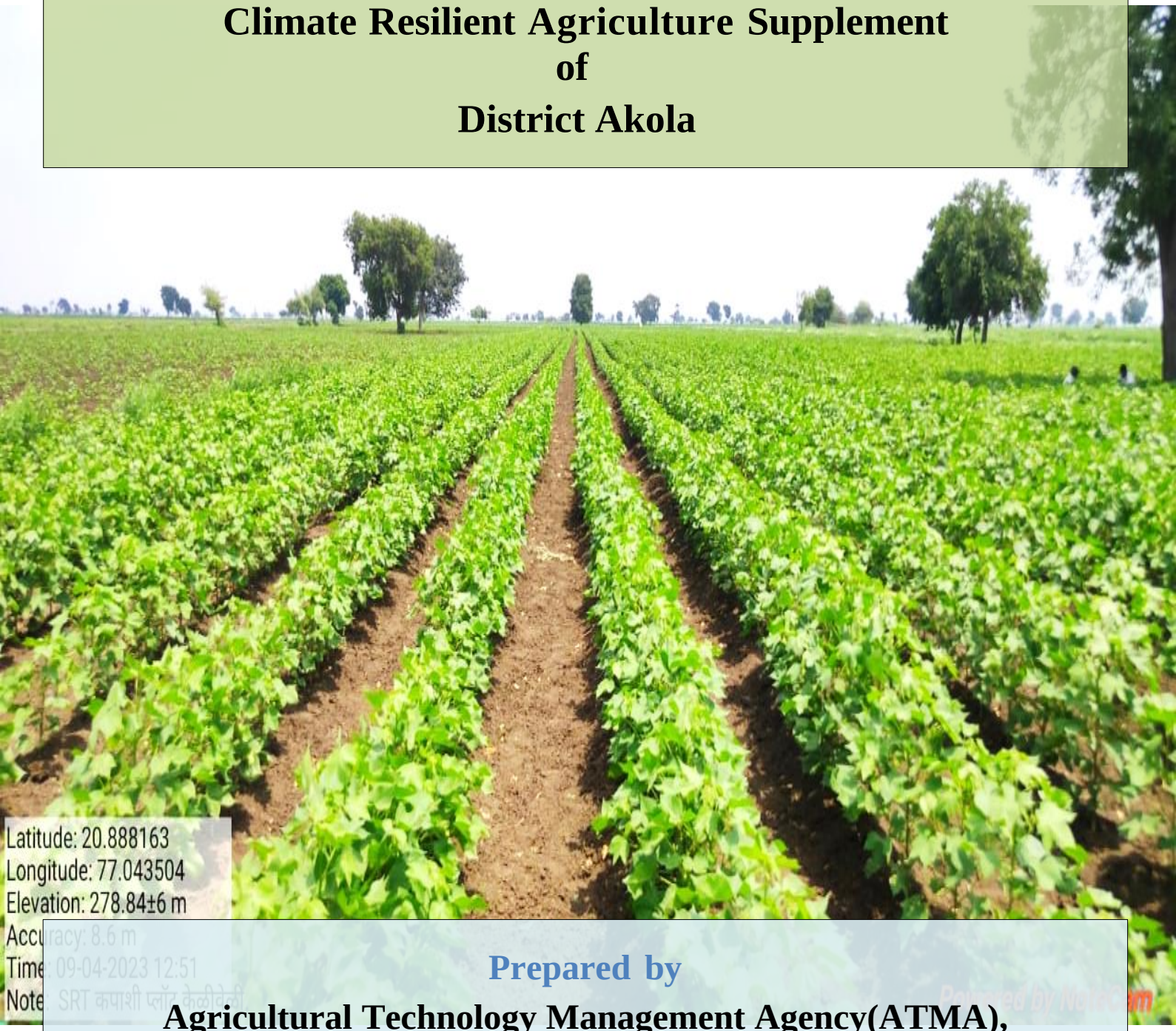
Nanaji Deshmukh Krushi Sanjeevani Prakalp

Strategic Research & Extension Plan (SREP)
Climate Resilient Agriculture Supplement
of
District Akola



Prepared by

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INTRODUCTION

The Project on Climate Resilient Agriculture in Maharashtra (PoCRA) is a project of Government of Maharashtra with Partnership of World Bank and the project is implemented in 5220 vulnerable villages in 16 districts of Marathwada, Vidarbha and North Maharashtra. The project development objective (PDO) is 'to enhance climate resilience and profitability of smallholder farming system in selected districts of Maharashtra'. On the backdrop of frequent droughts affecting the agriculture in the state, the project is focused on enhancing climate resilience at farm level. Climate Resilient Agriculture involves sustainable agricultural practices that enhance productivity, mitigate risks, and reduce greenhouse gas emissions. The farmers can ensure food security in the face of extreme weather events and climate change by adopting climate-resilient agriculture practices. The extension functionary of the Department of Agriculture is mandated to disseminate knowledge and skills about resilient technologies to the farming community. The district-level authority of the Department of Agriculture prepares the strategy for need-based extension with the help of the Agriculture Universities and Krushi Vidnyan Kendra's. In order to facilitate this process, the Government of India has directed the states to prepare a Strategic Research and Extension Plan (SREP) at the district level as an integral part of extension reforms under the Agriculture Technology Management Agency (ATMA) initiative.

SREPs are multi-year strategy documents for the dissemination of innovations and the coordinated interaction in the field between State Agricultural Universities (SAU), Regional Research Stations (KVK), district-level agricultural extension services (ATMA) and the farming community. SREPs are developed under the leadership of the Project Director (ATMA), whose responsibility is to bring together researchers, extensionists, farmers and other stakeholders to make, based on joint diagnostic studies, district extension plan and recommendations for expanded adaptive research to introduce innovations in technology dissemination to cater to local needs and situations. The project had taken a conscious decision to review and update the current SREPs to mainstream climate vulnerability and its impact on farming in project districts as well as to explore the potential for strengthening existing value chains with up-to-date market intelligence. This task is accomplished with preparation of climate resilient agriculture supplement as a supportive document to the current SREP of each project district. As per the project agreement between the Government of Maharashtra and the World Bank, the updation of SREPs is considered as one of the project assessment indicators. The document is prepared by the Project Director (ATMA) in consultation with the field functionary of the Department of Agriculture, State Agriculture Universities (SAUs), Krushi Vigyan Kendra's (KVKs), Farmers, Farmer Producer Organizations from the district. The SREP supplement contains an account of weather analysis, information about cropping pattern, impact of climate change on crop yields, coping mechanisms adopted by the farmers, adoption level of climate resilient technologies, constraints in marketing of agriculture produce and scope for value chain development. The SREP supplement ends with comprehensive template for Village Adaptation Plan which will act as guide for the Agriculture Assistants who are the cutting-edge extension workers. It will be helpful to extension workers while carrying out extension of 'climate resilience technologies.

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Chapter 1: General Profile of the District

1.1 Geographical area and location of the district

Akola district is situated in the middle east of Maharashtra state. The latitude & longitude of the districts is 20°55′33″N to 77°45′53″E. There are ranges of Gavilgad hills on the north of the district. Total area of Akola district is 5428 sq. Kms. Which is 1.76% of the total area of the state. The largest tehsil is Akola tehsil. It consists of an area of 1134.13 sq.km. Telhara tehsil has the lowest area of 628 sq. Kms. district comprises Eastern Maharashtra Plateau zone. As per 2011 census total population of the district is 1,813,906 as per the Census 2011. Out of which 932,334 are males while 881,572 are females. In 2011 there were a total 395,690 families residing in Akola district. The Average Sex Ratio of Akola district is 946.

1.2 Tehsil details

There are 7 blocks and 998 villages in Akola district.

Sr. No.	Block	Total villages (No.)	Sr. no	Block	Total villages (No.)
1	Akola	197	5	Murtijapur	164
2	Akot	181	6	Patur	96
3	Balapur	99	7	Telhara	102
4	Barshitakali	159	Total villages- 998		

(Source: Dr. P.D.K.V Akola, annual report, year 2022.)

1.3 Annual average rainfall of the district

Average annual rainfall of the district is 750 mm. Highest rainfall is received in telhara tehsil (1105 mm.) and lowest rainfall is received in Akola tehsil (785 mm.)

1.4 Demographic information

Sr No.	Block	Population	% of literacy	Male	Female	Workers						Social Category			
						Agri.			Non Agri.						
						Male	Female	Total	Male	Female	Total	SC	ST	OBC	Gen
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Akola	751345	78	431295	320050	67943	25450	93393	65250	48255	113505	68500	38565	395780	248500
2	Murtizapur	174650	80	89711	84939	30223	20436	50659	59488	64503	123991	49759	7039	0	0
3	Barshitakli	149243	72	77234	72009	25900	7209	33109	51334	64800	116134	35677	9820	0	39944
4	Akot	232493	72	119863	112630	29385	19591	48976	9776	6518	16294	31940	24524	11857	164172
5	Telhara	156776	71	80951	75825	20859	13906	34765	4657	3105	7762	12027	9376	79955	55418
6	Balapur	130997	75	68672	62325	20762	14178	34940	5069	4402	9471	11358	5380	76250	38009
7	Patur	150642	72	99632	51010	56324	36124	92448	43308	14886	58194	43215	9365	79325	18737

(Source: ATMA SREP, 2019 and KVK, Akola)

1.5 Max. and min. temperature of the district

Temperature rises rapidly from mid-February to till May which is the hottest month of the year. Minimum Temp is 5.6°C and Maximum Temp is 45.9°C in the district and Max. 45°C in Akot tehsil and min.17°C in Balapur.

1.6 River network of the district

The main rivers of the district are "Purna, Katepurna, Morna, Man, Nand, Uma, Aas and Vaan are the tributaries of the Purna. Mass, Utawali, Vishwamitri, Nirguna and Gandhari are the tributaries of the Man River.

River Network map

1.7 Irrigation potential of the district

Sr. No.	Tehsil	Canals (Area)	Tanks		Open Wells		Tube /Bore Wells		Lift Irrigation		Other Sources		Total	
			Nos.	Area (Ha.)	Nos.	Area (Ha.)	Nos.	Area (Ha.)	Nos.	Area (Ha.)	Nos.	Area (Ha.)	Nos.	Area (Ha.)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Akola	11125	1	266.36	1164	1164.30	-	-	-	-	2	1369.56	1167	2800.220
2	Barshitakli	2450	2	373.25	2930	3028.30	-	-	1	294.25	3	2066.53	3334	6062.630
3	Murtijapur	3477	2	313.04	3328	3328.60	-	-	-	-	2	1466.36	3332	5108.000
4	Akot	1950	5	765.60	8321	8321.52	-	-	1	294.25	8	10890.6	8335	20271.930
5	Telhara	14347	6	740.15	9985	9985.82	-	-	1	294.25	7	6922.53	9999	17942.750
6	Balapur	3051	2	313.69	3328	3328.60	-	-	-		3	2895.24	3333	6537.530
7	Patur	7718	5	733.50	8321	8321.52	-	-	1	294.25	5	4344.98	8332	13694.250
Total District		**44118**	**23**	**3505.59**	**37377**	**37478.66**	0	0	**4**	**1177.00**	**30**	**29955.8**	**37832**	**72417.31**

(Source: ATMA SREP, 2019 and KVK, Akola)

1.8 Different types of soils of the districts

Two types of soils have been observed in the district namely medium black soil occurring in the plain central part of trap origin and deep black soil occurring in the valley in the northern part. The district Saline Sodic Soils (Among all soils of Akola district) about 153977 Ha.

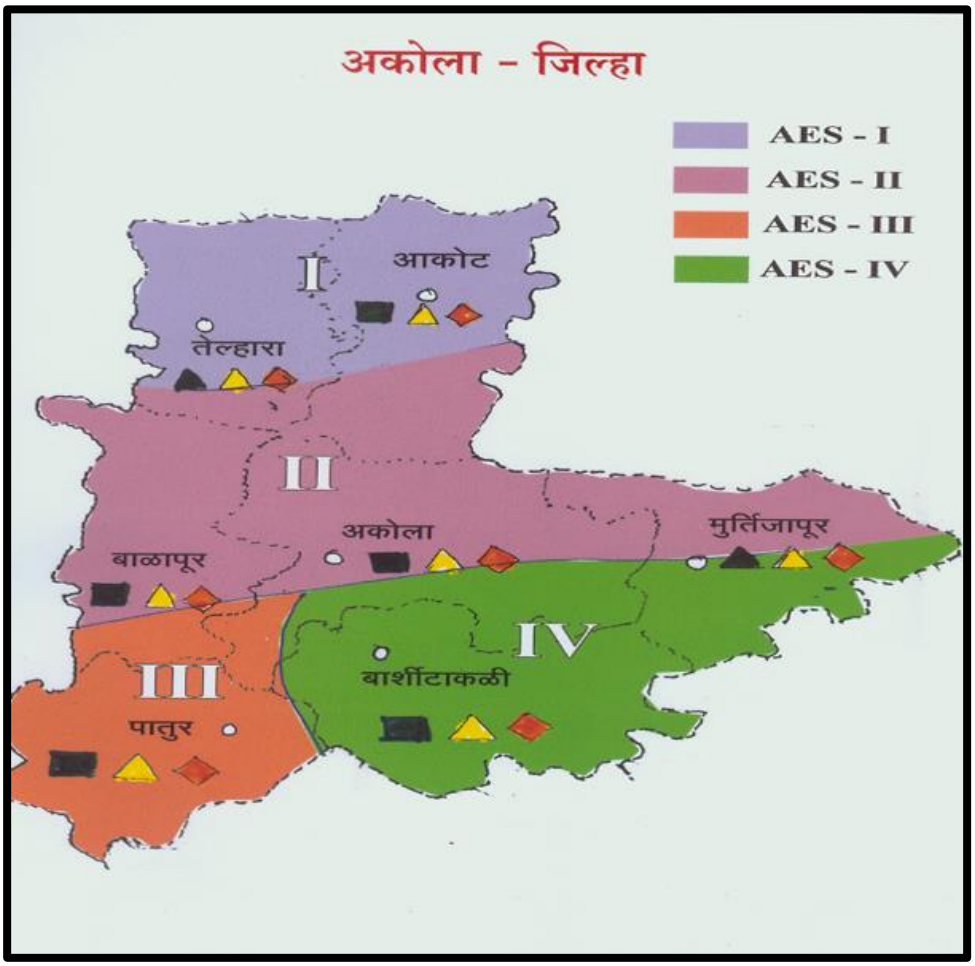
1.9 Agro-ecological situations

The Akola district is divided into 4 zones according to Agro-Ecological Situations prevailing in the different parts of the district. These situations are based on the major factors like rainfall, soil depth, topography and irrigation facility.

Sr.no	Agro Ecological situations	Characteristics
1	AES I (Telhara & Akot)	Soil type: Heavy soil depth, pH: 8.0 and above, high NPK, rainfall, Above750mm, command area, deep black colour
2	AES II (Akola, Balapur)	Soil type: medium, soil depth: swallow, pH: 7.0 to 8.5, low NPK, Rainfall below 750mm, light colour, sandy loam
3	AESIII (Murtizapur, Barshitakali)	Soil type: medium, soil depth- medium, pH- 7.5 to 8.5, moderate NPK, rainfall- below 750 mm, clay
4	AES IV (Patur)	Soil type- medium, soil depth- medium, pH- 7.5 to 8.0, moderate to low NPK, rainfall- below 750 mm, medium black colour, loamy

(Source: ATMA SREP, 2019 Akola)

Agro Ecological situations map of Akola district…



Chapter 2: Agriculture Profile of District

2.1 Land use classification of the district

Land use classification Information on land use pattern in the district Akola

Sr. no.	Name of the block	Geographical area (Ha.)	Cultivable area (Ha.)	Cultivated area (Ha.)	Cultivable waste (Ha.)	Current fallow (Ha.)	Forest		Pasture	Land put to Non agri. Use (Ha.)	Land under misc. plantation (Ha.)	Barren and unculturable land (waste land) (Ha.)
							Reserved (Ha.)	Open (Ha.)				
1	2	3	4	5	6	7	8	9	10	11	12	13
1	Akola	110119	101400	95738	5062	600	-	4105	67	665	1929	2163
2	Barshitakli	78248	54782	52093	1480	1209	-	12432	2269	281	2275	2142
3	Murtizapur	79613	72655	68093	1028	3534	-	926	1973	838	2038	2236
4	Akot	79539	72275	68528	2700	1047	413	0	275	756	918	2329
5	Telhara	58331	50916	47936	1305	1675	-	275	1100	977	167	1726
6	Balapur	66888	61219	58861	1328	1030	-	108	1750	953	556	2328
7	Patur	70116	42852	40320	1178	1354	-	19866	1911	1817	602	2419
Total		542854	456099	431569	14081	10449	413	37712	9345	6287	8485	15343

(Source: - District Statistics Department, DSAO Akola & KVK Akola)

Agriculture land holdings- its distribution according to sizes *(Source- ATMA SREP, 2019 Akola)*

Sr.no.	Land Holding (Ha.)	No. of land holders
1	Below 1 (ha)	77907
2	1 to 2 (ha)	208462
3	2 to 4 (ha)	62696
4	4 to 10 (ha)	6900
5	10 (ha) & Above	–
Total		3,55,965

2.2 Types of Irrigation facilities/ water resources available the district Akola *(Source- ATMA SREP, 2019 and KVK, Akola)*

Sr no.	Name of the block	Rainfed area (Ha.)	%	Irrigated area (source wise)									Lift			Wells/ Bore wells			Tanks			Ponds			Other		
				Major			Medium			Minor																		
				%	P	A	%	P	A	%	P	A	%	P	A	%	P	A	%	P	A	%	P	A	%	P	A
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
1	Akola	87867	87	-	-	-	11	1863	1632	0.6	500	325	-	-	-	3	3500	3363	1	750	330	1	750	330	0.3	350	225
2	Barshitakli	46822	87	6	450	2450	-	-	-	-	-	-	5	362	-	87	5793	3186	-	-	-	-	-	-	-	-	-
3	Murtizapur	63200	20	-	-	-	100	14100	12735	-	-	-	21	3334	2700	57	8520	7290	4	550	535	14	2150	1730	4	500	480
4	Akot	51132	65	-	-	-	-	-	-	-	-	-	-	-	-	15	18003	1175	5	6254	4131	0.5	392	417	14	2607	2607
5	Telhara	37808	74	-	-	-	49	6500	2505	-	-	-	-	1700	1523	50	6608	3634	10	280	262	11	310	225	-	-	-
6	Balapur	63547	89	-	-	-	6	3813	-	3	1906	-	-	-	-	5	3745	-	-	-	-	2	845	-	-	-	-
7	Patur	34921	75	-	-	-	26	5836	1505	-	-	-	-	711	-	43	7351	3127	-	-	-	-	-	-	-	-	-

2.3 Cropping pattern -

Akola district is land of cotton which is famously known as white gold district of Maharashtra state., but since the last 5 years it has remained as a district of soybean. As of the last three years 49 per cent of the area was covered with soybean, the district has main market Of Cotton and Pulses and Millets Processing Mills. followed by Soybean and Cotton, the other major crops of the district are cereals (Jawar, Bajara, Wheat), Pulses and Oilseeds (Sunflower, Ground Nut). In kharif Season Soybean, Red Gram and Gram, In Rabi Wheat and Gram while in Summer Groundnut and Vegetables Are Grown. A Variety of Fruits Like Lemon, Orange, Mango, Pomegranate, Custard Apple, Guava, Banana, Papaya and Vegetables Like Onion, Chilly, Brinjal, Cucumber, Water Melons.

(Source: SAO Office, Akola)

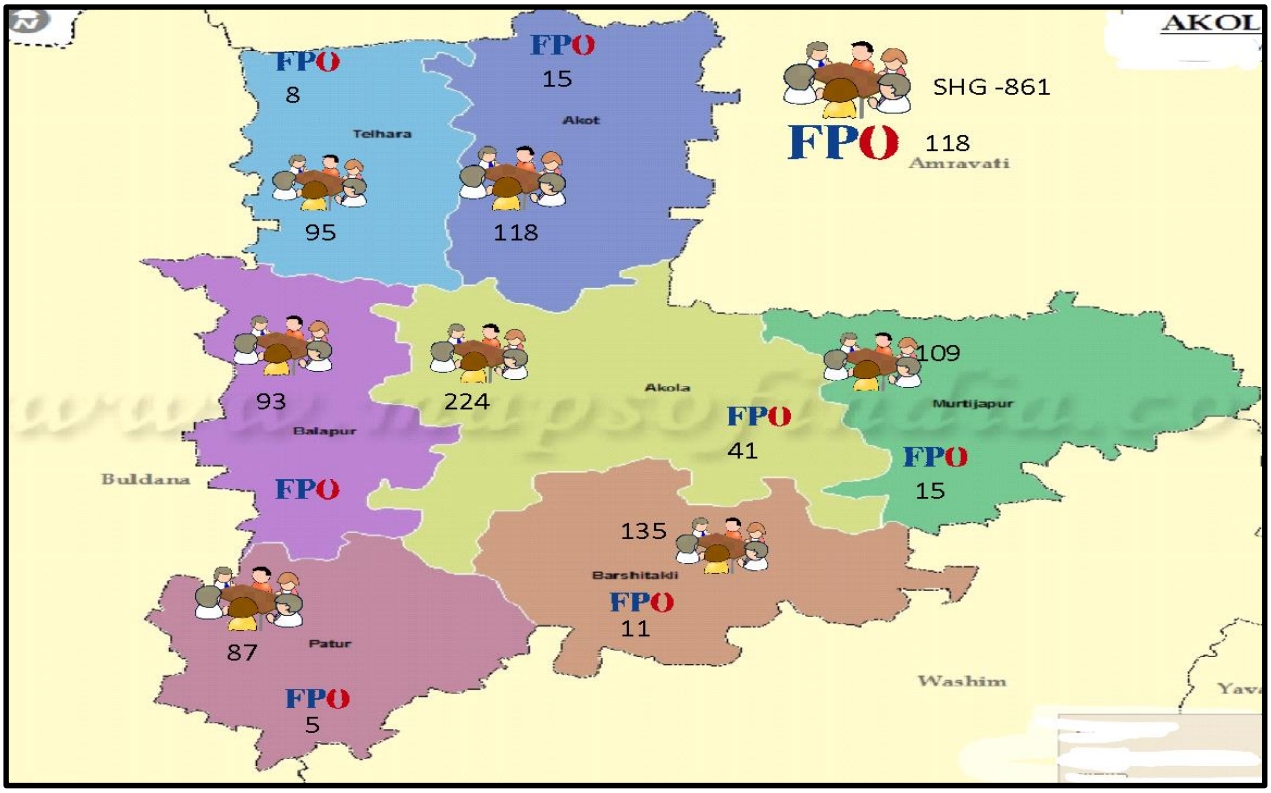
2.4 Production and Productivity of crops for the last 5 years

(Area in00' hectare, Productivity in kg/hectare, Production: 00' Metric ton)

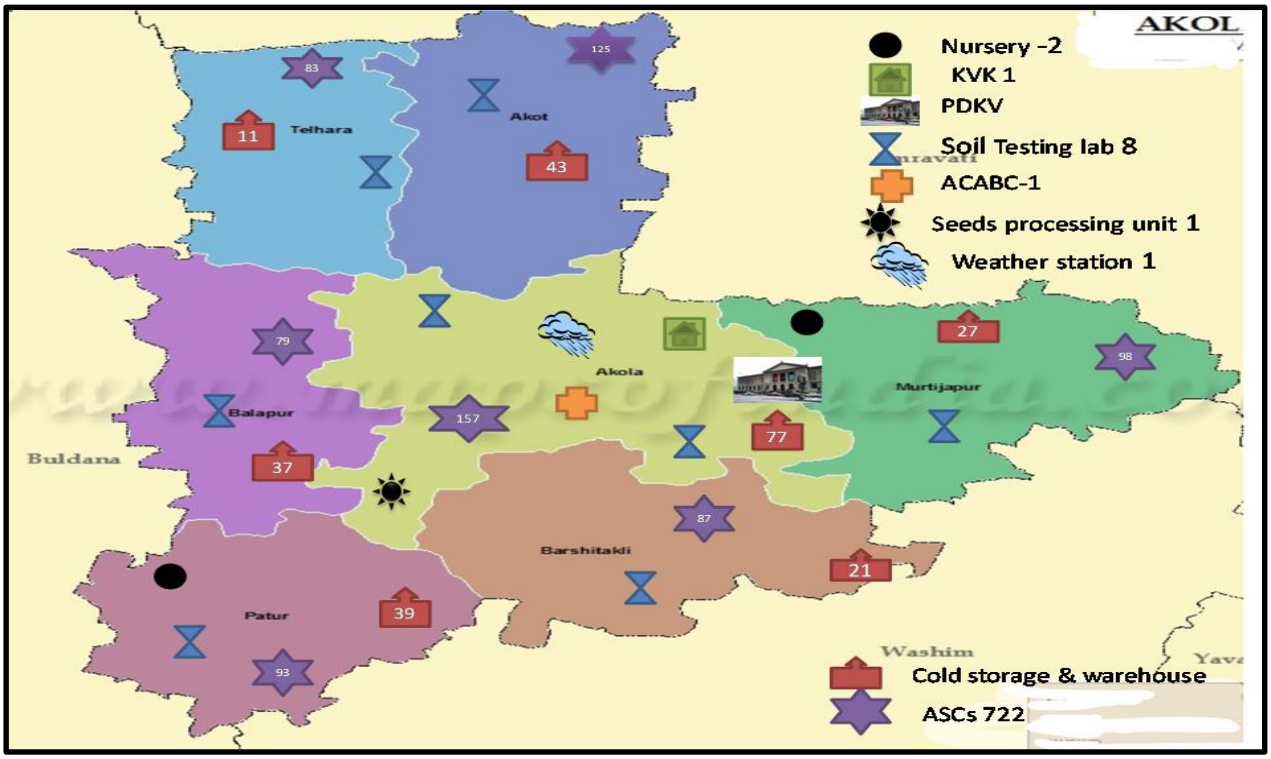
Year	Sorghum			Pigeon Peas			Green Gram			Black Gram			Soybean			Cotton		
	A(ha)	P	Py	A(ha)	P	Py	A(ha)	P	Py	A(ha)	P	Py	A(ha)	P	Py	A(ha)	P	Py
2018-19	123	161	1307	472	293	620	308	139	450	238	117	490	1467	1998	1362	1438	3536	418
2019-20	95.01	69	725	509	1143	2246	193	84	433	139.7	47	336	1710	1595	933	1545	3535	389
2020-21	69	51	735.7	497	591	1189	339	23	67.9	154	35	229.4	2031	2438	1200.4	1453	2547	298
2021-22	53	15	290.18	563	1506	2675.3	223	36	161.64	153	14	94.43	2189	2392	1092.7	1410	2662	320.95
2022-23	17	9	546.63	555	455	820.1	222	60	269.65	164	56	339.72	2011	3237	1609.6	1334	3231	411.73
Average	71	61	721	519	798	1510	257	68	276	170	54	298	1882	2332	1240	1436	3102	368

(Source: Superintending Agricultural Officer, Akola)

2.5 FPO & SHG Map



Other Facilities –



(Source- DIU team, AKOLA)

Chapter 3: Weather trend of district

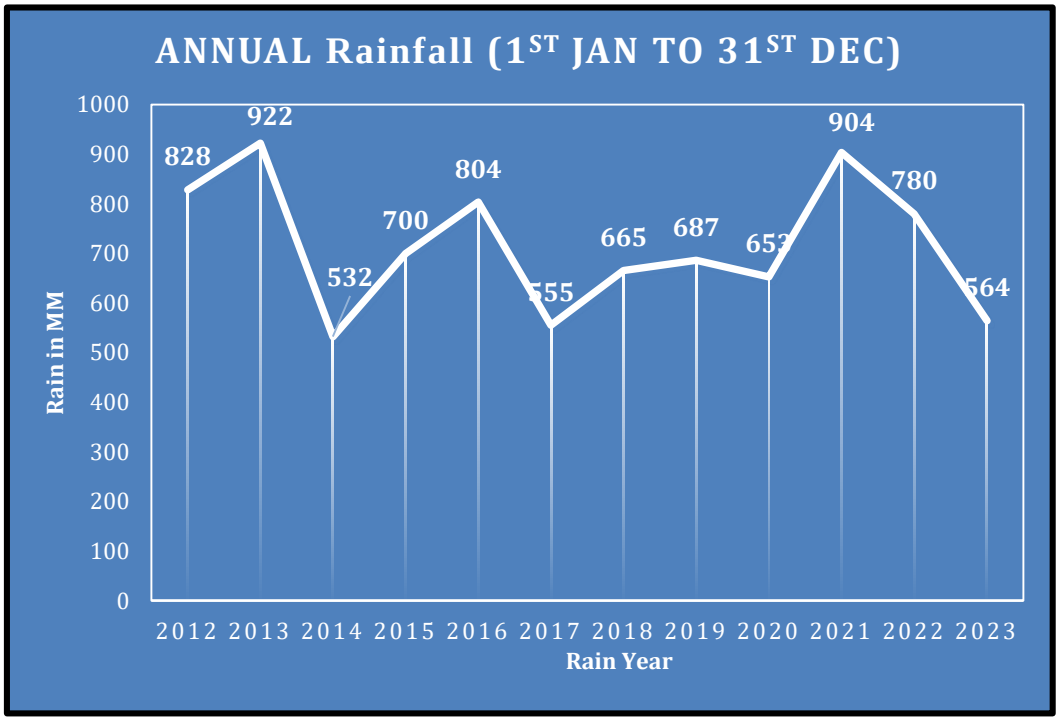
Introduction

Mahavedh project is operationalised by the Government of Maharashtra (GoM) through Public Private Partnership with M/S Skymet Weather Services pvt.ltd. At present 2127 Automatic Weather Stations (AWS) have been installed at circle level in Maharashtra. Weather data fetched from these Automatic Weather Stations (AWS) is useful for implementation of Public Welfare and Development schemes, Research and Development, Disaster management and Allied services.

PoCRA seamlessly combines forecast data from IMD and historical weather data from Mahavedh through APIs, integrating and storing the information in a database. This consolidated data is utilized to generate tailored weather-based advisories for farmers. Leveraging AICRPAM's crop calendars, PoCRA's automated systems craft pest and disease advisories to enhance agricultural decision-making.

3.1 Annual average rainfall of last twelve years.

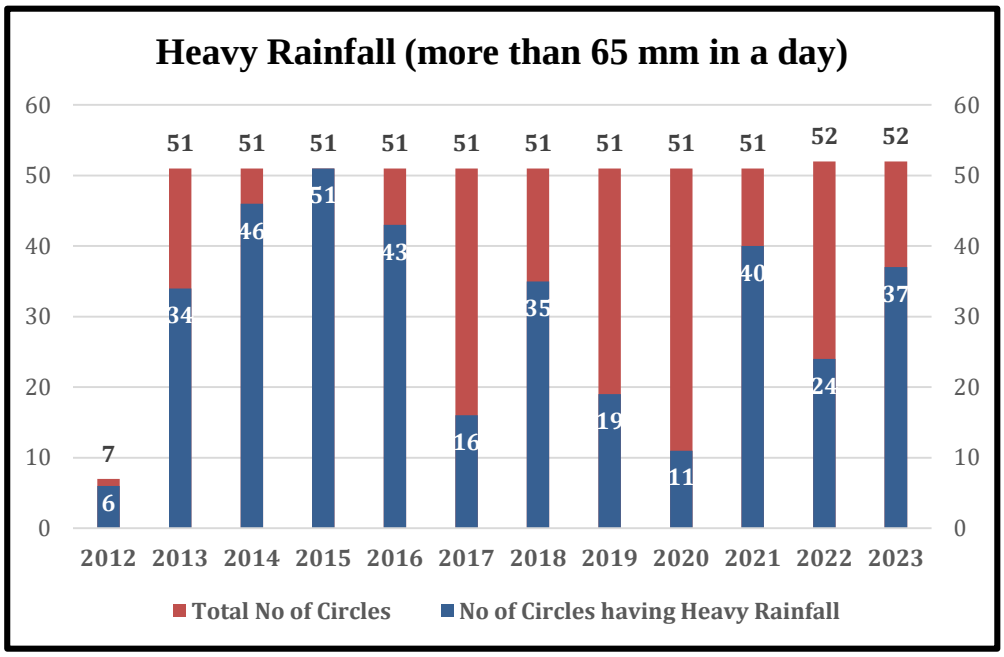
Normal or average rainfall is the amount of precipitation that we expect per year (in a given area). It is obtained and set by calculating the average (mean) of precipitation recorded in an area. Annual rainfall or precipitation is the sum of daily rainfall in a year.



The graph 3.1 presents annual rainfall data of Akola district from 2012 to 2023, highlighting fluctuations in precipitation. Notably, the lowest recorded rainfall was in year 2014 at 532 mm, while the highest occurred in year 2013 with a total of 922 mm annual average rainfall.

3.1 Heavy rainfall.

Heavy rainfall is defined as rainfall that exceeds 65 mm in 24 hours.



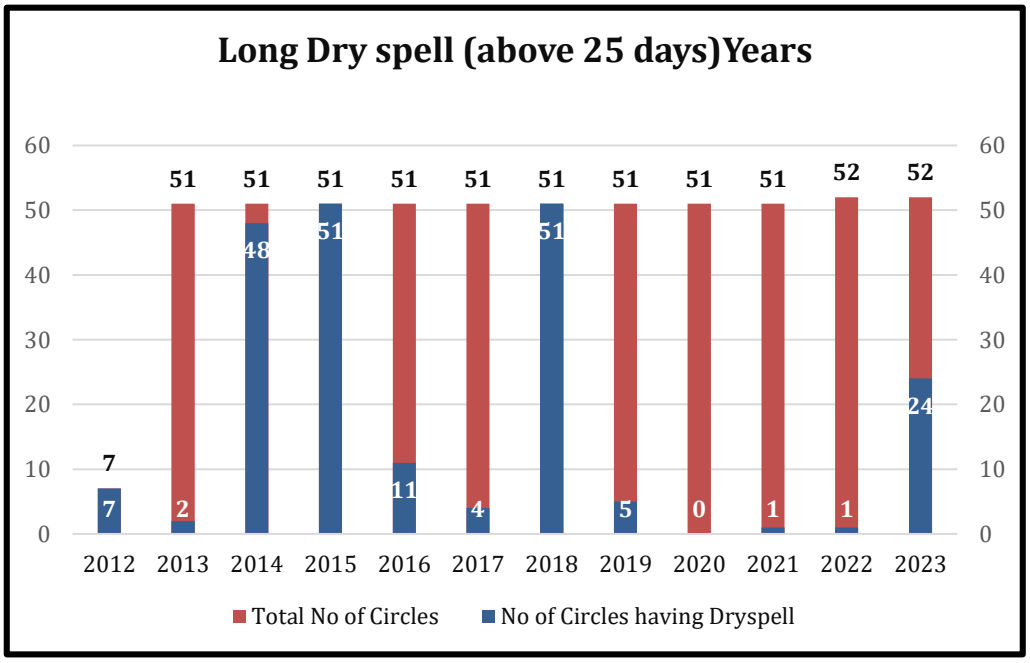
The provided graph 3.2 illustrates occurrences of heavy rainfall in circles within the Akola district from year 2012 to 2023. Notably, in year 2015, heavy rainfall affected the all 51 circles, in the Akola district. Conversely, the year 2020 recorded a lower incidence of heavy rainfall, with only 11 circles out of the 51 circles being affected in Akola District.

3.2 Dry spells:

A dry day is when rainfall is below 2.5 mm, and consecutive dry days form a dry spell in monsoon period. Longer dry spells impact crop growth. Categories include very short (up to 7 days), short (7-14 days), medium (14-25 days), and long (more than 25 days) dry spells, each influencing crop development differently.

3.3.1 Long Dry spell

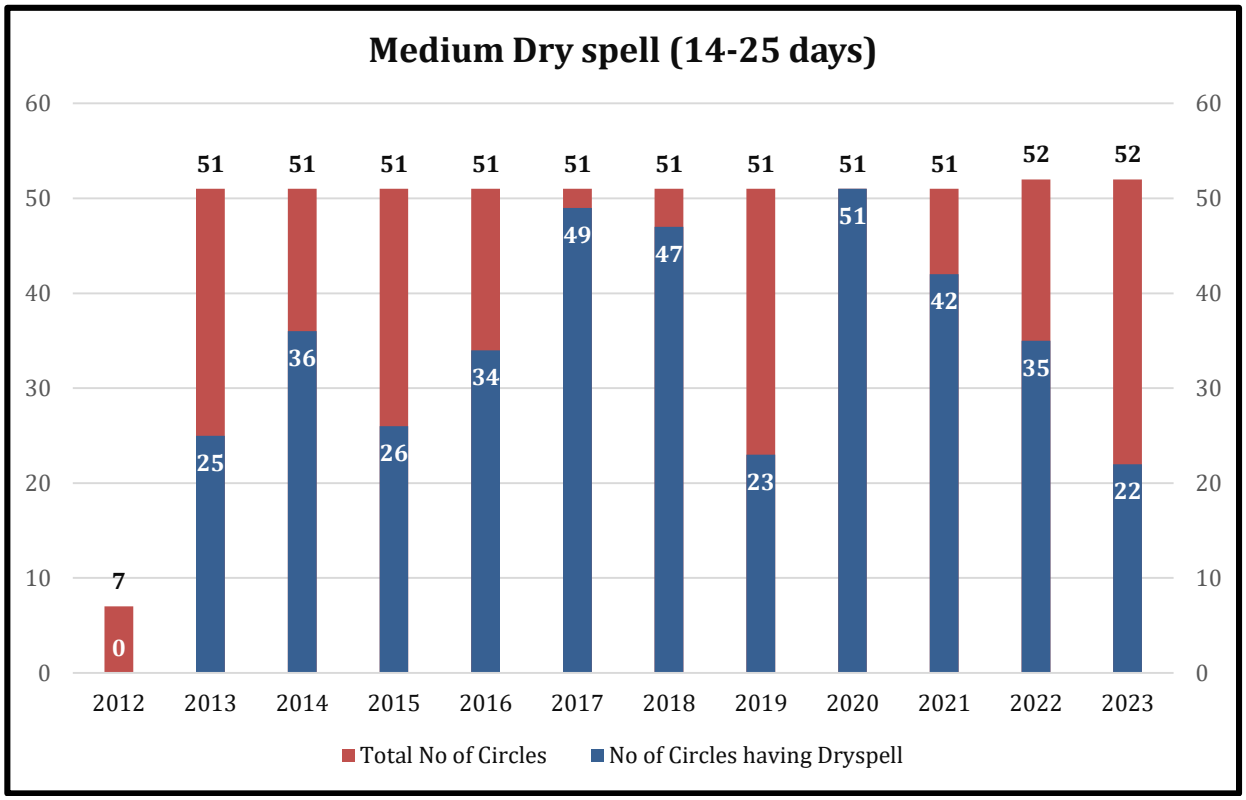
Long Dry spell is a prolonged period above 25 days of dry days in monsoon period.



A graph (Graph 3.3.1) that shows the trend of long dry spells observed in Akola district. The data covers the total number of circles and the circles that affected long dry spell (more than 25 days) from the year 2012 to 2023. The graph shows that in year 2015 and 2018, all circles in the district experienced long dry spells. Conversely, in year 2020, there was no long dry spell, across all 51 circles in the district.

3.3.2. Medium Dry spell

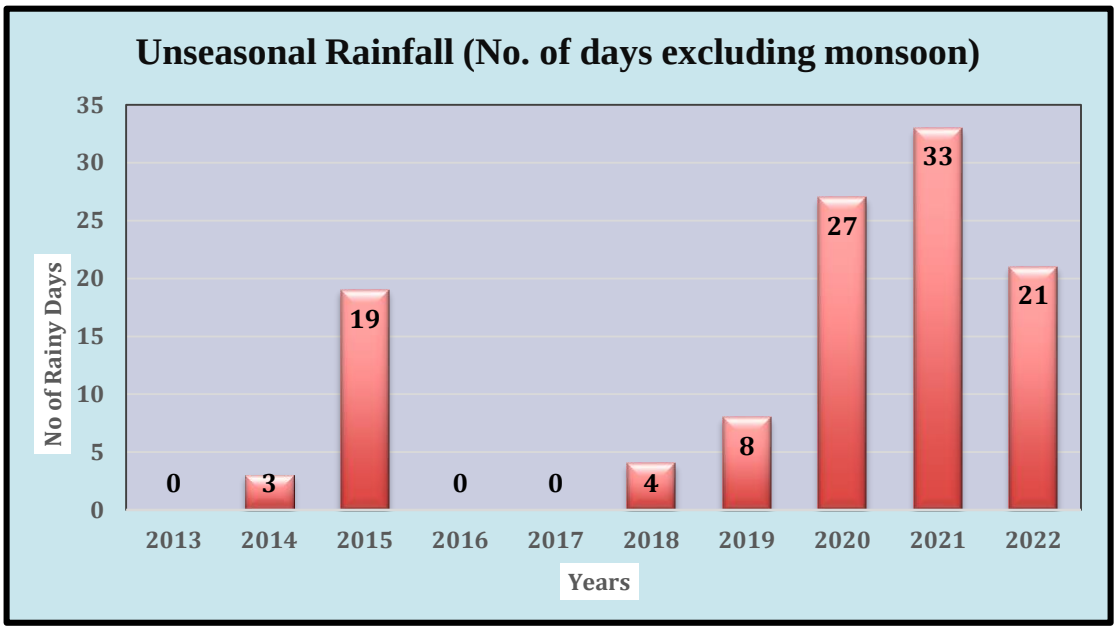
Medium Dry spell a period of 14-25 days of dry weather.



A graph (Graph 3.3.2) that shows the trend of medium dry spells observed in Akola district. The data covers the total number of circles and the circles that affected medium dry spell (14 to 25 days) in Akola district from the year 2012 to 2023. The graph shows that in year 2020, all 51 circles in the district experienced medium dry spells. Conversely, in year 2023, there was only 22 circles out of 52 circles experienced medium dry spell in the district.

3.1 Unseasonal rainfall.

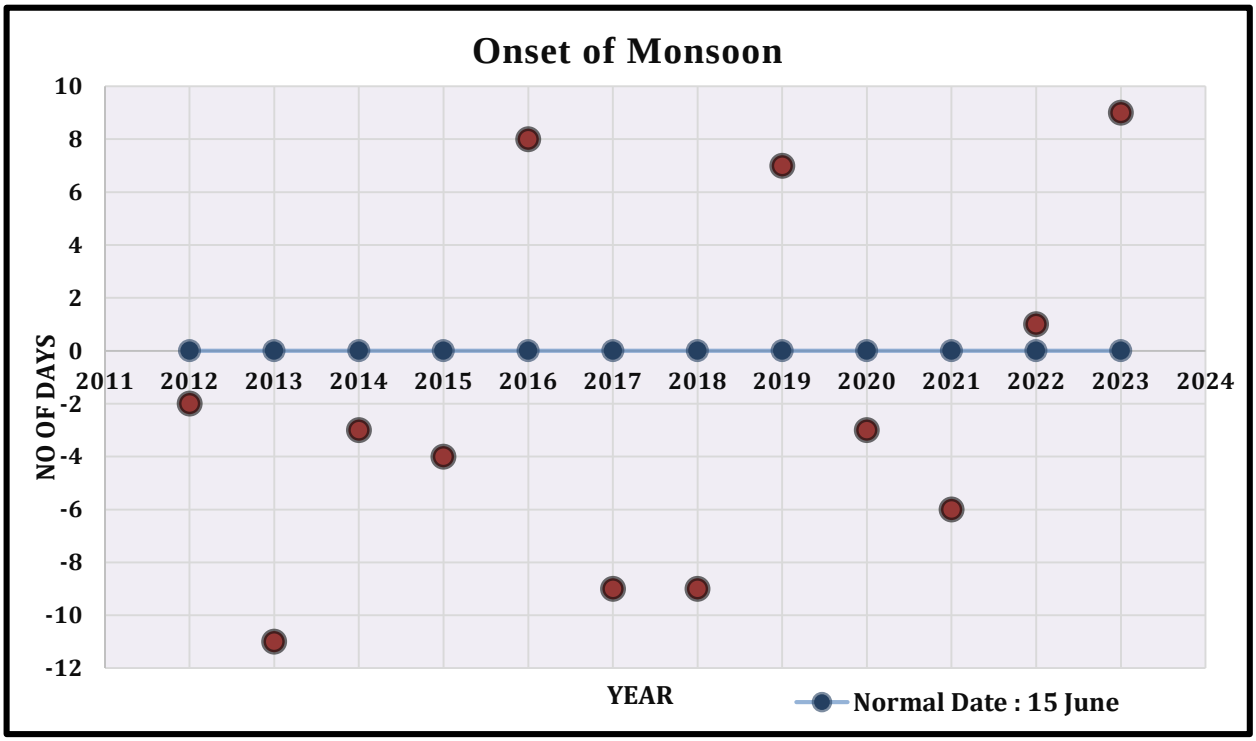
Rainfall received during non mosoon days is treated as unseasonal rainfall. Unseasonal rains-when there is a sudden change in atmospheric pressure, it can result in precipitation, even during non-monsoon seasons.



The graph 3.4 illustrates the annual occurrences of unseasonal rainfall in the Akola district from year 2013 to 2022. The data reveals a variation ranging from o days to 33 days of unseasonal rainfall.

3.5 Monsoon onset delay

The onset of the southwest monsoon refers to the time when the southwest monsoon winds begin to establish over a region, bringing widespread rainfall. The onset of the monsoon in Maharashtra typically occurs around early June. However, the exact timing can vary slightly from year to year. According to the document published by IMD dated 15th May, 2020 (CRS research report), Normal monsoon onset date is 15th June in Akola district.

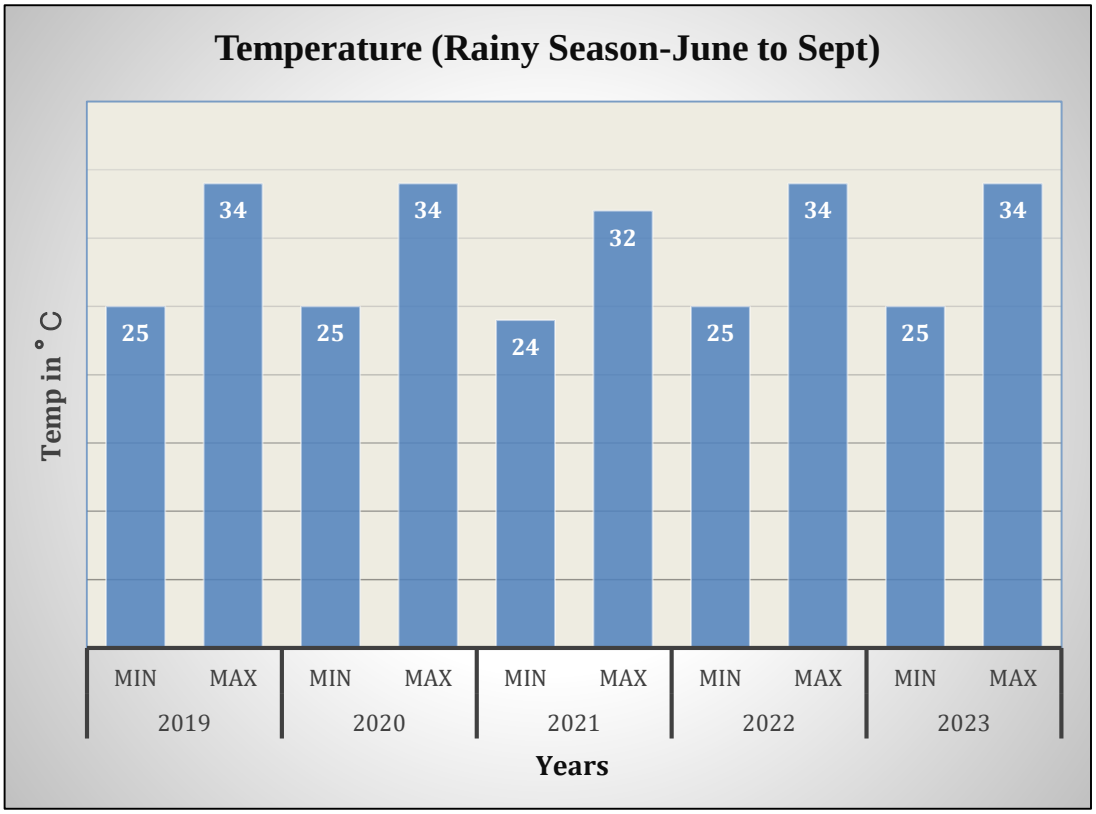


The graph 3.5 presents the annual onset of the monsoon, with a blue line representing the normal onset. The onset days show variations ranging from -11 to 9 days. Notably, in year 2016, 2019, 2022 and 2023 the monsoon arrived delayed than the normal onset date. However, in remaining years the monsoon was notably arrived earlier.

3.3 Temperature.

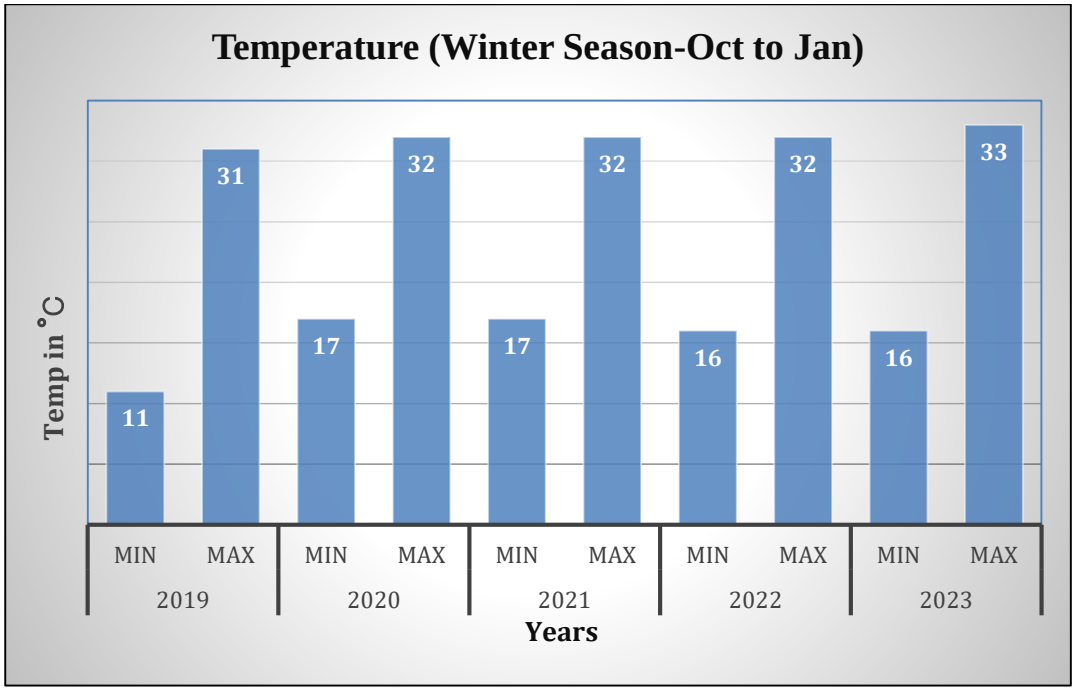
Temperature is a physical quantity that quantitatively expresses the attribute of hotness or coldness. The average temperature is 25 °Cwith a minimum of 17° and a maximum of 33°C. On the coldest nights, the temperature usually drops to around 11°C. On the warmest days, the temperature usually reaches around 39°C.

3.6.1 Temperature (Rainy Season-June to Sept)



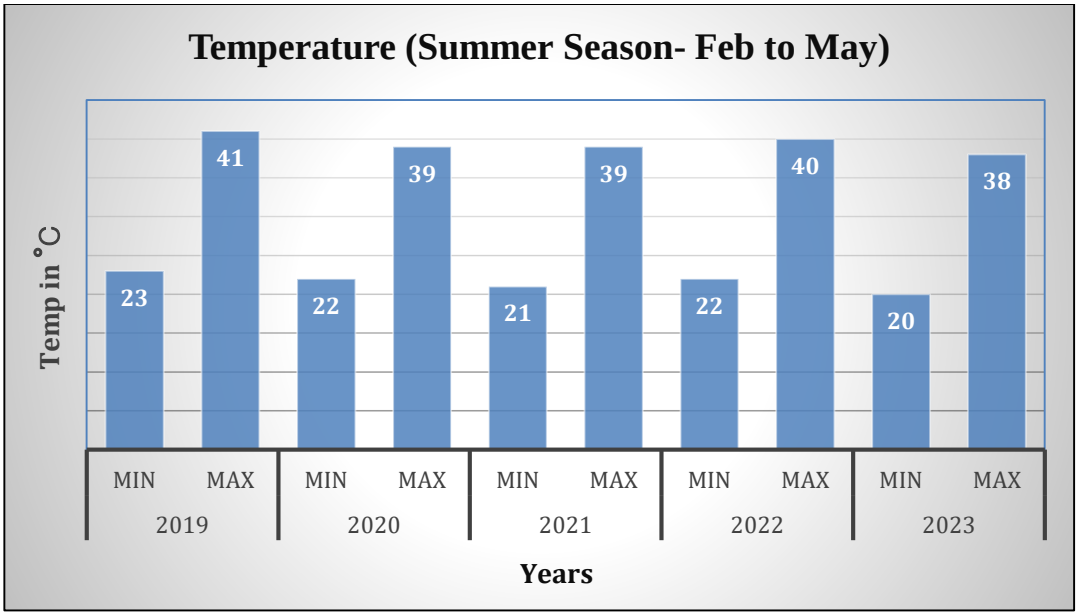
The graph 3.6.1 presents the temperature in the Akola district during the rainy season from year 2019 to 2023 exhibited a consistent range, with minimum temperatures fluctuating between 24-25 °C and maximum temperatures ranging from 32-34 °C.

3.6.2 Temperature (Winter Season-Oct to Jan)



The graph 3.6.2 presents the temperature in the Akola district during the winter season from year 2019 to 2023 exhibited a consistent range, with minimum temperatures fluctuating between 11-17 °C and maximum temperatures ranging from 31-33 °C.

3.6.3 Temperature (Summer Season- Feb to May)

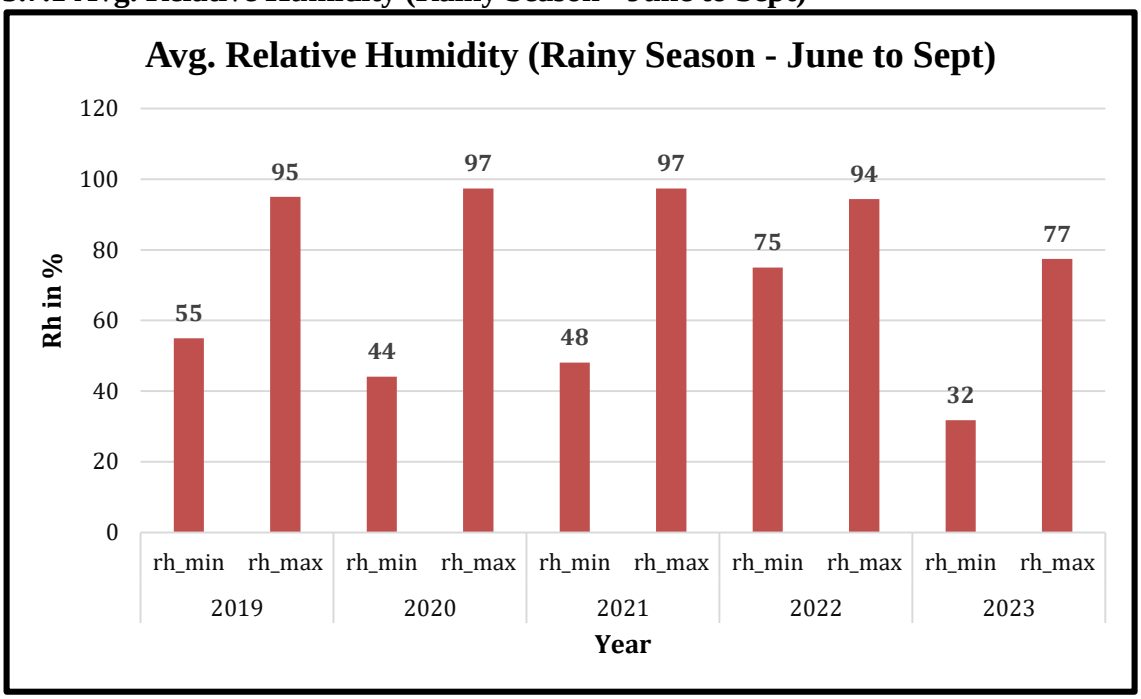


The graph 3.6.3 presents the temperature in the Akola district during the summer season from 2019 to 2023 exhibited a consistent range, with minimum temperatures fluctuating between 19-23 °C and maximum temperatures ranging from 38-40 °C.

3.4 Relative Humidity

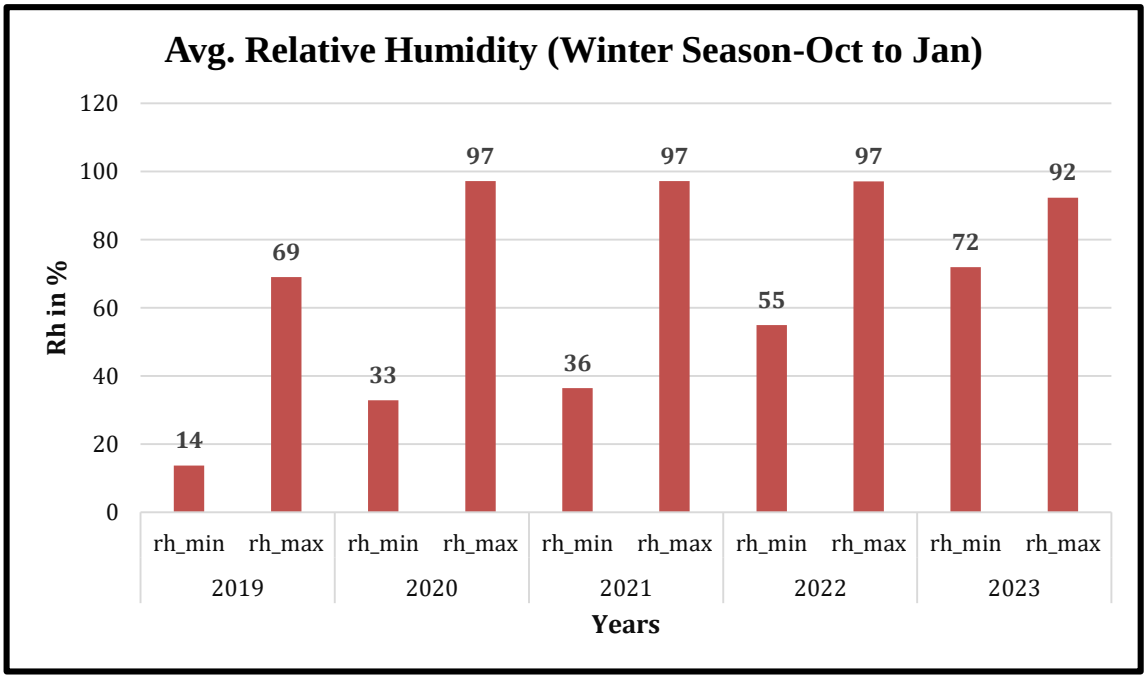
Relative Humidity is the ratio of the actual quantity of moisture at a certain temperature and pressure to the maximum it can hold at the same temperature and pressure. It is usually multiplied by 100 and expressed in percent.

3.7.1 Avg. Relative Humidity (Rainy Season - June to Sept)



The graph 3.7.1 illustrates humidity levels during the rainy season in the Akola district, revealing a variation in minimum humidity from 32% to 75% and maximum humidity ranging between 77% and 97%.

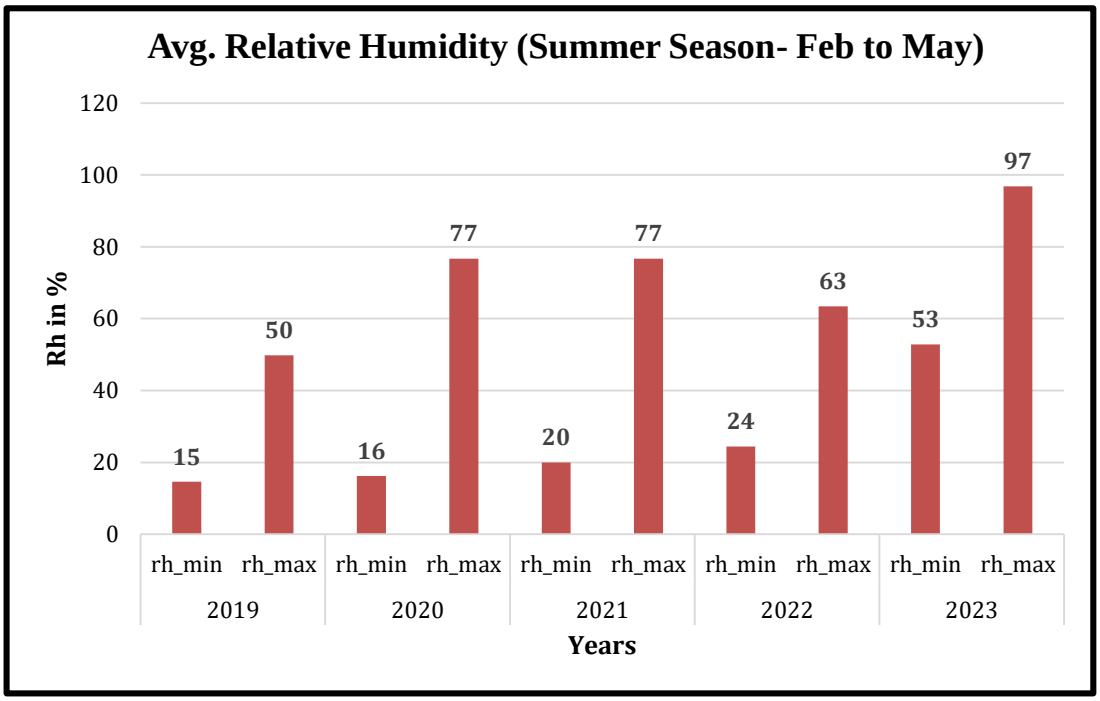
3.7.2 Avg. Relative Humidity (Winter Season- Oct to Jan)



The graph 3.7.2 illustrates humidity levels during the winter season in the Akola district, revealing a variation in minimum humidity from 14% to 72% and maximum humidity ranging between 69% and 97%.

3.7.3 Avg. Relative Humidity (Summer Season- Feb to May)

The relative humidity during the summer season, typically averaged from Feb to May.



The graph 3.7.3 illustrates humidity levels during the summer season in the Akola district, revealing a variation in minimum humidity from 15% to 53% and maximum humidity ranging between 50% and 97%.

Chapter 4: Impact of climate variability on agriculture production

Sr. No	Climate Variability	Kharif			Rabi	
4.1	**Impact of Temperature**	**Cotton**	**Soybean**	**Pigeon pea**	**Gram**	**Wheat**
4.1.1	Crop Growth and Yield	1) Stunted Growth Normal temp. for cotton crop is 27-32 c. minimum temp. required for germination is 16 C if temp <16c it affects germination of seed, 21-27c is good for vegetative growth and fibre development affect if the temp<15c and also affect the crop production temp>43c it causes flower and bud dropping 2)shedding of square 3) Decrease in soil moisture so uptake of nutrients is reduced. 4)yield losses	1)average temperature-26-30C 2)Lower temp.-delay the flowering 3)higher temp-dropping of flowering Stunted Growth 4)dropping of flower 5)Decrease in soil moisture affect uptake of nutrients is reduced 6)Yield Losses up to 20% 7)In 2022 rabbi soybean crop In Tiosa taluka affected due to high Temperature (42-45c)	1) Low Yield 2)Poor Pod Formation 3)Flower Drop 4)Low Conservation ratio of flower to fruit /pod	1)normal temp- 15-25C 2)low temp and cold-causes disfavour to germination and flowering Germination Problem 3)Vegetative Growth Disturb 4)Decrease in soil moisture so uptake of nutrients is reduced 5) Yield Losses up to 10%	1) Normal temp- 16-22C,wheat required cool temp. for growth and tillering 2)if temp high- affect the growth 3) >25 c it reduces grain weight 4) Optimum temp. for germination is 20-22c 5)if the temp high it affect the germination Problem 6) Decrease in soil moisture so uptake of nutrients is reduced 7)Yield Losses up to 10%
4.1.2	Water Availability	1) Evaporation 2) Wilting of Crop	1) Evaporation 2) Wilting of Crop 3) Stress on Crop	1) Wilting of crop 2 Affect physiological growth	1) Evaporation 2) Wilting of Crop 3) Stress on Crop	1) Evaporation 2) Wilting of Crop 3) Stress on Crop 4) Crop Lodging

Sr. No	Climate Variability	Kharif			Rabi	
1	**Impact of Temperature**	**Cotton**	**Soybean**	**Pigeon pea**	**Gram**	**Wheat**
4.2.3	Pest and Diseases Infestation	Diseases: Lalya, Alternaria leaf spot, Anguler leaf spot, etc. Pest: thrips, Whitefly. 1) Cotton plants undergo transpiration, where water is taken up by the roots and released into the atmosphere through small pores in the leaves (stomata). 2) Higher temperatures often lead to increased transpiration rates, contributing to the overall water demand of the crop. Elevated temperatures, coupled with insufficient water availability, can result in water stress for cotton crops. 3) Water stress during critical growth stages, such as flowering and boll development, can negatively impact yield and fiber quality.	Pest: Whitefly. 1) Higher temperatures generally lead to increased evaporation rates from the soil surface. 2) Higher temperatures often lead to increased transpiration rates. If temperatures are high and there is insufficient water in the soil to meet the demands of evaporation, transpiration, and plant growth, soybean plants can experience drought stress. Drought stress negatively impacts plant development and can lead to yield losses.	1) Impact of Climate Variability will Increase pest, plant disease and weed distributions, with potential to reduce crop yields 2) Increase in pest Plume moth, Pod fly	1) The crop performs better at 20-25°C temperature, cool temperature for germination and early seedling moderate temperature for flowering and pod formation. 2) High temperatures exceeding 30°C. can lead to heat stress resulting in flowering, pod setting, and yield. Yield loss 10%-30 % due to heat stress.	1) Wheat is particularly sensitive during its reproductive stage, including flowering and grain filling. 2) High temperatures during these stages can lead to reduced grain setting and negatively impact yield. 3) 1°C increase in temperature beyond the optimal range during the grain-filling stage, wheat yield can decrease by about 5-10%. Temperature conditions can also influence the prevalence of certain diseases and pests in wheat. 4) Optimal temperature 15-24°C during the vegetative and reproductive stages.

Sr. No	Climate Variability	Kharif			Rabi	
4.2	**Impact of Rainfall on**	**Cotton**	**Soybean**	**Pigeon pea**	**Gram**	**Wheat**
4.2.1	Crop Growth and Yield	1) Delay onset of Monsoon delay Sowing season 2)Due to dry spell yield losses 3)Adverse effect on crop health and growth 4)Excessive rainfall causes crop rot	1) Delay onset of Monsoon delay Sowing season 2)Due to dry spell yield losses 3)Adverse effect on crop health and growth 4)Excessive rainfall causes root rot and wilt	1) The delay in arrival of monsoon resulted in delay in sowing and terminal moisture stress and finally low productivity in pigeon pea 2) Excessive rainfall causes Flower drop	1) Damage of Flowering and Pod Formation 2) Vegetative Growth Disturb 3) Yield Losses	1) Damage of tillers 2) Crop lodging 3) Vegetative Growth Disturb 4) Yield Losses 5- Excessive rainfall causes root rot and wilt 6- affect the pollination
4.2.2	Irrigation Supply	1) Water level Decrease 2) soil Cracking 3) Wilting of Crop 4) Stress on Crop	1) Irrigation frequency diminish 2) soil pan Cracking 3) compact of soil 4) Stem and root rot	1) Affects irrigation demand, water availability and the greenhouse gas intensity of irrigation energy 2)Wilting of Crop	1) Water level Decrease 2) Soil Cracking 3) Wilting of Crop 4) Stress on Crop	1) Irrigation frequency diminish 2) soil pan Cracking 3) compact of soil 4) Stem and root rot
	a) Drought	1) Water Stress 2)Stunted Growth 3)Wilting of Crop 4) Soil Cracking 5)low Germination 6) Increasing in pest population	1) Water Stress 2)Stunted Growth 3)Wilting of Crop 4) Soil Cracking 5)low Germination 6)yellowing of leaves	1) Frequent droughts have threatened the crop yields and livelihoods 2)Affects Germination 3)Low Yield	1) Water Stress 2) Stunted Growth 3) Wilting of Crop 4) Soil Cracking 5)low Germination	1) Water Stress 2)Stunted Growth 3)Wilting of Crop 4) Soil Cracking 5)low Germination 6) yellowing of leaves

	b) Flood	1) Heavy Loss of Standing Crop 2) seedling mortality 3) drain of soil nutrient 4) soil erosion take place 5) affect root respiration	1) Heavy Loss of Standing Crop 2) Seedling mortality 3) drain of soil nutrient 4) Soil erosion take place 5) Affect root respiration	1) Flood disasters physically cause damage to farms and crops, 3)Crops get rotten on farms under wet conditions and Starts Wilting 3)flooded soils has shown that the oxygen concentration approaches zero after 24 hours 4)wet soils are most conducive to disease development	1) Heavy Loss of Standing Crop 2) Seedling mortality 3) drain of soil nutrient 4) soil erosion take place 5) affect root respiration	1) Heavy Loss of Standing Crop 2) seedling mortality 3) drain of soil nutrient 4) soil erosion take place 5) affect root respiration
	Pest and Disease infestation and its managemen t	Outbreak of disease and Pest	1) These delays keep seedlings from out-growing damage by soil-borne diseases that attack seeds and seedlings. 2) Outbreak of disease and Pest	1) Increase in soil-borne diseases that attack seeds and seedlings.	Increase in *Heliothis armigera.* Loss of Grain Quality and Quantity	Increase in Rust Disease and Loose Smut
	Soil erosion and nutrient loss	1) Fertile soil and Nutrient losses due to flood and leaching	Fertilize soil and Nutrient losses due to flood and leaching	In Pigeon pea crop Climate affects soil erosion and the chemical and biological deterioration of the soil. The state of the soil (texture, structure and chemical and biological properties) is a major factor,	Crop Rotations	Crop Rotations

	Harvest & Storage	Deterioration of lint quality, affect boll bursting	Deterioration of grain quality	1) Minimize qualitative and quantitative losses of food crop dietary nutrients 2) Increase in Store grain pest	1) Pod size Decrease	Heavy loss of Quality and quantity of crop

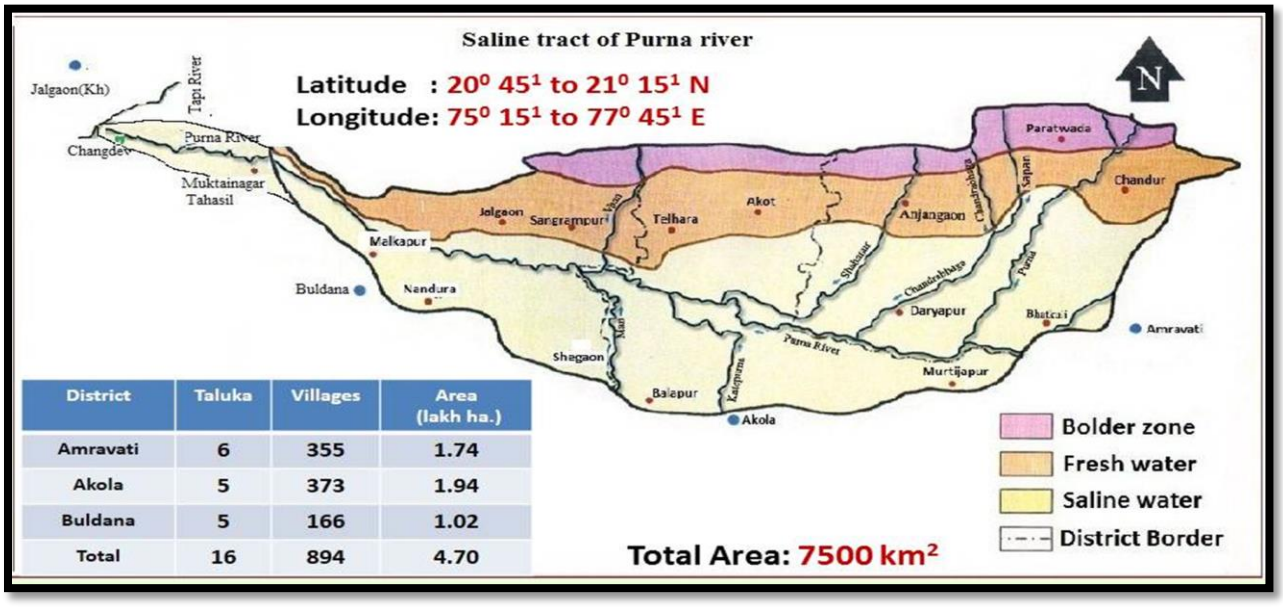
Sr. No	Climate Variability	Kharif			Rabi	
4.3	**Impact of Other Calamities (Cyclones and hail storms etc.)**	**Cotton**	**Soybean**	**Pigeon pea**	**Gram**	**Wheat**
	Crop Damage and Loss	1) Yield losses up to 40% 2) Cyclone associated flood water also brings sand and silt along with it to the crop fields and thereby resulting in change in soil physical condition	1) Yield losses up to 40%	1) Cyclone associated flood water also brings sand and silt along with it to the crop fields and thereby resulting in change in soil physical condition 2) One of the main reasons for poor productivity in agriculture is uncertain weather and its associated natural disasters	1) Yield losses up to 40%	2) The crops get affected both in terms of establishment and productivity 2) Yield losses up to 40%

Saline Soils and their impact on cropping in the district

Soils: In general, the soils in the area are clay, sticky and poorly permeable in nature. They have an excellent soil moisture retention capacity. Because of these physical properties, leaching of excess water does not take place causing water logging and deposition of salts. The chemical analysis of soils from this depth has shown that the soils are alkaline in nature and sodic. The alkalinity in the soil goes on increasing in depth. The pH value in the soil profile thickness of up to 6 cm ranges in between 7.5 and 8.5. The soils of the basin are mostly alkaline with exchangeable sodium percentage in surface, i.e. ESP < 8, while the subsurface has higher values of the salinity and sodicity being ECe > 2.7 and ESP > 17 (Singh and Sharma 1996). The interfluvial zones of the northern and southern alluvial plains are covered with thick to very thick black soils. Owing good fertility, it supports the growth of important crops in the region, viz. cotton, jawar, tur, soyabean, safflower, gram and groundnut. Pal et al. (2001) reported that in the north-eastern and south-western parts of the basin, surface-oriented plasma separation indicates a high degree of clay activity and shrink–swell phenomena; however, the plasmic fabric is not uniform throughout. In the southern part of the basin,

Land Use/Land Cover, Palaeochannels and Lineaments:

Land use/land cover map, prepared by using the satellite data of three seasons, viz.Kharif, Rabi and Zaid, and following the standard land use classification as pro-posed by NRSA (1995) denotes five major units: (i) built-up land (282.47 km2),(ii) agricultural land (12,438.35 km2), (iii) forest land (3068.05 km2), (iv) waste-lands (2409.35 km2) and (v) water bodies (316.64 km2). The major problem of the basin is inland groundwater salinity in the central alluvial part covering significant parts of districts **Amravati, Akola and Buldhana.**



District	Taluka	Villages	Area (lakh ha.)
Amravati	6	355	1.74
Akola	5	373	1.94
Buldana	5	166	1.02
Total	16	894	4.70

The salinity is recorded in both shallow and deep aquifers as revealed by the dug well and borewell data. It has also been experienced that there is an irregular trend in the magnitude of salinity both in lateral and vertical profiles of the basin. Because of it, the groundwater of the area is unsuitable for both drinking and agricultural purposes. **More than 400 villages falling in saline area are**

continuously facing severe problem of drinking water, which becomes more acute in summer months. The magnitude of the problem is so high that in some of the area it is directly affecting the socio-economic set-up, i.e. desertification of villages, reduction of crop yield, and infertility of soil. The area is also deprived of well irrigation; hence, only rainfed crops are cultivated.

Socio-economic Status:

Agriculture is the main land use in the basin area. Maximum agriculture is unir-rigated followed by the non-cultivable area and grazing land. Cotton (Gossypium) is major crop in Kharif season followed by jowar (Sorgum), mung (Vigna), tur Purna River, Maharashtra 499 (Pisum) and soybean (Glycine), whereas some farmers also crop the gram (Cicer), wheat (Triticum), groundnut (Arachis) and kardi (Carthamus) in Rabi season. In the saline tract area, the well water is moderately to highly saline and unsuitable for irrigation; therefore, the agriculture is mainly rain-fed. **Majority of farmers in the village of the basin own the land <2 ha of land that indicates the higher percentage of marginal farmers.** Bamboo is widely spread in the forests. The area, particularly the Melghat forest, is rich in medicinal plants. Flash flood is a regular phenomenon of the area. Large areas of cultivated land get devastated and eroded by flash floods. These floods also cause damage to houses and cattle, as well as erode the soil and rendered it barren. Extensively hazardous flood during September 1959 due to heavy rains is still remembered, which affected 179 villages in the Amravati district. Damage was caused to villages along the banks of the Pendhi tributary in Amravati, Belmandi the Kholat sub-tributaries in Chandurbazar, Chandrabhaga and Shahanur tributaries in Daryapur talukas. Houses were washed away and an area of about 74 km 2with standing crops was also completely swept away by floods. Thousands of acres of standing crops were submerged in water for a number of days.

(Source: The Indian Rivers (pp.479-502) Authors: Ashok Srivastava (Sant Gadge Baba Amravati University) and Vivek Kale (Maharashtra Remote Sensing Applications centre, hyderabad.)

Chapter 5: Measures to cope with climatic variability

Sr. No	Climate Variability	Kharif			Rabbi	
5.1	Recommendation of Universities	**Cotton**	**Soybean**	**Pigeon pea**	**Gram**	**Wheat**
5.1.1	Heavy Rainfall	1) Excess water should be drained out 2) Spraying of 2 % DAP 3) For wilt 1.5 kg N + 1.5 kg P in 100 ltr water 4)Drenching of Carbendazim + Mancozeb 5) Drenching of Trichoderma Viridi 6)In case of continuous cloudy days in August, Agronomy Measures to prevent bud and boll shedding spray Napthalic acetic acid (NAA) @ 20 ppm	1) Used resistant / tolerant variety 2) Contingency crop planning helps in providing better resilience in post cyclone and flood period resulting in lesser extent of crop damage. 3) In medium and lowlands under high rainfall region and cyclone and flood prone areas, land modification such as raised and sunken bed technique would be highly effective 4) Sowing by BBF mathod	1)Drenching of Carbendazim + Mancozeb 2) Drenching of Trichoderma Viridi 3)land modification such as raised and sunken bed technique would be highly effective 4) Sowing by BBF mathod	1)Used resistant / tolerant variety 2) Contingency crop planning helps in providing better resilience in post cyclone and flood period resulting in lesser extent f crop damage. 3) Drenching of Trichoderma Viridi	1) Short Duration Variety
5.1.2	Low Rainfall	1) Spearying of 2 % DAP 2) Protective Irrigation	1)Spray 13:00:45 Raise crop on raised beds with drip irrigatio	Raise crop on raised beds with drip irrigatio	1) Nipping of apical bud Raise crop on raised beds with drip irrigatio	1) Selection of Short Duration Variety 2) Increasing Irrigation

5.1.3	Dry Spells / water stress	1)In case of dry spell of >15 days with appearance of cracks of pencil thickness, provide a life-saving irrigation through sprinklers, perforated pipes, drip or alternate furrow wherever possible 2) Mulching3) Reflector-Kaolin 4) Hoeing	In water stress condition foliar application of sulphur 85% WP @ 1.5-2.0 g/litre for quick recovery during active vegetative growth stage. 2) In Dry Spell condition foliar application of water soluble NPK fertilizer (for example 5g/litre 19:19:19 NPK) may be given for quick recovery.	Foliar application of sulphur 85% WP @ 1.5-2.0 g/liter for quick recovery during active vegetative growth stage.	1)Protective Irrigation	Foliar application of micronutrient mixture containing Zn, Mn, Fe, Cu, B at 30, 45 and 60 DAT for better crop stand (5 ml/l).
5.1.4	Terminal Drought	1) Raise seedlings on a raised bed with drip or micro-sprinkler irrigation system to use available irrigation water judiciously. In case, drip irrigation facility is not available, apply irrigation water through water sprinkler cans. 2)) Application Micro Nutrient	1) Raise seedlings on a raised bed with drip or micro-sprinkler irrigation system to use available irrigation water judiciously. In case, drip irrigation facility is not available, apply irrigation water through water sprinkler cans. **Apply stubble mulch (paddy** straw/wheat straw etc.) until seed germination to avoid evaporation. In case of poor seedling growth, foliar application of water soluble NPK fertilizer (for example 5g/liter 19:19:19 NPK) may be given for quick recovery.	Apply stubble mulch (paddy straw/wheat straw etc.) until seed germination to avoid evaporation.	1)Spraying Potassium Phosphate & Mulching 2) Application of Micro Nutrient	1)Spraying Potassium Phosphate & Mulching 2) Application of Micro Nutrient

5.1.5	Late onset of monsoon	1)Selection of late duration Variety 2)Use of Drip Irrigation	late duration Variety should be sown	Late duration Variety should be sown	late duration Variety should be sown	late duration Variety should be sown
5.2	Temperature Condition	Used resistant, tolerant variety	5) Used resistant, tolerant variety	6) Used resistant, tolerant variety	Used resistant, tolerant variety	Used resistant, tolerant variety
5.2.1	High Temperature	1) Crop Shifting 2) Inter Cropping	Intercropping	Intercropping	1)Spraying Potassium Phosphate & Mulching 2) Application of Micro Nutrient	1)Spraying Potassium Phosphate & Mulching 2) Application of Micro Nutrient
.2.2	Cold waves/low temperature	**Light irrigation** could be equally effective to protect the crop 1)Vermicompost, FYM, Crop rotation	1)Light irrigation could be equally effective to protect the crop 2) Intercropping 3) To burn the crop residue/straw in the direction of northern side at evening time. Smoke also protects to crops from cold injury. 4)Impact Based Forecast-Warning for Cold Wave	1) To burn the crop residue/straw in the direction of northern side at evening time. Smoke also protect to crops from cold injury. 2)Impact Based Forecast-Warning for Cold Wave 3)Intercropping	1)Light irrigation could be equally effective to protect the crop 2Spray with Thiourea, Liquid Sulphur etc 3Spray of dilute Sulphuric Acid @ 0.1% 4)Vermicompost, FYM, Crop rotation 5 To burn the crop residue/straw in the direction of northern side at evening time	**1)Light irrigation** could be equally effective to protect the crop 2) Spray with Thiourea, Liquid Sulphur 3) Spray of dilute Sulphuric Acid @ 0.1% 4)Vermicompost, FYM, Crop rotation To burn the crop residue/straw in the direction of northern side at evening time. Smoke also protects to crops from cold injury.
5.3	Soil degradation	1) Tillage operation and sowing across the slope	1) Soil conservation measures, such as contour ploughing,	1) Soil conservation	1)Horizontal sowing on a slope	1)Horizontal sowing on a

		2) Dead Farrow, Short Duration Variety 3) Nala Bunding	bunding, use of strips and terraces, can decrease erosion and slow runoff water. 2)Crop Rotations 3)Water Harvesting, Terracing The broad bed and furrow system decreased soil loss	measures, such as contour ploughing, bunding, use of strips and terraces, can decrease erosion and slow runoff water. 2)Crop Rotations 3)Water Harvesting, Terracing The broad bed and furrow system decreased soil loss	2) Dead Farrow, Short Duration Variety 3) Nala Bunding The broad bed and furrow system decreased soil loss	slope 2) Dead Farrow, Short Duration Variety 3) Nala Bunding 3)Water Harvesting, Terracing

Strategy for Reclamation

1) The application of gypsum @ 2.5 t ha^{-1} as an amendment. The gypsum should be incorporated before sowing of crops and mixed thoroughly in upper 15 cm soil layer by harrowing.

2) The gypsum bed technique in which the alkaline ground water is passed through tank filled with gypsum is also helpful in decreasing the alkalinity of irrigation water.

3) Farm pond in a micro watershed is useful to collect the surface run off and shall be recycled for life saving irrigation to crop.

4) Use of FYM, compost, green manures, crop residues are some of the other measures needs to be taken which are also recommended to reclaim the soil.

Subsurface tillage with subsoiler is also essential to break subsurface hard pan to improve drainage

5) In situ soil and water conservation measures recommended are-

a) Kharif and Rabi:

Cultivation across the slope cultivation.2) Raise beds across the slope cultivation 3) Contour cultivation. 4) Contour raise beds cultivation. 5) Intermittent opening of furrow in crop rows sown along the slope.6) Agro-Horticulture systems7) Continuous contour trenches on degraded land (CCT's).

b) Cultivated fallow in Kharif (Deep Black Soil):

1) Across the slope cultivation 2) Contour cultivation

3) Square basin with and without green manuring crop e.g. Dhaincha

c) Rainfed rabbi (Second crop):

1) Across the slope 2) Contour cultivation across the slope.

d) Rainfed kharif and rabbi with protective irrigation using surface water:

1) Sprinkler 2) Drip

e) **Management Interventions to be implemented are as under-**

1) Integrated reclamation 2) Subsurface drainage system with slotted pipes

3) Broad bed furrow (BBF) land configuration 4) Crop residue management

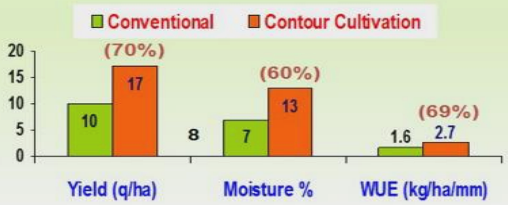
5) Use of amendments 6) Crops and cropping system

Excess Rain water Management techniques followed

Photographs showing Excess Rain water Management techniques in normal field *(Source- KVK Akola)*

Cultural practices by Dr. PDKV for reclamation of saline soils

Technology Option 4: Contour cultivation



- Contour cultivation enhanced rain water productivity, moisture availability during dry spell and increase crop yield.
- It reduced 55% run off, 70% soil loss and 60% nutrient loss.
- B:C ratio – 1.19 to 1.80
- Cost per ha – Rs. 4800/- (Addi.)
- GWP – INR 26.28 to 45.56 (Rs/ha-mm)

Technology Option 6 (a) : Sowing on Broad Bed Furrows (BBF)

Broad Bed and Furrow method of cultivation using bullock drawn machines and tools is a proven system under rainfed condition for *in situ* soil and water conservation, can sustain dry spells. In this system beds are permanent and compaction is restricted to furrows leaving bed zone friable for absorption of moisture. Excess water moves out through graded furrows.

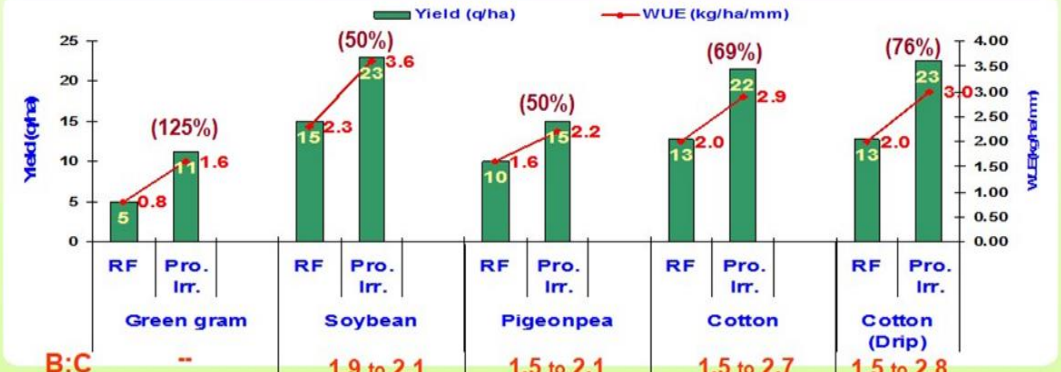
Technology Option 10: Green Manuring

In across the slope cultivation –

- Green manuring not only Improves soil fertility but also retains 55% higher moisture for rabi crops and enhance rain water productivity.

Technology Option 11: Farm Pond for Protective Irrigation

Farm ponds constructed by Department of Agriculture. Stored rain water used for protective irrigation during dry spell enhanced crop and water productivity in vertisols. Av. Of 100 farmers of 4 yrs.



B:C	--	1.9 to 2.1	1.5 to 2.1	1.5 to 2.7	1.5 to 2.8
GWP (Rs/ha-mm) INR		42.1 to 46.2	28.5 to 43	37.5 to 70.1	37.5 to 73.6

Ideal Approach for Rain Water Management in Saline tract

Chapter 6: Climate Resilient Technology (CRT) Interventions and its impact on yield of crops

6.1 CRTs Interventions

Climate Resilient Technologies promoted under PoCRA			
Technology	**Resilience Feature**	**Benefits**	**Suitable Crops**
1. Cultivation by broad bed furrow (BBF) method	Resilience to moisture stress, poor soil drainage, nutrient (fertilizer) loss	Ensures optimum moisture and aeration at root level, helps drain out water in excess rainy condition, saves seed, ensures proper fertilizer placement in root zone, helps develop optimum microclimate under crop canopy, helps in proper intercultural operations, reduces cost of cultivation.	All field crops both in Kharif and Rabi season
2. Intercropping	Resilience to risk due to crop failure, moisture stress, pest incidence	Ensures optimum use of soil moisture & nutrients, overcomes risk due to aberrant climatic variabilities, helps in effective pest management, and reduces financial risk in farming.	Cotton, soybean, pulses, sorghum & pearl millet
3. Use of climate resilient seed varieties	Resilience to moisture stress due to dry spell & drought, pest epidemic, infestation by wilt & soil borne pathogens	Higher yields than existing varieties, helps escape drought condition due to shorter durations, tolerance to moisture stress, resistance to pest & disease infestation fetches good price due to better consumer preference.	All crops
4. Seed treatment	Resilience to biotic stress	Protection from soil born pathogen and pests, enhances good root development.	All field crops
5. Integrated Nutrient Management	Resilience to abiotic stresses including soil salinity, nutrient deficiencies, susceptibility to pest & disease	Enhances crop health, higher yields, enhances quality of produce, resistance to biotic & abiotic stresses, enhances quality of produce, enhances consumer preference, helps to fetch better market price.	All crops
6. Integrated Pest Management	Resilience to pest & disease epidemic, environmental hazards	Protection from pest & disease attack, reduction in use of chemical pesticide, helps in production of residue free agriculture commodities, reduces environmental hazards, enhances quality of produce, enhances consumer preference in domestic and export market, helps to fetch better market price.	All crops
7. Furrow opening	Resilience to moisture stress,	Helps in conservation of moisture around root zone of crops during dry spell.	Cotton, soybean, pulses, sorghum & pearl millet

8. Foliar spray of 2% Urea at flowering and 2% DAP at boll development	resilience to poor nutrition & moisture stress		Cotton
9. Protective irrigation through farm pond	resilience to moisture stress during dry spell & drought condition	Overcomes moisture stress during critical stages, improves nutrient uptake, and enhances increase in yield.	All crops
10. Conservation tillage	Resilience to moisture stress, soil & nutrient loss	Enhances level of soil carbon, soil fertility & water holding capacity, better crop health and higher yields, enhances quality of produce, resistance to biotic & abiotic stresses, and enhances quality of produce.	All crops
11. Incorporation of biomass	Resilience to soil organic carbon (SOC) loss	Enhances level of soil carbon and soil fertility, enhances water holding capacity of soil, leading to better crop health and higher yields, tolerance to moisture stresses.	All crops
12. Canopy management in fruit crops	Resilience to stress management	Enhances fruit bearing capacity, enhances quality of fruits, and reduces cost of harvesting.	Mango, Pomegranate & Guava
13. Cultivation of citrus crops on broad ridges	Resilience to poor soil drainage & soil borne diseases	Enhances proper microclimate around root zone, helps in retaining optimum soil moisture, avoids contact of water with stem collar, and prevents infection by phytophthora & other soil borne pathogens.	Mandarin orange, sweet orange and Kagzi Lime

6.2 Impact of CRT on crop yield based on FFS data.

FFS (Farmers' Field School) sessions have been implemented in the project village since 2018, focusing on soybean, cotton, pigeon pea and gram crops in the Akola district. FFS aims to promote sustainable and efficient farming. It does this by introducing effective practices for selected crops, improving farmers' knowledge with concepts like IPM and INM, empowering them to make informed decisions and working towards reducing cultivation costs, restoring soil fertility and increasing productivity. In essence, the FFS focuses on sustainable farming and empowering farmers as decision-makers. The adoption of climate resilient technology (CRT) was promoted on the FFS plot during these sessions. A comparison of the crop yields between the FFS plot and the control plot is detailed below, as per the data captured in the FFS app.

Year wise crop yield (Kg/ha)

Year	Soybean		Cotton		Pigeon Pea		Gram	
	FFS Plot	Control Plot	FFS Plot	Control Plot	FFS Plot	Control Plot	FFS Plot	Control Plot
2019	650	580	757	715	817	733	2512	2248
2020	1181	1103	1638	1499	1118	1010	1663	1538
2021	1242	1115	1386	1305	1117	1012	1871	1712
Average	**1024.33**	**932.67**	**1260.33**	**1173.00**	**1017.33**	**918.33**	**2015.33**	**1832.67**

The FFS plot for soybean crops benefited from various CRT interventions, including seed treatment with fungicide and biofertilizer, sowing using the BBF method, intercropping, protective irrigation during dry spells and foliar spray of Neem seed kernel extract (NSKE). As a result, the yield of the FFS plot increased by 9.83% compared to the control plot.

The FFS plot for cotton crops benefited from various CRT interventions, including seed treatment with biofertilizer, intercropping, protective irrigation during dry spells, foliar spray of Neem seed kernel extract (NSKE), nipping of bud and use of traps (Pheromone traps, sticky traps). As a result, the yield of the FFS plot increased by 7.45% compared to the control plot.

The FFS plot for Pigeon pea crops benefited from various CRT interventions, including as Seed treatment with fungicide and biofertilizer, protective irrigation in dry spell, foliar spray of Neem seed kernel extract (NSKE), topping. As a result, the yield of the FFS plot increased by 10.78% compared to the control plot.

The FFS plot for Gram crops benefited from various CRT interventions, including as Seed treatment with fungicide and biofertilizer, sowing by BBF method, protective irrigation, NSKE, and use of pheromone traps. As a result, the yield of the FFS plot increased by 9.97% compared to the control plot.

6.3 Impact of BBF on yield crop

- If there is a shortage of rain due to widespread evaporation and irrigation, the rainfall helps to rot around the roots of the irrigated crop.
- If there is more rain or if there is more rain in a short period of time, it prevents the drainage and waterlogging in the field and spoils the crop.
- In this method, the crop is harvested by the seed dibbling (token) method. Hence the seed quantity reduces.
- In two lines sowing and spacing between two trees are maintained in proper proportion. Therefore, inter-cultivation in vertical crops is done in a proper manner. Also, due to the free aeration in the crops, the growth of the crops is better.
- Farmer Name- *Prem Dharmale*, *Village Name - Degaon*, BBF showing area- 1 Ha. yield per acer- 8 quintal. so due to that he is motivated and this year all farms are shown with BBF technology.
- In the district 240 farmers have adopted BBF technology in 504 acres.

SRT Technology

- No-tillage is the technique of tilling crops or pastures without tilling the field.
- This technology was first used for pulse crops.
- In this method, the beds are prepared in the first season. In the subsequent season, after the first crop is harvested, the second crop is sown on the same bed without ploughing the land.

6.4 Nimboli Ark

- Chemicals have been used in agriculture for a long time. Due to the overuse of chemical drugs since some time ago, research has shown that the resistance of the enemy has increased against these drugs.
- In such a situation, many schemes and campaigns are being carried out on a large scale from the government level to increase the availability of naturally available linseed extract in the agricultural sector.
- **Azadiractin** present in neem trees acts as an insecticide.
- When sprayed regularly at 15 days intervals on all types of crops, insect control is achieved by disrupting the life cycle of sap-sucking insects.
- Being natural ingredients, they do not have any adverse effect on the environment.
- As it is produced entirely from natural sources, the cost is extremely low.
- The farmer of Vaibhav Thakare Lives in Dalambi village. He is adopting Nimboli Ark, organic farming and proving the profitable farming of organic farming. He is always motivated by other farmers.

(photograph: NSKE extract for sprayed plot of-Shri.Thakare, Village: Dalambi)

Table: Technologies and no. of farmers following in the district.

Sr. No.	Taluka	BBF		Zero tillage		Neem based extract	
		Farmer No.	Area (Ha.)	Farmer No.	Area (ha)	Farmer No.	Area (Ha.)
1	Akola	45	73.40	11	12.00	561	545.50
2	Balapur	8	20.60	4	5.20	34	46.40
3	Barshitakli	24	36.00	4	5.00	84	137.40
4	Murtijapur	63	113.22	4	11.20	324	372.94
5	Patur	1	1.00	10	12.40	44	45.50
6	Akot	17	50.87	7	10.00	116	147.50
7	Telhara	82	209.00	41	80.00	612	436.30
District Total		**240**	**504.09**	**81**	**135.80**	**1775**	**1731.54**

(Source- DPIU, Akola)

6.5 BIO FERTILIZERS

- Integrated fertilizer management is an important principle in modern agriculture.
- Biofertilizer is a key component under Integrated Fertilizer Management. These fertilizers are mainly used in the farming community to process the seeds.
- In biofertilizers, Rhizobium, Azotobacter and PSB are used.
- The use of these fertilizers reduces the use of chemical fertilizers.

6.6 CRA

- In this method irrigation is done in the root zone of fruit crops.
- The use of this method results in an increase in the number of grafts/seedlings in fruit crops.
- Due to the irrigation of fruit crops, the growth of plants is better and the circumference of leaves, branches and buds increases.
- This technology depends on cost reduction.

6.7 Reduction in Cost

- SRT technology is an important component in the agriculture sector. Due to the use of this technology, the cost of pre-cultivation work which is frequently done in agriculture is reduced.
- Nimboli ark spraying is as important from the natural point of view as it is from the economic point of view of the farmers.
- Spraying reduces the cost of purchase of chemicals during the initial period of the crops and saves the collective cost of the farmers.
- Use of organic fertilizers is an important factor in agricultural fertility. It is also experienced that the use of bio-fertilizers leads to savings in chemical fertilizers applied to crops.
  (Source: TAO, PA, AA & CA)

Chapter 7: Plan to cope with weather related contingencies of Akola District

(Source- http://www.icar-crida.res.in/)

7.1 Drought

7.1.1 Rainfed situation

7.1.1.1. Early season drought (delayed onset)

Condition			**Suggested Contingency measures**		
a) Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop / Cropping system**	**Change in crop /cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks 25th June-1stJuly 26th MW		Bt. Cotton	No change	**Normal recommended Package of Practices by Dr. PDKV, Akola**	
	Deep & Medium deep black soils	Cotton +Pigeon pea	No change in crop or variety	**Normal recommended Package of Practices by Dr.PDKV, Akola** (Cotton + Pigeon pea 6:2 & Cotton+Greengram/Blackgram 1:1 intercropping system.)	Linkage with Dr.PDKV / MSSC NSC
		Soybean	No change	**Normal recommended Package of Practices by Dr. PDKV, Akola** Test GP% Use seed rate @ 75-80kg/ha Seed Treatment with *Rhizobium+* PSB 250gm each /10Kg seed + Thiram 3 gm+Carbendazim 1gm+*Trichoderma* 4 gm/Kg of seed. Intercrop one row of pigeon pea after every 4 or 6 rows of soybean as per convenience. Open furrow after six /Three rows of soybean	
		Pigeon pea	No change	**Normal recommended Package of Practices by Dr.PDKV, Akola** Intercrop Soybean+ Pigeon pea(4:2 / 6:2)Cotton + Pigeon pea(8:1 / 6:2)	
		Sorghum (Kh. Jowar)	No Change	**Normal recommended Package of Practices by Dr.PDKV, Akola** Seed Treatment of Imidachloprid 70 WS 7g/Kg Seed Sulphur 4g/Kg Seed	
	Shallow black soils	Soybean	No change	**Normal recommended Package of Practices by Dr. PDKV, Akola** Test GP% Use seed rate @ 75-80kg/ha. Seed Treatment with *Rhizobium* + PSB (250gm each /10Kg seed) + Thiram 3 gm+Carbendazim 1gm+*Trichoderma* 4 gm/Kg of seed	
		Green gram	No Change	**Normal recommended Package of Practices by Dr.PDKV, Akola** Seed Treatment with *Rhizobium*+ PSB (250gm each /10Kg seed) + Thiram 3 gm+ Carbendazim 1 gm + *Trichoderma* 4 gm/Kg of seed	
		Black gram	No Change	**Normal recommended Package of Practices by Dr.PDKV, Akola** Seed Treatment with *Rhizobium*+ PSB (250gm each /10Kg seed + Thiram 3 gm+ Carbendazim 1 gm + *Trichoderma* 4 gm/Kg of seed	

Condition			Suggested contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop / Cropping system**	**Change in crop / cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 weeks 28th wk. 9-15th July	Deep to medium deepblack soils	Bt Cotton	**Soybean,** JS-335, JS-93 -05 **Pigeon pea** Varieties AKT- 8811, Vipula , PKV- Tara, BSMR- 736	**Normal recommended Package of Practices by Dr. PDKV, Akola** Test GP% Use seed rate @ 75-80kg/ha. Seed Treatment with*Rhizobium+* PSB (250gm each /10Kg seed + Thiram 3 gm+Carbendazim 1gm+*Trichoderma* 4 gm/Kg of seed Intercrop one row of pigeon pea after every 4 or 6 rows of soybeanas per convenience Open furrow after six /Three rows of soybean	Linkage with Dr.PDKV / MSSCNSC
		Cotton +Pigeonpea	Use early varieties of American /Deshi cotton varieties No change in varieties for Pigeon pea	Use 20-25% more than recommended seed rate and reduce fertilizerdose by 25% for Cotton. Replace the hybrids with improved varieties in cotton. (American Cotton:- AKH-8828,PKV Rajat,AKH-081, Desi Cotton:- AKA-5, AKA-7, AKA-8. Avoid sowing of Green gram and Black gram. To reduce the risk of late sowing follow Cotton: Sorghum: Pigeon pea: Sorghum (6:1:2:1) intercropping system.	
		Soybean	No Change	Follow Normal Recommended Package of Practices	
		Pigeonpea	Change in variety AKT 8811,Vipula, PKV-Tara, BSMR-736	Use spacing 90 x 20 cm instead of 90 X 30 cm.	
		Sorghum (Kh. Jowar)	Replace sorghum by soybean Varieties JS-335, JS-93 -05 or Pigeon pea variety AKT 8811, Vipula, PKV- Tara, BSMR-736	Follow Normal Recommended Package of Practices	
	Shallow black soils	Soybean	No change	**Normal recommended Package of Practices by Dr. PDKV, Akola** Seed Treatment with *Rhizobium+* PSB (250gm each /10Kg seed + Thiram 3gm+Carbendazim 1gm+*Trichoderma* 4 gm/Kg of seed	
		Green gram	Replace Green gram & Black gram by Soybean Varieties JS-335, JS-93 -05		
		Black gram	No Change		

Condition			Suggested Contingency measures		
Early season drought (delayed on set)	**Major Farming situation**	**Normal Crop / Cropping system**	**Change in crop / cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Delay by 6 weeks 23-29 July 30th MW	Deep to Medium deep black soils	Bt. Cotton	Sole Pigeon pea AKT-8811, Vipula, PKV Tara, BSMR-736. Sunflower (hybrids) / Sesame AKT64/ Castor AKC-1, GCH-4, 5, 6& DCH-117, 32/Pearl millet. PKV Raj Shard, Saburi Pearl millet + Pigeon pea inter- cropping (2:1,.4:2)	Adopt closer spacing (60x30 cm) for Pigeon pea Follow *in-situ* moisture conservation measures	
		Cotton +Pigeon pea Soybean	Sole Pigeon pea AKT-8811, Vipula, PKV Tara, BSMR-736. Sunflower (hybrids) /Pearl millet. PKV Raj Shradha, Saburi / Sesame AKT64/ Castor GCH-4,5,6& DCH-117, Pearl millet + Pigeon pea inter-cropping (2:1, .4:2).		For Seed Source and Technology contact Dr. PDKV / KVK/MSSC/ NSC.
		Pigeon pea	Pigeon pea AKT-8811, Vipula, PKV Tara, BSMR-736.		
		Sorghum	Sole Pigeon pea AKT-8811, Vipula, PKV Tara, BSMR-736. Sunflower (hybrids)/ Sesame AKT64/ Castor AKC- 1, GCH-4, 5, 6& DCH-117, 32/pearl millet. PKV Raj Shradha, Saburi Pearl millet + Pigeon pea inter- cropping(2:1, .4:2).	Adopt closer spacing (60x30 cm) for Pigeon pea Follow *insitu* moisture conservation measures	For Seed Source and Technology contact Dr. PDKV / KVK/MSSC/ NSC.
	Shallow black soils	Soybean	Sole Pigeon pea AKT-8811, Vipula Sunflower (hybrids) / Sesame AKT64/ Pearl millet. PKV Raj Shradha, Saburi. Pearl millet + Pigeon pea inter-cropping (2:1,4:2).	Adopt closer spacing (45x20cm) for Pigeon pea Follow *insitu* moisture conservation measures	
		Green gram	Sole Pigeon pea AKT-8811, Vipula Sunflower (hybrids) / Sesame AKT64/ Pearl millet. PKV Raj Shradha, Saburi Pear lmillet +Pigeon pea inter-cropping(2:1,.4:2)	Adopt closer spacing (45x20 cm) for Pigeon pea. Follow *insitu* moisture conservation measures	For Seed Source and Technology contact Dr. PDKV / KVK/MSSC/ NSC.
		Black gram			

condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop / Cropping system**	**Change in crop / cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Delay by 8weeks 6-12 August, 32nd MW	Deep to Medium deep black soils	Bt. Cotton	Sole Pigeon pea AKT-8811, Vipula, Sunflower (hybrids) / sesame AKT64/ CastorAKC-1, GCH-4, 5, 6 & DCH-117, 32 / pearl millet. PKV Raj Shradha, Saburi	Adopt closer spacing (60x30 cm)forPigeon pea Follow *insitu* moisture conservation measures	
		Cotton +Pigeon pea	-do-		
		Soybean	-do-		
		Pigeon pea	Pigeon pea Varieties PKV Tara, BSMR-736,		
		Sorghum (Kh. Jowar)	Sole Pigeon pea AKT-8811, Vipula, Sunflower (hybrids) / sesame AKT64/CastorAKC-1, GCH-4, 5, & DCH-117, 32/pearl millet. PKV Raj Shradha, Saburi		
	Shallow black soils	Soybean	Sunflower (hybrids) / Sesame AKT64 /pearl millet. PKV Raj, Shradha, Saburi,	Follow *insitu* moisture conservation measures	
		Green gram	-do-		
		Black gram	-do-		

7.1.1.2. Early season drought (Normal onset)

Condition			Suggested Contingency measures		
b) Early season drought (Normal onset)	**Major Farming situation**	**Normal Crop/ cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
		Bt. Cotton			
Normal onset followed by 15-	Deep to Medium deep black soils	Cotton +Pigeon pea	Give protective irrigation wherever possible. Raise cotton seedlings in nursery & transplant at sufficient soil moisture or	Avoid applying fertilizer till sufficient moisture in soil.	Sowing on BBF

20 days dry spell after sowing leading to poor germination/crop stand etc.			Gap filling to be done by pot watering 7-10 days after sowing when crop stand is less than 80%.		
		Soybean	Give protective irrigation wherever possible. Gap filling with maize and sesame. If germination is less than 50% resowing immediately after receipt of rains.	One hoeing	Rain water harvesting &recycling to be strengthened
		Pigeon pea	Gap filling either by sesame or maize. Provide protective irrigation, wherever is possible		
		Sorghum (Kh. Jowar)	Follow thinning to maintain optimum plant population.	One hoeing. Fertilizer application at sufficient moisture	
	Shallow black soils	Green gram	Protective irrigation if possible.	One hoeing is to be done for Conservation of soil moisture.	Shallow black soils
		Black gram			

Condition		**Suggested Contingency measures**			
c) Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm)period)	**Major Farming situation**	**Normal Crop/ cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At vegetative stage	Deep to Medium deep blacksoils	Bt. Cotton	Weeding Intercultivation to creat soil mulchto conserve moisture. Protective irrigation if possible.	Avoid applying fertilizer till there is sufficient moisture in the soil. Opening of alternate furrows.	With limited water availability prefer micro irrigation n system Intercultivation implements/ machineries to be popularizedthrough Govt. schemes.
		Cotton +Pigeon pea			
		Soybean		Opening of alternate furrows.	
		Pigeon pea			
		Sorghum (Kh.		Avoid applying	

		Jowar)		fertilizer till there is sufficient moisture in the soil. Opening of alternate furrows.	
	Shallow black soils	Soybean		Opening of alternate furrows. Spraying of 2 % urea or DAP.	
		Green gram	Intercultivation to create soil mulch to conserve moisture. Protective irrigation if possible.	Spraying of 2 % urea or DAP.	
		Black gram			
Mid season drought (long dry spell)					
At flowering/ fruiting stage	Deep to Medium deep black soils	Bt. Cotton	Protective irrigation if possible.	Spraying of 2 % urea or DAP.	
		Cotton + Pigeon pea			
		Soybean, Pigeon pea			
		Sorghum (Kh. Jowar)			
	Shallow black soils	Soybean , Black gram			
		Green gram			
Terminal drought (Early withdrawal of monsoon)					
	Deep to Medium deep black soils	Bt. Cotton	Giving life saving supplemental irrigation if available or taking up harvest at physiological maturity with s realizable yield.		
		Cotton + Pigeon pea Intercropping		-	-
		Soybean, Sorghum (Kh. Jowar)		Plan for *rabbi* season	
		Pigeon pea			
	Shallow black soil	Soybean			
		Green gram		Prepare for *rabbi* sowing Provided irrigation is available	

7.1.2 Irrigated situation:

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/croppingsystem**	**Agronomic measures**	**Remarks on Implementation**
Delayed release ofwater in canals due to low rainfall	Deep to Medium deep black soils	Wheat & Chickpea	Wheat to be replaced by Chickpea/Safflower/Mustard	Follow alternate row irrigation/irrigate at critical stages/Stream cutoff	Tapping of other sources ofirrigation. Sprinkler Irrigation
	Shallow black soils	Chickpea	Safflower/Mustard		
Limited release ofwater in canals due to low rainfall	Deep to Mediumdeep black soils	Wheat & Chickpea	Wheat to be replaced by Chickpea/Safflower/Mustard/ Linseed/Sesamum	Follow alternate row irrigation/irrigate at criticalstages/Stream cutoff	
	Shallow black soils	Chickpea	Safflower /Mustard		
Insufficient groundwater rechargedue to low rainfall	Open well irrigated-Rabi cropping	Wheat , Chickpea, Safflower	Chickpea, Safflower	Sprinkler Irrigation	

7.2 Unusual rains (untimely, unseasonal etc.) (Rainfed and irrigated situations)

Condition	Suggested contingency measure			
Continuous high rainfall in a shortspan leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post-harvest**
Cotton, Soybean, Green gram, Black gram	Opening of field channels to remove surface ponding, Foliar spray of 2% Urea. Interculture at optimum soil moisture to improve soil aeration.	Opening of field channels to remove surface ponding, Nutrient spray to arrest flower drop	Opening of field channels to remove surface ponding,	
Pigeon pea				Shifting to saferplace for drying
Horticulture				

Acid Lime Orange	Opening of field channels to removesurface ponding,	Mrig bahar not affected. For Ambia bahar Opening of field channels to remove surface ponding, Nutrient spray of NAA 10 ppm+ 1% Urea to prevent flowers drop.	Timely harvest to avoid losses	Fungal removal followed by Washing & waxing
Heavy rainfall with high speed windsin a short span				
Cotton	Opening of field channels to remove surface ponding. Improved drainage and drenching with copper oxy chloride to avoid wilting incidence.	Opening of field channels to remove surface ponding, Improved drainage and drenching with copper oxy chloride by opening of the nozzle of spray pump to avoid wilting incidence. Occurrence of grey mildew- control by sulphur spray @ 25 g/10 lit.	Occurrence of grey mildew- control by sulphur spray @ 25 g/10 lit.	Shifting to saferplace for drying
Soybean, Green gram, Black gram, Pigeon pea	Opening of field channels to removesurface ponding			
Horticulture				
Nagpur Mandarin Acid lime and sweet orange	Support by bamboo if < 3 years plants.	Support by bamboo if < 3 years plants. Opening of field channels to remove surface ponding,	Opening of field channels to remove surface ponding,	Fungal removal followed by Washing & waxing

Outbreak of pests and diseases due to unseasonable rains	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post-harvest**
Cotton	To control Jassids and Thrips spray with Acetamiprid 20 SP @ 1.5 g/ 10 lit.			
Soybean	To control semi-looper spray NSKE 5% or quinalphos 25 EC 20 ml/10 lit.		-	-
Green gram, Black gram	To control Powdery mildew penconozol 5 ml or dinocap 10 ml ortriadomorph 5 ml or sulphur spray @30 g/10 lit. of water.			
Pigeon pea	Improved drainage and drenching withcopper oxy chloride @25g/10 lit of water to avoid incidence of wilt and root rot.		-	-
Horticulture				
Mandarin Orange Sweet Orange	To control Citrus *psylla* Malathion 50EC 10ml Or Quinolphos 25EC 10mlOr Cypermethrin 25 EC 4 ml/10 lit		Immediate harvesting	Selling

Note: - Field bunds on slopy area to be strengthened

7.3 Extreme events: Heat wave / Cold wave/Hailstorm:

Extreme event type	Suggested contingency measure			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Heat Wave				
Horticulture	Increase the frequency of irrigation, Use of temporary shed net, Spraying of antitranspirant, Mulching. Pruning of damaged parts	Increase the frequency of irrigation, Spraying of antitranspirant, Mulching. Pruning of damaged parts, Application of Boudreaux paste	Increase the frequency of irrigation, Spraying of antitranspirant, Mulching. Pruning of damaged parts	Immediate harvesting of fruits, Increase the frequency of irrigation, Spraying of antitranspirant, Mulching. Pruning of damaged parts, Application of Bourdaeux paste
Cold wave				
Horticulture	Covering with poly tunnel, flood irrigation at evening	Smogging, Flood irrigation at evening, Basin Mulching, Supplementary dose of fertilizer	Smogging, Flood irrigation at evening, Basin Mulching, Foliar application of potash fertilizers	Immediate harvesting, smogging, Flood irrigation, Basin Mulching, Foliar application of potash fertilizers
Hailstorm				
Horticulture	Remove damaged parts , fungicidal spray	Remove damaged parts , fungicidal spray	Remove damaged parts, fungicidal spray, Spraying of NAA 20 ppm + 1 % urea.	Harvesting and grading

Chapter 8: Agro meteorological Advisory

8.1 Agro-Meteorogical advisory

8.1.1 Importance/ Need of Agromet advisory

The success and failure of crops in the large parts of the country depend on the monsoon rain. There are numerous and diverse sources of weather and climate-related risks in agriculture; limited water resources, drought, land degradation, erosion, desertification, hail, flooding, early frosts and many more. Effective weather and climate information and advisory services can ensure the decision making of farmers and improve their management of agricultural risks. Such services can help to develop sustainable and economically viable agricultural systems, improve production and quality, reduce losses and risks, decrease production costs, increase efficiency in the use of water, labour and energy, conserve natural resources, and decrease pollution by agricultural chemicals or other agents that contribute to the degradation of the environment. Thus, the importance of the Agromet Advisory Services that have now been established at district levels in India. These Services meet the real-time needs of farmers and contribute to weather-based crop/livestock management strategies and operations dedicated to enhancing crop production and food security. To fulfill the present and future needs, Agro Advisory Services emerged as an effective communication medium for transfer of technology regarding climate change information. Agro Advisory Services provide timely and accurate weather forecasts and miscellaneous agricultural operations to be carried out for better crop growth. Agro Advisory Services (AAS) were formed to be helpful to the farmers in managing climate risks effectively for sustainable and profitable agricultural production.

8.1.2 Forecasts or advisories generated at district level

The Agro-meteorological Advisory Service (AAS) rendered by IMD, Ministry of Earth Sciences (MoES) is a mechanism to apply relevant meteorological information to help the farmer make the most efficient use of natural resources, with the aim of improving agricultural production; both in quantity and quality. The district level bulletins are issued by Agro-Met Field Units (AMFUs) and embrace crop specific advisories including field crops, horticultural crops, and livestock. At present bulletins are being issued twice in a week i.e. Tuesday and Friday. Agromet advisories help to increase profits by consistently delivering actionable weather information, analysis and decision support for farming situations such as; to manage pests through the forecast of relative humidity, temperature; manage irrigation through rainfall & temperature forecasts; protect the crop from thermal stress through forecasting of extreme temperature etc.

A typical Agromet Advisory Bulletin enables farmers to reap benefits of benevolent weather and minimize or mitigate the impacts of adverse weather are district specific weather forecast, in quantitative terms, for next 5 days for weather parameters like; rainfall, cloud, maximum and minimum temperature, wind speed/direction and relative humidity, including forewarning of hazardous weather events (hailstorm, heat/cold waves, drought and flood etc.) likely to cause stress on standing crop and suggestions to protect the crop from them.

- Weather forecast based information on soil moisture status and guidance for application of irrigation, fertilizer and herbicides etc.
- Advisories on sowing/planting dates and suitability of intercultural operations covering the entire crop spectrum from pre-sowing to post harvest to guide farmers in their day-to-day cultural operations.
- Weather forecast based forewarning system for major pests and diseases of major crops and advises on plant protection measures.
- Propagation of techniques for manipulation of crop's microclimate e.g. shading, mulching, surface modification, shelter belt, etc. to protect crops under stressed conditions.

8.1.3 DAMU information

Akola do not have DAMU unit. Districts Agrometeorological Unit (DAMU) have been established at Krishi Vigyan Kendra (KVKs) in collaboration with Indian Council of Agricultural Research (ICAR) to implement block level Agrometeorological Advisory Services (AAS) through Agricultural Technology Application Research Institutes (ATARIs) during the year 2018-19 as per the MOU signed between ICAR and IMD, New Delhi. It is also the part of Agrometeorological Advisories Services do the similar works as do under the GKMS (Gramin Krishi Mausam Seva) in Vidarbha region. In Vidarbha region KVK, Buldhana, KVK, Sakoli and KVK Gadchiroli (SAUs) and KVK, Amravati, KVK, Washim (NGOs) and KVK, Nagpur (ICAR) provide block level Agromet Advisories through various modes of mass communication towards the farmers of region.

In Akola district under AMFU centre Akola Block level experimental Agromet Advisory Bulletin was initiated from 12 June, 2018 for all blocks of Akola district (Akola, Akot, Balapur, Barshitakli, Patur, Telhara and Murtijapur) and continuing till date. Automatic AAB was prepared in pilot mode by using software provided by WOTR for blocks of Akola district of Vidarbha region from August 2018. Farmers appreciate the online and timely response and weather alert provided to them which helps them in their day-to-day farming practices like sowing, fertilizer application, irrigation management, spray and harvesting schedules.

8.1.4 Other sources of Agro-met advisory

- **NICRA_ All India Coordinated Research Project on Agrometeorology (AICRPAM):** The NICRA-AICRPAM project aims to increase the resilience of agriculture to climate change and climate vulnerability through strategic research and demonstration of new technologies and one of the major objective of the project to customize micro-level Agromet advisories and their efficient dissemination through ICTs.
- **Micro level agromet advisories**: Helped farmers of the selected village of Akola district to obtain higher profitability avoiding losses due to unfavourable /abnormal weather enhancing their resilience to climate related risks.
- **PoCRA (Govt project):** Forecast, Agromet advisory bulletins, Real time advisory and weather alerts were also disseminated to selected farmers through different extension activities of POCRA (Govt project).

8.1.4 Other sources of Agro-met advisory

- **Apps:**
  DAMINI-A mobile app is used to assist farmers regarding lightning alerts.
  MEGHDOOT - A mobile app to assist farmers for weather-based farm management.
- **WhatsApp groups**: Agromet advisory bulletins, Real time advisory and weather alerts were also disseminated to selected farmers (1167), through 36 WhatsApp groups,
- **Department of Agriculture:** Akola district having seven (Talukas) blocks each Tahsil Agriculture Officers (TAO) provides AAS to different WhatsApp groups (170) through Agril. Assistant to the farmers group of minimums (500) Approximation outreach is 87500 farmers, as on March 2023.
- **POCRA (Govt project):** Forecast, Agromet advisory bulletins, Real time advisory and weather alerts were also disseminated to selected farmers through different extension activities of POCRA (Govt project).
- **COART (Dr. PDKV project):** Organic farmers (11000) through 22 organic farmers WhatsApp groups.
- **NGO (Reliance foundation):** Forecast, Agromet advisory bulletins, Real time advisory and weather alerts were also disseminated to selected farmers (5550), through different extension activities of reliance foundation.
- **Local Channels:** Very important real time advisory and weather alerts are telecasted on TV through the local channel and biweekly Agromet advisory through extension activities of reliance foundation.
- **All India Radio Channel:** All India Radio daily broadcasts the real time recorded met data,forecast, weather alerts on "frequency modulated band" and regularly broadcasts the Agro-met bulletins on every Tuesday in the evening between 19.40 to 20 hrs.
- **Dr.PDKV campus dashboard:** Daily weather recorded Met data is displayed through a digital LED light dashboard on the main gate of university campus.
- **Agri-met Divisional Website:** Total 312 Agromet advisory bulletins were uploaded on every Tuesday and Friday through Agri-met division website.
- **Dr.PDKV Akola website:** Daily weather recorded Met data, Agromet advisory bulletins were uploaded through Dr, PDKV Akola website.
- **Director of Extension, Dr. PDKV Akola:** Daily weather recorded Met data, Forecast, Agromet advisory bulletins, Real time advisory and weather alerts were also disseminated to selected farmers through different extension activities of university.
- **Farmers portal website:** Total 104 SMS were sent on every Tuesday and Friday through farmers' portal.
- **M-Kisan:** About 938154 farmers have been benefited in (2022-2023), About 73823086 farmers have been benefited till now (2018-2023) through this service as displayed for the centre on website.
- Total about (99667) farmers have benefited during 2022-2023.

8.1.6 Utilization of Agro-met advisory by farmers in changing climatic condition

- Agro Advisory Bulletin helps in decision making and timeliness of agriculture operations like sowing, intercultural operation, plant protection, harvesting etc.
- Agromet-advisories regularly contain important information about weather, growing crops/vegetables, its nutrient management/need based management options/ affect plant protection measures.
- Agro Advisory Bulletin helps to save cost of inputs such as seeds, fertilizers and pesticides, labour etc. For example, postponement of sowing due to delayed monsoon forecast, postponement of insecticidal/foliar spraying/irrigation due to rainfall forecast etc saves the cost to be incurred on inputs and labour.
- Agro Advisory Bulletin helps in protection of crop harvest and its storage avoiding rain damage at harvest/storage stage thus reducing the economic losses.
- Timely advisory bulletin with forecast of extreme weather like dry spell, heat wave, hail storm and advised management options thereof helps to protect crops. Such timely advisories alerts and benefit the farmers.
- Overall, AAB helps to reduce cost of cultivation, increase crop yields and profit margin.
- Though forecasting has improved in recent times, there is need of seasonal monthly forecast at regional level, and taluka level forecast during the crop season
- Especially, the sowing operation, plant protection schedule, irrigation schedule and crop harvesting are being modified on the basis of weather forecasts given under AAS and it benefited the farmers

(Source- Dr. PDKV Akola)

Chapter 9: Commodity wise status of climate Resilient Agriculture value chain

9.1 Existing marketing scenario in the district

9.1.1 Year wise marketable surplus of major crops. (All values in quintal)

Sr. No.	Year	Cotton	Tur	Soybean	Gram	Wheat
1	2022-23	14720	329058	684445	284602	45875
2	2021-22	20079.72	287055	404774	202775	45522
3	2020-21	291840.10	200725	700549	178098	51609
4	2019-20	212236	205674	471412	208456	63378

(Source- APMC, Akola)

9.1.2 Year wise price variation of major crops. (All values in Rupees)

Sr. No.	Year	Cotton Price Variation	Tur Price Variation	Soybean Price Variation	Gram Price Variation	Wheat Price Variation
1	2022-23	10800	5733	5148	4125	2438
2	2021-22	8900	5650	7751	4550	1713
3	2020-21	5615	6225	4250	4125	1775
4	2019-20	5450	4700	3250	3900	2200

(Source- APMC, Akola)

➢ 9.2 Constraints in existing value chain

- Access to finance- They need to be given relaxations in tax, institutional credit and other monetary incentives. For example, many incentives are given to IT companies and new start-ups, such facilities can be extended to agricultural products exporting firms.
- Quality of the product- The production, collection, storage and delivery parts of value chains have to be made efficient in order for the small farmers to realise higher returns.
- Market assesses- for the existence of middlemen and agents farmers and FPOs not getting a good market and profit.
- Capacity building-Another major challenge is improvement in the production and supply competencies of the small and marginal farmers. To export agricultural products in external markets, it is necessary that quality and safety of product is maintained. Most of the small and marginal farmers do not realise how to produce, store and preserve agricultural products in a modern way and how to constantly check the quality. Even many cold storage and godown owners do not know the exact details to preserve and store agricultural produce.

9.3 Potential for strengthening of commodity wise value chains

- In this Akola District total 118 FPC are registered, they have applied for various activities like CHC, Warehouse, Cleaning & grading Units, Dal Mills, Cold Pressed Oil Units, Food Processing units.
- Post-Harvest Technology: Post harvest loss reduction technology encompasses the usage of optimum harvest factors, reduction of losses in handling, packaging, transportation and storage with modern infrastructure machinery, processing into a wide variety of products, home scale preservation with low-cost technology.
- Food Processing Industry: Agriculture processing may be defined as an activity which is performed to maintain or improve the quality or to change the form or characteristics of agricultural products.
- Primary Processing: Purification of raw materials by removing foreign matter, immature grains and then making the raw material eligible for processing by grading in different lots or conversion of raw materials into the form suitable for secondary processing.
- Secondary Processing: Processing of primary processed raw materials into products which are suitable for food uses or consumption after cooking, roasting, frying etc.
- Tertiary Processing: Conversion of secondary processed materials into ready to eat form.
- Pulse Milling: Pulses are the major sources of protein for the vegetarian in india. In a total world production of 60 million tonnes of pulses.
- Linking Farmers to Market: A major subset of value chain development work is concerned with ways of linking producers to companies and hence into the value chain.

(source- Krushi utpanna bazar samiti akola & information from TAOs)

9.4 FPCs' contribution in value chain development

9.4.1 Status of FPCs in the district

Status of FPC and supported activity under NDKSP, Akola

Total FPC in the District		**118**
Services Provided Under NDKSP		**52**
Sr.No	Activity Name	Total No.
1	Construction of Godown	9
2	Custom Hiring Centre	26
3	Food Processing Unit	2
4	Goat Breeding Centre	2
5	Grain Processing Unit	3
6	Poultry Feed Mill & Shed	1
7	Pulse Mill	3
8	Refrigerated Van	4
9	Sale of Agricultural Input	1
10	Seed Processing Shade/ Drying Yard	1

(Source : PoCRA DBT portal)

9.4.2.1. Objectives of Evaluation

- The study is an attempt to assess the Farmer Producer Companies of project area and find whether these companies are performing and earning sufficient returns to sustain business. The report has also proposed a rating method to measure the performance of FPCs considering different 8 parameters. The reports analysed 42 Farmer Producer Companies with the help of parameters. The parameters were further assigned performance scores on the basis of efficiency and effectiveness with the help of Automatic Rating Meter.
- On the basis of assessment report, suggesting the measures for strengthening of FPCs e.g. capacity building, climate resilience adaptation.

Table no. 9.2.2.1.a. Criteria for Evaluation of FPCs

Criteria	Max. Score
Organization and Administration(Core foundation strength)	21
Governance(Control System in Place)	11
Management (Decision making processes)	8
Infrastructure(Assets and resources)	5
Finance(Financial Base and health)	25
Business and Market Linkages (Resource quality)	21
Capacity Building (Resource quality)	5
Climate Resilience (Adaptability to climate risk)	4
Final Score	100

Scoring Method of Evaluation

- The maximum score for the above mention parameter was 100. The FPC rating report was generated by calculating the obtained score for a FPC. From these scores the result boxes were generated in the report indicating areas where this particular FPC needs to be improved. Selected questions were grouped under every parameter and weightage was accorded to each question under each parameter. The final score was calculated by using formula:

$$\text{Score}=\frac{\textit{Maximum Obtained Score}}{\textit{Maximum Obtainable Score}}\times 100$$

9.4.2.2 Output of evaluation.

All the major parameter noted above can be classified on the basis of percentage and frequency. The total obtained percent score was use for categorization of the parameter. The parameter was categories into three categories i.e. below 50% marks, 50- 75% marks, and above 75% marks. And all the FPCs were categories in three categories which help to analysed the present situation of the FPCs present in the project area and will also help to given suggestion to them. This analysis can be useful for the project also for developed different strategies plan for the project area.

The main findings from the survey and the observations from the detailed interactions with the member or directors of the FPCs created insights in terms of how the FPCs operate today, where the members want it to go in the future, how the Directors perceive the plan of action for the future and in which focus areas the gaps between reality and expectation lie.

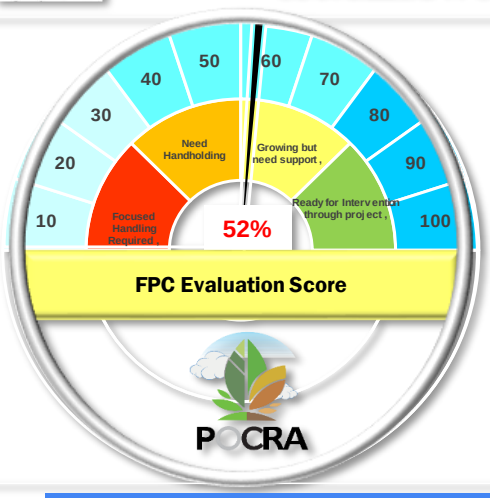
Customized FPC Evaluation Report

Nanaji Deshmukh Krush Sanjivani Praklap

Maharashtra Project on Climate Resilient Agriculture

(Project of government of Maharashtra in partnership with World Bank)

CUSTOMIZED FPC EVALUATION REPORT



Name of FPC

Awanee Agro Producer Company Limited

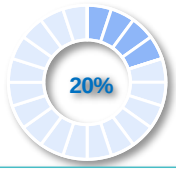
Address

Ghar kra.354, Dahigaon Gavande Ta. Akola, Dist-Akola, Pincode- 444001

Score Report

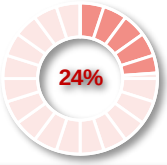
Criteria	Max. Score	Score Obtained
Organization & Adminstration (Core Foundation Strength)	21	15
Governance (Control Systems in Place)	11	10
Management (Decision making processes)	8	8
Infrastructure (Assets and resources)	5	3
Finance (Financial base and health)	25	9
Business & Market Linkages (Resource quality)	21	5
Capacity Building (Resource quality)	5	1
Climate Resilience (Adaptability to climate risk)	4	1
Final Score	100	52

What could improve your FPC?



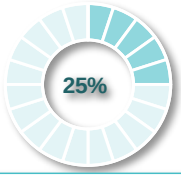
Capacity Building

Training is required on various climate resilient crop production practices and other new technologies. BOD trainings required for business management and legal compliances. Awareness on climate change is required so that the FPC can adapt CR practices.



Business & Market Linkages

Bankable business plans will help in increasing financial turnover. Backward and forward linkages should be developed for commodity procurement, value addition and marketing



Climate Resilience

The FPC should promote various climate resilient agricultural technologies.

For more Information contact us at Project Director, ATMA, Akola

Commodities on which FPCs or farmer groups are working and services provided by FPCs

Sr. no	Taluka	Village	Name of Farmer Group	Name of Commodity/crop	Activity/ service
1	Balapur	Ural Bk.	Agristock Farmer Producer Company Limited	All Crops	Establishment of Custom Hiring Centers.
2	AKOT	Akot	Akot Agro Producer Company Ltd	All Crops	Establishment of Custom Hiring Centers.
3	AKOT	Akot	Akot Agro Producer Company Ltd	Tur& Gram	Pulse Mill (Dal Mill)
4	AKOT	Akot	Akot Agro Producer Company Ltd	Cotton, Soybean, Gram, Tur	Construction of Godown/ Small Warehouse.
5	Balapur	Andura	Andura Agro Producer Company Limited	All Crops	Establishment of Custom Hiring Centers.
6	Balapur	Andura	Andura Agro Producer Company Limited	Cotton, Soybean, Gram, Tur,	Construction of Godown/ Small Warehouse
7	Balapur	Andura	Andura Agro Producer Company Limited	Wheat	Grain Processing Unit (Cleaning/Sorting/Grading Unit)
8	Barshitalki	Kanheri	Krushi Vigyan Madhuratna Farmers Agro Producer Company	Spices	Food Processing Unit
9	Barshitalki	Kanheri	Krushi Vigyan Madhuratna Farmers Agro Producer Company Limited	All Crops	Establishment of Custom Hiring Centers.
10	Barshitalki	Punoti Bk	Vidarbha Krushi Samruddhi Farmer Producer Company	All Crops	Establishment of Custom Hiring Centers.
11	Barshitalki	Punoti Bk	Vidarbha Krushi Samruddhi Farmer Producer Company	Goat	Goat Breeding Center.
12	Barshitalki	Punoti Bk	Vidarbha Krushi Samruddhi Farmer Producer Company	Transporting Cotton, soybean, gram, tur, wheat,	Refrigerated Van or Vegetable/Fruit carrier/ vehicle.
13	murtizapur	murtizapur	Sewartha Agro Producer Company Limited	Soybean, Gram, Cotton	Seed Processing Shade/ Drying Yard. Food Processing Unit.
14	telhara	adgaon bk	Shivarpan Agro Producer Co. Ltd. Adgaon Bk.	All Crops	Establishment of Custom Hiring Centers.
15	akot	kasod shivpur	Farm Growth Science Farmers Producer Company Limited	Wheat	Grain Processing Unit (Cleaning/Sorting/Grading Unit).
16	akot	kasod shivpur	Farm Growth Science Farmers Producer Company Limited	Wheat	Grain Processing Unit (Cleaning/Sorting/Grading Unit).
17	murtizapur	bhagora	Murtizapur Shetkari Producer Company Limited	Tur & Gram	Pulse Mill (Dal Mill).
18	Murtizapur	Bhagora	Murtizapur Shetkari Producer Company Limited	Cotton, Soybean, Gram, Tur, Wheat	Construction of Godown/ Small Warehouse.
19	Murtizapur	Bhagora	Murtizapur Shetkari Producer Company Limited	all crops	Establishment of Custom Hiring Centers.
20	Patur	Vivara	Jay Pundlik Mauli Agro Producer Company Ltd.	all crops	Establishment of Custom Hiring Centers.

(Source- Pocra DBT Portal, SMART Project, DIU, Akola)

Chapter 10: Extension Strategies for Adaptation to Climate Change

I) Preparation of Village Adaptation Plan

- Need for participatory micro-planning and pre-season meetings
- Process for micro-planning and seasonal meetings- agenda, stakeholders, duration, material required, information needed etc.
- Role of Village Agriculture Development Committee of Gram panchayat
- Components of Village Adaptation Plan to be prepared for each village

❖**Planning for water security**

a.Computation of water budget

b.Water conservation structures

c.Groundwater recharge structures (including recharge of wells)

d.Water harvesting structures

e.Micro-irrigation plan

❖**Planning for soil health**

a.Soil health Card status of the village

b.Status of Organic Carbon content

c.Soil health based advisory- crop suitability

d.On-farm production of biofertilizers

e.Production of organic inputs

f.Regenerative agriculture plan

g.Soil erosion/ degradation arresting measures

❖**Crop planning based on water budget and market demand**

a.Current cropping pattern

b.Available water balance (post monsoon)

c.Last year prices of crops

d.Crop diversification

e.Proposed cropping pattern (season and crops)

❖**Planning for Carbon sequestration**

a.Agro-forestry plantation

b.Horticulture plantation

c.Forage/ Cover crop cultivation

d.Bamboo plantation

e.Live fencing plan

❖**Planning for reduction of production cost**

a.Reducing cost on labour intensive operations (by mechanization)

b.Reducing use of chemical fertilizers (by enhancing use of bio/ organic fertilizers)

c.Reducing use of chemical pesticides (by enhancing use of bio/ natural pesticides)

d.Reducing tillage operations (by conservation agriculture)

e.Reducing excessive water usage (by micro-irrigation)

❖**Planning for conservation and production of climate resilient variety seed**

a.Identification of CRV.

b.Production programme for Truthful/ Certified/ Foundation seeds- status

c. Conservation of indigenous seed having climate resilient characters- details of such seeds with location and characteristics

❖**Adoption of climate resilient technologies**

a.Identification of CRT useful to the village and creating awareness

b.Plan of demonstration of CRT (FFS, Method/ Result Demonstrations)

c.Most prominently adopted technologies and their impact

d.Innovative technologies adopted

e.Validation of technologies developed by Progressive farmers

❖**Integrated Pest Management Plan**

*a.*Identification of common pests on major crops based on *CROPSAP*

b.Plan of IPM technologies to be adopted

c.On-farm production of bio-pesticides, natural pesticides etc.

d.Skill training to reduce pesticide hazard

❖**Integrated farming systems**

a.Potential for crop based and other livelihood activities

b.Households to be engaged in IFS

c.Plan for market linkage for IFS produce

❖**Preparation of contingency plan**

a.Village level weather forecast mechanism

b.Preparedness for contingencies

c.Crop insurance promotion and status

d.Monitoring of contingencies

e.Assessment of losses due to natural calamities if any

❖**Strengthening of commodity value chains**

a.Assessing existing commodity value chains

b.Identification of gaps in existing value chains

c.Assessing volume of commodity to be marketed

d.Assessing warehouse availability and available capacity

e.Assessing transportation facilities

f.Plan for infrastructure

g.Plan for market linkage of major commodities

h.Role of Women Self Help Groups, Farmer Groups, FPCs

II. Convergence of govt. programmes with extension plan

- Convergence of govt. programmes with extension plan Farmers' skill trainings and field extension as contained in all 4 Sub Missions of NMAET [Viz. Sub Mission on Agricultural Extension (SMAE), Sub-Mission on Seed and Planting Material (SMSP), Sub Mission on Agricultural Mechanization (SMAM) and Sub Mission on Plant Protection and Plant Quarantine (SMPP)] will be converged with similar farmer-related activities going on through ATMA.
- Thus, for instance, Seed Village programmes under SMSP, capacity building of farmers through institutions identified by the State Government under SMAM and pest monitoring, Farmer Field Schools & Integrated Pest Management (IPM) trainings to farmers under SMPP will only be carried out through the district level institutions of ATMA and Block Technology Teams.
- Mutually synergetic linkages will be established among various activities instead of unilaterally mandating that all such farmer-centric activities shall be carried out through ATMA. For instance, half day's training given under Seed Village Programme shall also be made part of Farm Schools as, in any case, training on seed technologies form a part of 6 critical stages during which farmers are trained under Farm Schools conducted under ATMA.
- Similarly, the Assistant Technology Managers recruited under ATMA shall also double up as Pest Surveillance Scouts. This convergence should be institutionalized by ensuring that the State Extension Work Plan [which emanates from Strategic Research and Extension Plan (SREP)] covers field level training & extension components for all modes of Mission .
- SREP is an ideal platform to provide convergence from the conceptual level and prioritization point of view. IDWG will further underline such a convergent approach at the State level. A single ATMA Governing Board headed by the District Magistrate will provide commonality in approach & implementation and avoid duplication.
- ATMA Governing Board shall act as an over-arching umbrella at District level to oversee all extension related activities in other Missions like National Horticulture Mission (NHM), National Food Security Mission (NFSM), Rashtriya Krishi Vikas Yojana as also the other Sub-Missions under NMAET.. Such a holistic approach will avoid duplication of efforts and promote more extensive & inclusive coverage of beneficiaries.
- The Integrated ICT platforms (such as Farmers' Portal, State Agriculture Portals, Central Agriculture Portal) will also provide requisite impetus to implementation in the field level. Convergence with other Farmer Centric Schemes of DAC: With the given man-power support, ATMAs will also look after the work related to RKVY, NFSM, National Project on Soil Health and Fertility Management etc. as mandated under respective schemes.
- There should be full convergence of extension related work being carried out under different programmes/schemes. The field level extension workers under these different programmes/schemes

should work in conjunction with the dedicated manpower being provided under this Scheme under the umbrella of BTT or ATMA, as the case may be.

- While these extension related workers & consultants under other schemes/programmes can continue to act as experts in their respective fields, they should also double up as multifunctional extension workers in the jurisdiction to be assigned to them by the BTT/ATMA. Budget for extension related components in different schemes and programmes of DAC shall be dovetailed at district level through ATMA. Operational Modalities and Mechanism Fertility Management to achieve complementarities and check duplication of efforts and resources.
- SMART: 29 applications have been received under the project for various activities and all the applications have received pre-sanction and the construction work, procurement process is in progress.
- NDKSP: Till date 104750 farmers of the district have been registered on the online DBT portal individual benefit applications have been registered. Out of which till date 25252farmers have been given subsidy amounting to Rs.102.26 cr.

  Also under the agribusiness component till date 356 farmer groups and farmer producer companies in the district have distributed subsidy amounting to Rs 36 cr.

III. Monitoring mechanism for village adaptation progress -

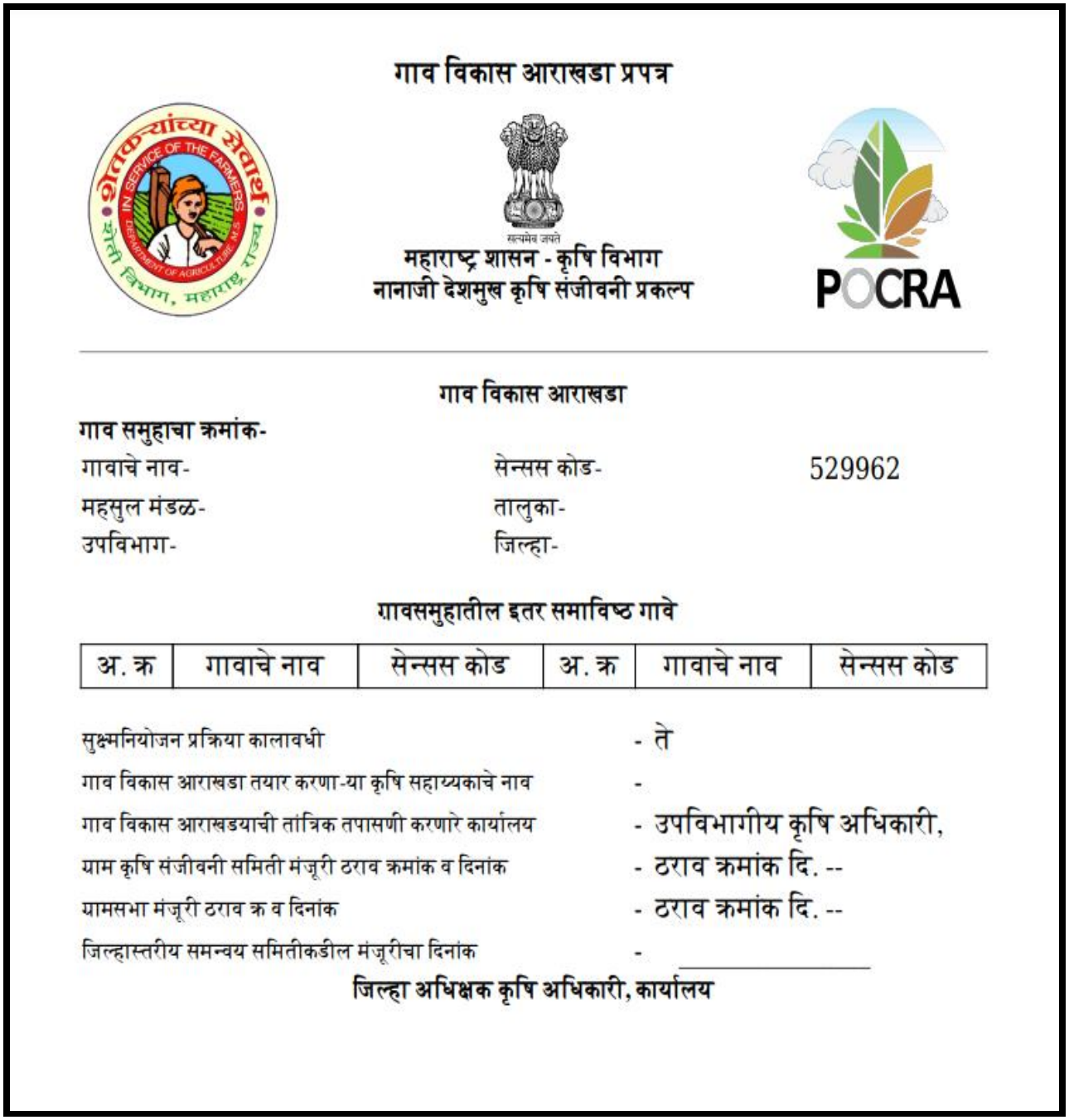
- Monthly review of Taluka Agriculture Officers and Circle Agriculture Officers.
- Monthly meetings with field functionaries of all agriculture schemes.
- Through the field farm school to give the proper guidance for farmers regarding climate resilient technologies to create sustainable livelihood opportunities.
- To inspire the farmer by effective communication to plan adaptation of new technology and schemes and to focus on adaptive climate resilient agriculture technologies for sustain.
- To identify the needs and problems of farmers for effective implementation of various agriculture schemes.
- To train extension workers, government officials, and agricultural experts to provide guidance and support to farmers in adopting mechanization.
- Provide easy access to information about the latest trends in mechanization and government support programs through online platforms and local agricultural extension offices.
- Encourage the formation of farmer cooperatives to jointly invest in and share machinery. This can help small farmers access modern equipment.
- Promote the use of mechanization methods that are environmentally sustainable, such as precision agriculture and reduced chemical usage.
- Monitor the adoption of modern agricultural technologies and machinery, such as tractors, harvesters, irrigation systems, and precision agriculture tools.

IV. Strategy for revisiting of village adaptation plan

- Revisiting a village adaptation plan is essential to ensure that it remains effective and relevant to the changing needs and circumstances of the communities it serves. Here's a strategy for revisiting and updating a village adaptation plan:
- Stakeholder Engagement: Identify and engage with key stakeholders, including local government officials, community leaders, farmers, NGOs, and agricultural experts. Conduct meetings and workshops to gather input and feedback on the existing plan and to understand the evolving needs and challenges of the villages.
- Assessment of Changing Climate Patterns: Consider the impact of changing climate patterns on agriculture and rural communities. Assess the need for climate-resilient strategies and adaptations.
- Technology and Mechanization: Review the adoption of modern agricultural technologies and machinery in the villages. Evaluate the effectiveness of any support or subsidies provided for technology adoption.
- Market and Value Chain Analysis: Analyse the local and regional markets for agricultural produce. Identify opportunities to strengthen value chains, improve market access, and increase farmers' income.
- Resource Management: Evaluate the sustainable management of natural resources, including water, soil, and forests. Consider strategies for resource conservation and sustainable practices.
- Climate-Smart Agriculture: Incorporate climate-smart agricultural practices and technologies to help farmers adapt to changing weather patterns. Promote techniques such as crop diversification and water management.
- Capacity Building and Training: Review the effectiveness of training and capacity-building programs for farmers. Ensure that farmers have access to knowledge and skills needed for modern and sustainable farming practices.
- Community Participation: Involve local communities in the planning and decision-making process. Encourage community-led initiatives and self-help groups.

Annexure I Sample Village Level Micro-Plan

(https://mlpv2.mahapocra.gov.in/vdp.php?census_code=529962)



गाव विकास आराखडा प्रपत्र

महाराष्ट्र शासन - कृषि विभाग
नानाजी देशमुख कृषि संजीवनी प्रकल्प

POCRA

गाव विकास आराखडा

गाव समुहाचा क्रमांक-

गावाचे नाव- सेन्सस कोड- 529962

महसुल मंडळ- तालुका-

उपविभाग- जिल्हा-

गावसमुहातील इतर समाविष्ठ गावे

अ. क्र	गावाचे नाव	सेन्सस कोड	अ. क्र	गावाचे नाव	सेन्सस कोड

सुक्ष्मनियोजन प्रक्रिया कालावधी - ते

गाव विकास आराखडा तयार करणा-या कृषि सहाय्यकाचे नाव -

गाव विकास आराखडयाची तांत्रिक तपासणी करणारे कार्यालय - उपविभागीय कृषि अधिकारी,

ग्राम कृषि संजीवनी समिती मंजूरी ठराव क्रमांक व दिनांक - ठराव क्रमांक दि. --

ग्रामसभा मंजूरी ठराव क्र व दिनांक - ठराव क्रमांक दि. --

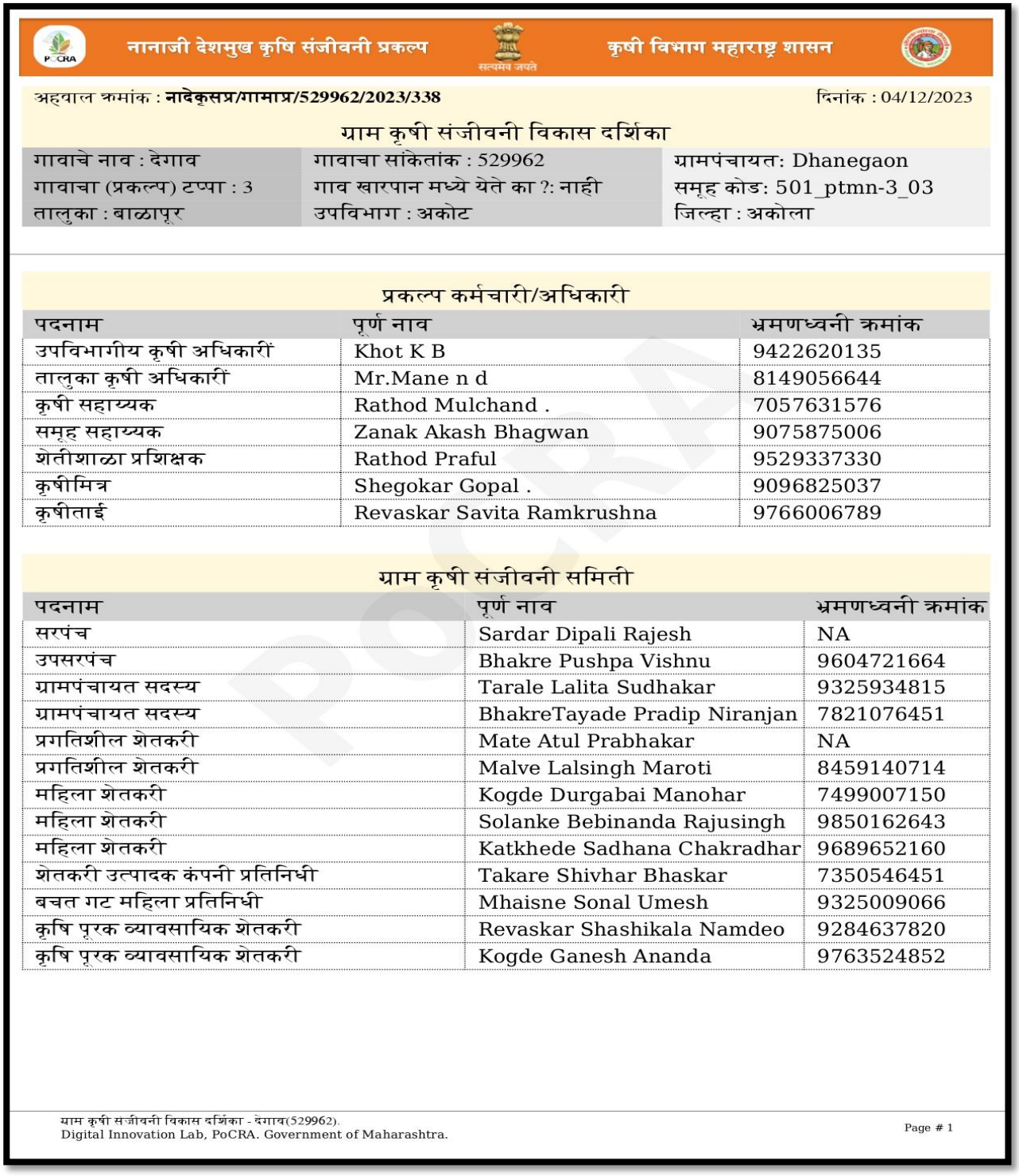
जिल्हास्तरीय समन्वय समितीकडील मंजूरीचा दिनांक - _____

जिल्हा अधिक्षक कृषि अधिकारी, कार्यालय

क्रमश: (अनुक्रमणिका)

Annexure II Sample Village Profile

(https://ffsauditlogs.blob.core.windows.net/mahapocra/scripts/pdf/pocra-village-profile-529962-2023338.pdf**)**



नानाजी देशमुख कृषि संजीवनी प्रकल्प — कृषी विभाग महाराष्ट्र शासन

अहवाल क्रमांक : **नादेकृसप्र/गामाप्र/529962/2023/338** दिनांक : 04/12/2023

ग्राम कृषी संजीवनी विकास दर्शिका

गावाचे नाव : देगाव	गावाचा सांकेतांक : 529962	ग्रामपंचायत: Dhanegaon
गावाचा (प्रकल्प) टप्पा : 3	गाव खारपान मध्ये येते का ?: नाही	समूह कोड: 501_ptmn-3_03
तालुका : बाळापूर	उपविभाग : अकोट	जिल्हा : अकोला

प्रकल्प कर्मचारी/अधिकारी

पदनाम	पूर्ण नाव	भ्रमणध्वनी क्रमांक
उपविभागीय कृषी अधिकारी	Khot K B	9422620135
तालुका कृषी अधिकारी	Mr.Mane n d	8149056644
कृषी सहाय्यक	Rathod Mulchand .	7057631576
समूह सहाय्यक	Zanak Akash Bhagwan	9075875006
शेतीशाळा प्रशिक्षक	Rathod Praful	9529337330
कृषीमित्र	Shegokar Gopal .	9096825037
कृषीताई	Revaskar Savita Ramkrushna	9766006789

ग्राम कृषी संजीवनी समिती

पदनाम	पूर्ण नाव	भ्रमणध्वनी क्रमांक
सरपंच	Sardar Dipali Rajesh	NA
उपसरपंच	Bhakre Pushpa Vishnu	9604721664
ग्रामपंचायत सदस्य	Tarale Lalita Sudhakar	9325934815
ग्रामपंचायत सदस्य	BhakreTayade Pradip Niranjan	7821076451
प्रगतिशील शेतकरी	Mate Atul Prabhakar	NA
प्रगतिशील शेतकरी	Malve Lalsingh Maroti	8459140714
महिला शेतकरी	Kogde Durgabai Manohar	7499007150
महिला शेतकरी	Solanke Bebinanda Rajusingh	9850162643
महिला शेतकरी	Katkhede Sadhana Chakradhar	9689652160
शेतकरी उत्पादक कंपनी प्रतिनिधी	Takare Shivhar Bhaskar	7350546451
बचत गट महिला प्रतिनिधी	Mhaisne Sonal Umesh	9325009066
कृषि पूरक व्यावसायिक शेतकरी	Revaskar Shashikala Namdeo	9284637820
कृषि पूरक व्यावसायिक शेतकरी	Kogde Ganesh Ananda	9763524852

ग्राम कृषी संजीवनी विकास दर्शिका - देगाव(529962).
Digital Innovation Lab, PoCRA. Government of Maharashtra.
Page # 1

भौगोलिक तपशील

माहिती उपलब्ध नाही

हवामान अंदाज व पीक सल्ला

माहिती उपलब्ध नाही

वैयक्तिक लाभार्थी तपशील

नोंदणी केलेले शेतकरी - 939	अर्जांची एकूण संख्या - 1059
पूर्वसंमंती दिलेले अर्ज - 346	लाभ दिलेले अर्ज- 338
लाभार्थी संख्या - 261	लाभार्थी महिला शेतकरी - 69
अनुसूचित जाती लाभार्थी - 1	अनुसूचित जमाती लाभार्थी - 20
वितरीत अनुदान रक्कम - 13217740	बँकेसोबत आधार संलग्न नसलेले शेतकरी - 133

घटकनिहाय वितरित अनुदान

घटक/बाब	एकूण अर्ज	पूर्व समंती प्राप्त अर्ज	नाकारलेल्या अर्जांची संख्या	लाभार्थी शेतकरी	वितरीत केलेला निधी (रू)
Apiculture	4	0	4	0	0
Backyard Poultry	10	0	10	0	0
Compost (Vermicompost / NADEP / Organic input production unit)	3	0	3	0	0
Drip Irrigation	98	20	76	14	654389
Farm Mechanization	121	36	85	31	2645700
Farm Pond (Individual)	25	0	24	0	0
FFS host farmer assistance / Promotion of BBF technology/ Zero Tillage Technology etc.	54	3	50	2	5600
Horticulture Plantation / Agroforestry	154	50	104	43	1369903
Inland Fisheries	6	0	6	0	0
Pipes	29	9	20	9	173025
Recharge of open dug wells	14	0	14	0	0

Saline and Sodic lands (Farm ponds/ Sprinklers / Water pump/ FFS)	3	0	3	0	0
Seed Production	9	3	6	0	0
Sericulture	20	0	20	0	0
Shadenet House	1	0	1	0	0
Sprinkler Irrigation	445	224	212	201	8354123
Water Pumps	15	1	14	1	15000
Well	48	0	48	0	0
Total	1059	346	700	301	13217740

कृषी व्यवसाय घटकाचा तपशील

नोंदणी केलेल्या FPC/SHG/Farmer Group ची संख्या - 4	एकूण अर्जांची संख्या - 2
पूर्वसंमती दिलेल्या अर्जांची संख्या - 2	कार्यारंभ आदेश दिलेल्या अर्जांची संख्या - 2
लाभ दिलेल्या FPC/SHG/Farmer Group ची संख्या - 2	अनुदान वितरीत रक्कम, रु. - 2173320

कृषी व्यवसाय घटकांतर्गत घटक/ बाबनिहाय वितरीत अनुदान

घटक/बाब	एकूण अर्ज	पूर्व समंती प्राप्तअर्ज	कार्यारंभ आदेश प्राप्त अर्ज	अनुदान वितरीत FPC/SHG/Farmer Group	वितरीत केलेले अनुदान रक्कम, (रू)
Establishment of Custom Hiring Centers	2	2	2	2	2173320

मृद व जलसंधारण तपशील

पावसाचे प्रमाण (मिमी) - 728.75	उपलब्ध अपधाव (TCM) - 1024.74
अडवलेला अपधाव (TCM) - 800.95	शिल्लक अपधाव (TCM) - 243.9
प्रस्तावित क्षेत्र उपचार (हे.) - 0	प्रस्तावित नाला उपचार संख्या - 0
कामांची एकूण रक्कम - 0	तयार अंदाज पत्रकांची संख्या - 0
एकूण तांत्रिक मंजुरींची संख्या - 0	पूर्ण झालेल्या ई निविदा संख्या - 0
सुरु झालेल्या कामांची संख्या - 0	पूर्ण झालेल्या कामांची संख्या - 0
निधी वितरण केलेल्या कामांची संख्या - 0	खर्च झालेली एकूण रक्कम (रू) - 0

पिक पद्धतींचा तपशील

माहिती उपलब्ध नाही

भूमी उपयोगिता वर्गीकरण

गावाचे एकूण भौगोलिक क्षेत्र 1789.58 हे असून निव्वळ पिकाखाली त्यापैकी 86.05% क्षेत्र आहे. गावाचे भूरूप ढोबळमानाने उंचसखल/ डोंगराळ/ सपाट प्रकारचे आहे. गावातील निव्वळ पिकाखालील क्षेत्रापैकी 191.56% क्षेत्राकरिता सिंचनसुविधा उपलब्ध आहे.

अ.क्र.	तपशील		क्षेत्र (हेक्टर)
1	एकूण भौगोलिक क्षेत्र (Total Geographical Area)		1789.58
2	पिकाखालील निव्वळ क्षेत्र (Net Cropped Area)		1540
3	दुबार पिकाखालील क्षेत्र (Double Cropped Area)		10
4	एकूण लागवडीखालील क्षेत्र (Gross cropped Area)		1540
5	एकुण सिंचित क्षेत्र (Irrigaterd Area)	हंगामी बागायत	1475
		बारमाही बागायत	1475
6	एकूण वन क्षेत्र (Total Forest Area)		0
7	कायम पड क्षेत्र (Permanent Fallow Area)		0
8	चालू पड क्षेत्र (Current Fallow Area)		20
9	गवत पड व चराऊ कुरणे (Pasture Land)		0
10	इतर पड क्षेत्र (Other Fallow Area)		17
11	बिगर कृषि क्षेत्र (Area put to non-Agricultural use)		128

पिकनिहाय क्षेत्र (क्षेत्र हेक्टर)

अ.क्र.	पिकाचा वर्ग	पिकाखालील क्षेत्र
1	तृणधान्य	27
2	कडधान्य	718
3	गळितधान्य	1032
4	नगदी पिके (कापूस,ऊस)	64
5	भाजीपाला पिके	0
6	फळपिके	0
7	चारा पिके	0
8	इतर	0
एकूण		1841

निरीक्षण विहिरींची पाण्याची पातळी

सूक्ष्म नियोजन आराखड्यानुसार गावतील सरासरी भुजल पातळी -- (खोली मी मध्ये) निरीक्षण साठी निवडलेल्या विहिरीचा तपशील

माहिती उपलब्ध नाही

शेतमाल निहाय घाऊक बाजारातील आवक व बाजार भाव बाबत माहीती

माहिती उपलब्ध नाही

नजिकचे गोदाम / वखारकेंद्रा बाबत माहीती

एकूण क्षमता (MT)	उपलब्ध क्षमता (MT)	तारीख
19450	11950	30/11/2023
गोदाम नाव	ईमेल	दूरध्वनी
AKOLA	akola.wh@mswc.in	0

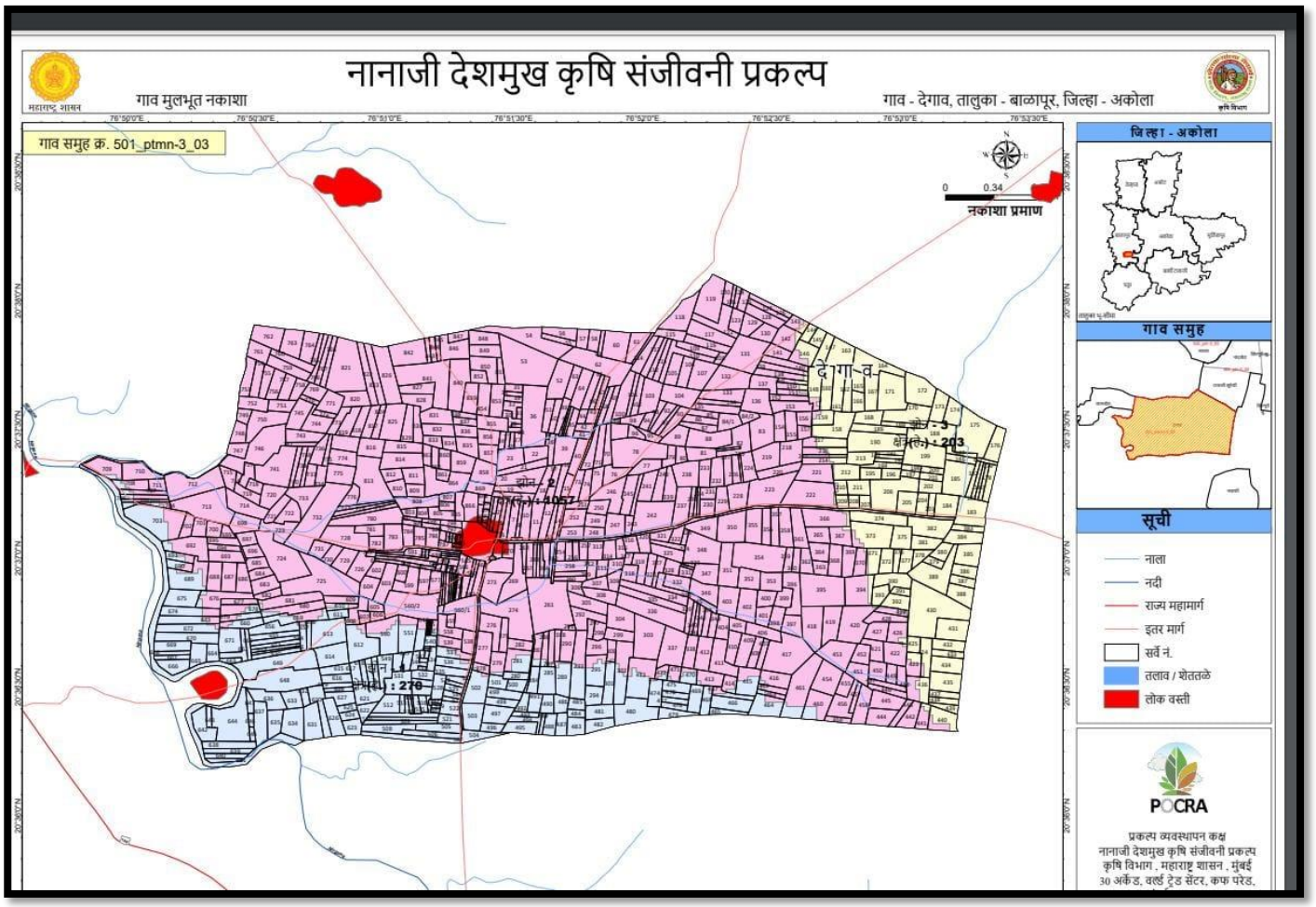
गोदामाचा पत्ता -MSWC, N66, PHASE-4, MIDC AREA, SHIVANI, AKOLA - 444001
गावापासून अंतर(कि.मी.) - 18.53

Sources of Information:

1. General Census 2011
2. Agriculture Census 2010
3. PoCRA DBT Portal
4. PoCRA MLP Application
5. PoCRA FFS Application
6. PoCRA Training Application
7. PoCRA SSO system

Annexure III Sample Village Map (गावाचा मुलभूत नकाशा)

(https://mahapocra.gov.in/maps/BaseMap/529962.pdf)



Annexure IV Sample Agro-met Advisory (तालुका निहाय हवामान अंदाज व कृषी सल्ला) https://mahapocra.gov.in/home/taluka_advisory/78

नानाजी देशमुख कृषि संजीवनी प्रकल्प — कृषी विभाग महाराष्ट्र शासन

कृषि हवामान सल्ला

जिल्हा : अकोला — तालुका : अकोला

पुढील पाच दिवसांसाठी हवामानाचा अंदाज (IMD कडून प्राप्त)

दिनांक
पाऊस (मिमी)
किमान तापमान (अं.से.)
कमाल तापमान (अं.से.)
सकाळची सापेक्ष आर्द्रता (%)
दुपारची सापेक्ष आर्द्रता (%)
वा-याचा वेग (किमी / तास)
वा-याची दिशा (या दिशेकडून येणारा वारा)
ढग स्थिती (आकाश)

मागील आठवड्यातील हवामान Automatic Weather Station (AWS) कडून प्राप्त माहिती

दिनांक	०४/१२/२०२३	०३/१२/२०२३	०२/१२/२०२३	०१/१२/२०२३	३०/११/२०२३
पाऊस (मिमी)	२२	१०.५७	१.९३	३.४६	०.२१
किमान तापमान (अं.से.)	१७.७६	१८.२	१९.५	२१	२०.०४
कमाल तापमान (अं.से.)	२१.३९	२०.७९	२६.३९	२८.७३	२५.९९
किमान आर्द्रता (%)	९७.७९	९७.८४	९७.०१	९४.७३	९७.३४
कमाल आर्द्रता (%)	९७.९४	९७.९६	९८	९७.९३	९८
वा-याचा वेग (किमी / तास)	७.७९	५.९३	६.०४	७.०७	६.२७

हवामान अंदाज

हवामान कोरडे राहण्याची शक्यता. आकाश स्वच्छ ते अंशत: स्वच्छ राहण्याची शक्यता. तापमान ० ते ० अंश से. दरम्यान असण्याची शक्यता.

पीक सल्ला

पीक	पीक सल्ला

कृषी हवामान सल्ला — Page # 1

क माहितीसाठी **9355056066** या हेल्पलाईन क्रमांकावर संपर्क साधा. **Request for Quotation- to print the**

तालुका निहाय कृषी हवामान सल्ला

अकोला

अकोट	तेल्हारा	अकोला
पातूर	बार्शिटाकळी	बाळापूर
मूर्तिजापूर		

आपला अभिप्राय/सूचना नोंदवा

या हवामान सल्ला विषयी आपला अभिप्राय/सूचना नोंदवण्यासाठी येथे क्लिक करा.

टीप :

वरील सल्ला भारतीय हवामान खात्याच्या अंदाजावर आधारित असून कृषि विद्यापीठाच्या शिफारशीप्रमाणे स्थानिक पीक परिस्थितीनुसार/ क्रॉपसॅपअंतर्गत तयार केलेला आहे. प्रकल्प व्यवस्थापन कक्ष मुंबई येथून सदर हवामान अंदाज व कृषि सल्ला प्रसारित करण्यात येत आहे.