excess water by proper drainage as early as possible</li> <li>• Harvest green cobs from dislodged plants for immediate marketing(Maize, sorghum)</li> <li>• Shift the produce into the shed</li> </ul> | Harvest the cobs after they are dried up properly<br>Dry the grains up to 10-12% moisture level before storage /bagging |
| Sorghum   | Drain out excess water<br><br>Take up plant protection measures<br>Apply 20kg N/ha at optimum moisture content  | Drain out excess water<br>Tie the fallen plants in to bundles with the help of leaves<br><br>Timely plant protection measures are to be taken up  | <ul style="list-style-type: none"> <li>• Drain out excess water Shift the produce into the shed</li> </ul>  | Harvest the Panicles after they are dried up properly<br><br>Shifting of grain immediately after drying                 |
| Soybean   | <ul style="list-style-type: none"> <li>• Drain excess water by proper drainage</li> <li>• Intercultivation with hoe to improve the aeration and to control weeds</li> <li>• Apply 20kg N/ha at optimum moisture content</li> </ul>  | <ul style="list-style-type: none"> <li>• Drain excess water by proper drainag</li> <li>• Intercultivation with hoe to improve soil aeration and to control weeds</li> <li>• Apply multi nutrient or hormonal spray</li> <li>• Planofix to promote flowering</li> </ul>  | <ul style="list-style-type: none"> <li>• Drain excess water by proper drainage as early as possible</li> <li>• Harvest at physiological maturity on clear sunny day</li> </ul>  | Dry the produce up to 10-12% moisture level before storage /bagging   |
| Green gram  | -do-  | -do-  | -do-  | -   |
| Black gram  | -do-  | -do-  | -do-  | -   |
| Sesame  | -do-  | -do-  | -do-  | -   |
| Groundnut   | Drain out the excess water at the earliest<br><br>Take-up the gap filling at the earliest<br>Apply 10-15 kg N/ha after  | Drain out the excess water at the earliest<br><br>Apply 4-5 kg N/acre after draining excess water   | Drain out the excess water at the earliest<br><br>Spray KNO <sub>3</sub> 1 % or 2% Urea to support nutrition  | Drain the field immediately.<br>Harvest the produce after the event.<br><br>Dry the pods to safe                        |

|                     |   |   |  |  |
|---------------------|---|---|--|--|
|                     | draining excess water<br><br>Take up plant protection measures against possible pests and disease incidence | Spray KNO <sub>3</sub> 1 % or Urea % water soluble fertilizers like 19-19- or 19, 20-20-20, 21-21-21 at 1% to support nutrition<br><br>Take up plant protection measures against possible pests and disease incidence<br><br>Incorporate. Gypsum 200 kg/ acre at flowering. | Take up plant protection measures against possible pests and disease incidence | moisture level to prevent storage pests. |
| <b>Horticulture</b> | Removal of excess water from field by formation of small channels   | Removal of excess water from field by formation of small channels   | Removal of excess water from field by formation of small channels              | -  |

| <b>Outbreak of pests and diseases due to unseasonal rains</b> |   |   |   |  |
|---|---|---|---|--|
| Maize/  | <b>Insect pest :-</b> Aphid, Jassids<br>spray Dimethoate 30EC or Monocrotophos 36 SL 1ml / lit water  | <b>Insect pest :-</b> Stem Borer<br>Quinalphos @ 2 ml/lit .   |   |  |
| Sorghum   | Early planting with( in one week) onset of monsoon to avoid shoot fly incidence for kharif crop<br><br>End of sept 1 <sup>st</sup> week of October to escape the damage of shoot fly for rabi crop<br><br>Spraying dithane M-45@2%, 2-3 times during early growth of plants to control rust disease | Stem borer damage can be checked by application of insecticides like carbaryl3G furodon3G@10-12kg/ha in the whorl at 30-35 days after germination | Dusting of carbaryl50 WP, Carbaryl3D once or twice at ear emergence to control sorghum midge and ear head bug | Quick drying grain 10-12% moisture to avoid storage grain pests    |
| Soybean   | Yellow mosaic virus   | Spray of methyl demeton/ monocrotophos any other systemic insecticide to control the vector of virus  |   | Quick drying of grain 10-12% moisture to avoid storage grain pests |

### 2.3 Floods Not Applicable

| <b>Condition</b>                                   | <b>Suggested contingency measure</b> |                         |                           |                   |
|--|--------------------------------------|-------------------------|---------------------------|-------------------|
|  | <b>Seedling / nursery stage</b>      | <b>Vegetative stage</b> | <b>Reproductive stage</b> | <b>At harvest</b> |
| <b>Transient water logging/ partial inundation</b> | <b>NA</b>                            |                         |                           |                   |

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

| Extreme event type                            | Suggested contingency measure <sup>r</sup>                         |                             |                             |                                   |
|---|--|-----------------------------|-----------------------------|-----------------------------------|
|   | Seedling / nursery stage   | Vegetative stage            | Reproductive stage          | At harvest                        |
| Hot wave                                      | -  | -                           | -                           | Harvest at physiological maturity |
| Horticulture                                  |  |                             |                             |                                   |
| Vegetables (Tomato/<br>Onion/Chilli /Brinjal) | Protected cultivation in shade net house<br>Spray of borex at 0.1% | Light & frequent irrigation | Light & frequent irrigation | Timely picking of fruits          |

|                         |   |  |   |   |
|-------------------------|---|--|---|---|
| <b>Cold wave</b>        |   |  |   |   |
| Wheat                   | Light irrigation<br>Smoking during night                              | Light irrigation<br>Smoking during night | <ul style="list-style-type: none"> <li>• Spray of H<sub>2</sub>SO<sub>4</sub> @ 0.1%,</li> <li>• Burning of crop residues around the field</li> <li>• Light irrigation</li> </ul> | Harvest at physiological maturity         |
| Mustard                 | Light irrigation<br>Smoking during night                              | Light irrigation<br>Smoking during night |   | Light irrigation<br>Smoking during night  |
| Gram                    | Light irrigation<br>Smoking during night                              | Light irrigation<br>Smoking during night |   | Light irrigation<br>Smoking during night  |
| <b>Horticulture</b>     |   |  |   |   |
| Pea, tomato,<br>brinjal | Protected cultivation in<br>shade net house<br>Spray of borex at 0.1% | Light irrigation<br>Smoking during night | <ul style="list-style-type: none"> <li>• Spray of H<sub>2</sub>SO<sub>4</sub> @ 0.1%,</li> <li>• Burning of crop residues around the field</li> <li>• Light irrigation</li> </ul> | Harvest and marketed as early as possible |
| <b>Frost</b>            |   |  |   |   |
| Wheat                   | Light irrigation<br>Smoking during night                              | Light irrigation<br>Smoking during night | <ul style="list-style-type: none"> <li>• Spray of H<sub>2</sub>SO<sub>4</sub> @ 0.1%,</li> <li>• Burning of crop residues around the field</li> <li>• Light irrigation</li> </ul> | -   |
| Mustard                 | -do-  | -do-                                     | -do-  | Harvest at physiological maturity         |
| Gram                    | -do-  | -do-                                     | -do-  | Harvest at physiological maturity         |
| <b>Horticulture</b>     | -do-  | -do-                                     | -do-  | Harvest at physiological maturity         |
| Pea, tomato,<br>brinjal | Protected cultivation in<br>shade net house<br>Spray of borex at 0.1% | Light irrigation<br>Smoking during night | <ul style="list-style-type: none"> <li>• Spray of H<sub>2</sub>SO<sub>4</sub> @ 0.1%,</li> <li>• Burning of crop residues around the field</li> <li>• Light irrigation</li> </ul> | Light irrigation<br>Smoking during night  |
| <b>Cyclone</b>          | <b>Situation does not exist</b>                                       | -  | -   | -   |



## 2.5 Contingent strategies for livestock, Poultry & Fisheries

### 2.5.1 Livestock

|                              | Suggested contingency measures  |  |  |
|------------------------------|---|--|--|
|                              | Before the event  | During the event   | After the event  |
| <b>Drought</b>               |   |  |  |
| Feed and Fodder availability | <p>As the district is regularly drought prone one, it should have some feed and fodder reserves at any point of the year for mobilization to the drought affected villages, Hence the under mentioned feed reserves should be created at district head quarter</p> <p>Urea molasses mineral bricks (UMMB):50-100 t</p> <p>Hay:100-250 t</p> <p>Concentrates: 20-50 t</p> <p>Minerals and vitamin supplements mixture:5-10 t</p> <p>Preserve available green fodder maize as silage fodder for feeding productive animals during drought/ summer</p> <p>Available crop residues especially Bajra Karabi, Wheat/barley straw/ Chopped sewan/Dhaman/Bharut/ Dry leaves of Jharberi/ Groundnut bhusa should be stored properly in the farm of hay at individual farmer level.</p> <p>Harvest the top fodder (Khejari, Neem, Subabul, Acasia, Pipol etc) and create fodder banks at village level</p> <p>Establishment of silvi-pastoral system in CPRs with <i>Stylosanthus hamata</i> and <i>Cenchrus ciliaris</i> as grass with <i>Leucaena leucocephala</i> as tree component</p> <p>Top dressing of N in 2-3 split doses @ 20-25 kg</p> | <p>Harvest and use all the failed crop (Maize, Blackgram, Sorghum, Ground nut, Cluster bean, Wheat, Barley, Green gram, Soybean etc..) material as fodder and feed the Livestock.</p> <p>Use judiciously the karabi, Preserved sewan /Dhaman /Bharut, Wheat straw, Lopped Khejari</p> <p>High productive animals should be Supplemented with tree fodder</p> <p>Available feed and fodder should be cut from CPRs and stall fed in order to reduce the energy requirements of the animals</p> <p><b>In case of Severe drought:</b> UMMB, hay, concentrates and vitamin &amp; mineral mixture should be transported to the drought affected villages</p> <p>All the hay should be enriched with 2% Urea molasses solution or 1% common salt solution and fed to LS</p> <p>Herd should be split and supplementation should be given only to the highly productive and breeding animals</p> <p>Provision of emergency grazing/feeding (Cow-calf camps or other special arrangements to protect high productive &amp; breeding stock)</p> <p>Available kitchen waste should be mixed with dry fodder while feeding</p> | <p>Flushing the stock to recoup</p> <p>Replenish the feed and fodder banks</p> |

|               |   |  |   |
|---------------|---|--|---|
|               | <p>N/ha in CPRs with the monsoon pattern for higher biomass production</p> <p>Increase area under short duration fodder crops of sorghum/bajra/maize(UP chari, MP chari, HC-136, HD-2, GAIN T BAJRA, L-74, K-677, Ananad/African Tall, Kisan composite, Moti, Manjari, B1-7 etc..) on farmers fields with some input subsidy</p> <p>Avoid burning of wheat straw</p> <p>Harvesting and collection of perennial vegetation particularly grasses which grow during monsoon</p> <p>Proper drying, bailing and densification of harvested grass</p> <p>Capacity building and preparedness of the stakeholders and official staff for the extreme events</p> | <p>Arrangements should be made for mobilization of small ruminants across the districts where no drought exits</p> <p>Unproductive livestock should to be culled during severe drought</p> <p>Create transportation and marketing facilities for the culled and unproductive animals (10000-20000 animals)</p> <p>Subsidized loans should be provided to the livestock keepers for procurement of feed</p>   |   |
| <b>Floods</b> | <p>Harvest all the possible wetted grain (Sorghum, Wheat, Groundnut etc) and use as animal feed.</p> <p>Don't allow the animals for grazing in case of early fore warning (EFW)</p> <p>Incase of EFW, shift the animals to safer places.</p>  | <p>Treatment of the sick, injured and affected animals through arrangement of mobile emergency veterinary hospitals / rescue animal health workers.</p> <p>Diarrhea out break may happen arrangement should be made to mitigate the problem</p> <p>Protect the animals from heavy rains and thunder storms</p> <p>In severe cases un-tether or let loose the animals</p> <p>Arrange transportation of highly productive animals to safer place</p> <p>Spraying of fly repellants in animal sheds</p> | <p>Repair of animal shed</p> <p>Deworm the animals through mass camps</p> <p>Vaccinate against possible out breaks</p> <p>Proper disposable of the dead animals / carcasses by burning / burying with lime powder in pit</p> <p>Bleach / chlorinate (0.1%) drinking water or water resources</p> <p>Collect drowned crop material, dry it and store for future use</p> <p>Sowing of above mention short duration fodder crops in unsown and water logged areas</p> <p>Application of urea (20-25kg/ha) in the CPR's to enhance the bio mass</p> |

|                                      |   |  |  |
|--------------------------------------|---|--|--|
|                                      |   |  | production.  |
| <b>Heat &amp; Cold wave</b>          | <p>Arrangement for protection from <b>heat wave</b></p> <ul style="list-style-type: none"> <li>i) Provision shed with bamboo/thatched material</li> <li>ii) Plantation around the shed</li> <li>iii) H<sub>2</sub>O sprinklers / foggers in the shed</li> <li>iv) Application of white reflector paint on the roof</li> </ul> <p><b>Cold wave :</b> Covering all the wire meshed walls / open area with gunny bags/ polyethylene sheets (with a mechanism for lifting during the day time and putting down during night time)</p>   | <p>Allow the animals early in the morning or late in the evening for grazing during heat waves</p> <p>Allow for grazing between 10AM to 3PM during cold waves</p> <p>Feed green fodder/silage / concentrates during day time and roughages / hay during night time in case of heat waves</p> <p>Add 25-50 ml of edible oil in concentrates and fed to the animal during cold waves</p> <p>Put on the foggers / sprinklers during heat waves and heaters during cold waves</p> <p>In severe cases, vitamin 'C' and electrolytes should be added in H<sub>2</sub>O during severe heat waves.</p> <p>Apply / sprinkle lime powder in the animal shed during cold waves to neutralize ammonia accumulation</p> | <p>Feed the animals as per routine schedule</p> <p>Allow the animals for grazing (normal timings)</p>  |
| <b>Health and Disease management</b> | <p>Procure and stock emergency medicines and vaccines for important endemic diseases of the area</p> <p>All the stock must be immunized for endemic diseases of the area</p> <p>Surveillance and disease monitoring network to be established at Joint Director (Animal Husbandry) office in the district</p> <p>Adequate refreshment training on draught management to be given to VAS, Jr.VAS, LI with regard to health &amp; management measures.</p> <p>Procure and stock multivitamins &amp; area specific mineral mixture</p> | <p>Carryout deworming to all animals entering into relief camps</p> <p>Identification and quarantine of sick animals</p> <p>Constitution of Rapid Action Veterinary Force</p> <p>Performing ring vaccination (8 km radius) in case of any outbreak</p> <p>Restricting movement of livestock in case of any epidemic</p> <p>Rescue of sick and injured animals and their treatment</p> <p>Organize with community, daily lifting of dung from relief camps</p>  | <p>Keep close surveillance on disease outbreak.</p> <p>Undertake the vaccination depending on need</p> <p>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</p> |
| <b>Insurance</b>                     | Encouraging insurance of livestock  | Listing out the details of the dead animals  | Submission for insurance claim and   |

|                |   |  |   |
|----------------|---|--|---|
|                |   |  | availing insurance benefit<br>Purchase of new productive animals                        |
| Drinking water | <p>Identification of water resources</p> <p>Desilting of ponds</p> <p>Rain water harvesting and create water bodies/watering points (when water is scarce use only as drinking water for animals)</p> <p>Construction of drinking water tanks in herding places/village junctions/relief camp locations</p> <p>Community drinking water trough can be arranged in shandies /community grazing areas</p> | <p>Restrict wallowing of animals in water bodies/resources</p> <p>Provide clean drinking water</p> | <p>Bleach (0.1%) drinking water / water sources</p> <p>Provide clean drinking water</p> |

### 2.5.2 Poultry

|                               | Suggested contingency measures   |  |  |
|-------------------------------|--|--|--|
|                               | Before the event <sup>a</sup>  | During the event   | After the event  |
| <b>Drought</b>                |  |  |  |
| Shortage of feed ingredients  | <p>Storing of house hold grain like maize, wheat, sorghum, bajra etc,</p> <p>Culling of weak birds</p>   | <p>Supplementation only for productive birds with house hold grain</p> <p>Supplementation of shell grit (calcium) for laying birds</p> | Supplementation to all the birds   |
| Drinking water                | Rain water harvesting  | Sanitation of drinking water   | Give sufficient water as per the bird's requirement  |
| Health and disease management | <p>Culling of sick birds.</p> <p>Deworming and vaccination against RD and IBD</p>  | Mixing of Vit. A,D,E, K and B-complex including vit C in drinking water  | <p>Hygienic and sanitation of poultry house</p> <p>Disposal of dead birds by burning / burying with lime powder in pit</p> |
| <b>Floods</b>                 |  |  |  |
| Shortage of feed ingredients  | <p>In case of EFW, shift the birds to safer place</p> <p>Storing of house hold grain like wheat/rice, sorghum, bajra etc,</p> <p>Culling of weak birds</p> | <p>Use stored feed as supplement</p> <p>Don't allow for scavenging</p> <p>Protect from thunder storms</p>                              | Supplementation to all the birds   |
| Drinking water                | Provide clean drinking water   | Sanitation of drinking water   | Give sufficient water as per the   |

|                                |  |   |   |
|--------------------------------|--|---|---|
|                                |  |   | bird's requirement  |
| Health and disease management  | In case of EFW, add antibiotic powder in drinking water to prevent any disease outbreak            | Sanitation of poultry house<br>Treatment of affected birds<br>Prevent water logging surrounding the sheds<br>Assure supply of electricity<br>Sprinkle lime powder to prevent ammonia accumulation due to dampness | Hygienic and sanitation of poultry house<br>Disposal of dead birds by burning / burying with lime powder in pit |
| <b>Heat wave</b>               |  |   |   |
| Shelter/environment management | Provision of proper shelter with good ventilation  | In severe cases, foggers/water sprinklers/wetting of hanged gunny bags should be arranged<br>Don't allow for scavenging during mid day  | Routine practices are followed  |
| Health and disease management  | Deworming and vaccination against RD and IBD   | Supplementation of house hold grain<br>Provide cool and clean drinking water with electrolytes and vit. C<br>In hot summer, add anti-stress probiotics in drinking water or feed                                  | Routine practices are followed  |
| <b>Cold wave</b>               |  |   |   |
| Shelter/environment management | Provision of proper shelter<br>Arrangement for brooding<br>Assure supply of continuous electricity | Close all openings with polythene sheets<br>In severe cases, arrange heaters<br>Don't allow for scavenging during early morning and late evening  | Routine practices are followed  |
| Health and disease management  | Arrangement for protection from chilled air  | Supplementation of grains<br>Antibiotics in drinking water to protect birds from pneumonia  | Routine practices are followed  |

**2.5.3: Fisheries/Aquaculture: Not Applicable**