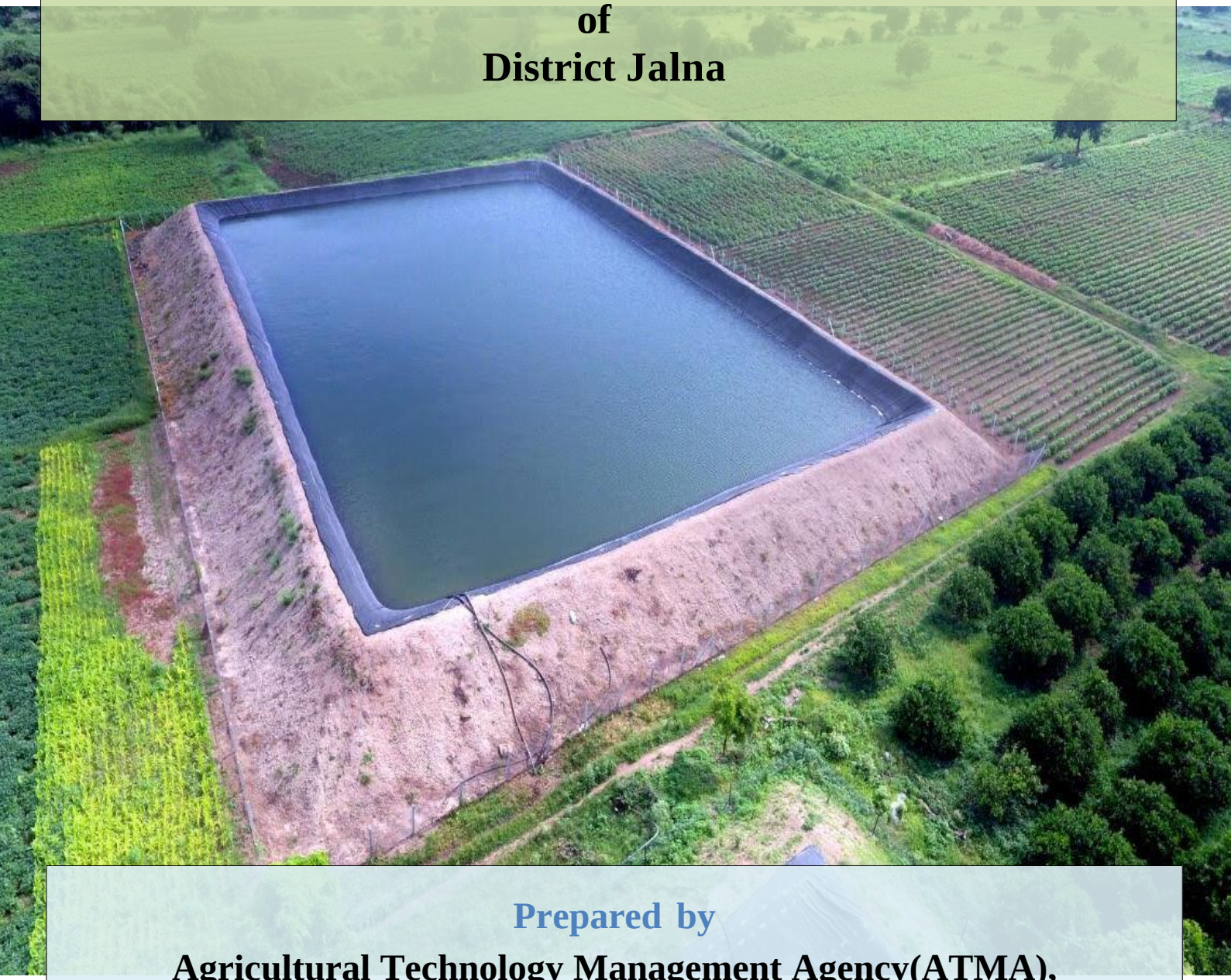
Nanaji Deshmukh Krushi Sanjeevani Prakalp

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



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 objectives (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 Kendras. 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 Kendras (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.

INDEX

Sr. No.	Chapters	Pg. No.
1	General profile of the district.	1
2	Agriculture profile of the district.	5
3	Weather trend of the district.	11
4	Impact of climate variability on agriculture production of the district.	19
5	Measures to cope with climate variability.	21
6	Climate Resilient Technologies (CRT) Interventions and its impact on yield of crops.	24
7	Plan to cope with weather related contingencies.	28
8	Role of Agro-Meteorological advisories.	47
9	Commodity wise status of climate resilient agriculture value chains of the district.	49
10	Extension strategies for adaptation to climate change in the district.	55
	ANNEXURE I	58
	ANNEXURE II	59
	ANNEXURE III	61
	ANNEXURE IV	62

Chapter 1: General Profile of the District

1.1 Geographical area and location of the district

Jalna district lies between 19° 1' and 20° 3' N latitude and 75° 4' and 76° 04 E longitudes. The average altitude of this district is 534 meters above mean sea level (MSL). Jalna district is the central part of Maharashtra State. It is surrounded on South by Beed district on the North by Buldhana districts, on the east by Parbhani district and on the west by Aurangabad districts.

It has the geographical area of 7718 sq. Kms. which is 2.51% of total area of Maharashtra. Out of the total geographical area 102 sq. kms area is urban and 7616 sq. Kms area is rural, indicating the dominance of the rural sector (i.e. 98.68%). There are 4 towns in the district, has 8 tehsils in two subdivision Partur and Jalna.

1.2 Tehsils details

Sr. No.	Tehsil Name	No. Of Villages
1	Ambad	137
2	Badnapur	91
3	Bhokardan	158
4	Ghansawangi	117
5	Jafferabad	101
6	Jalna	149
7	Mantha	115
8	Partur	96

1.3 Demographic Information

According to the Census-2011, Jalna district have 19,58,483 as a total population & density of population is 254 persons / Sq Km, while in 2001 census it was 209 persons / Sq Km. The male population is 10,15,116 & female population is 9,43,367. Male female ratio in district is found 1000 / 937. The literacy is 71.52 % where as it was 64.52 % in 2001 census. Literacy decade growth rate is 7 %. Male literacy is 81.53 % and for female it is 60.95 %.

1.4 Annual average rainfall of the district

The district has a sub-Tropical climate, in which the bulk of rainfall is received from the southwest monsoon, between June to September. The average annual rainfall of the district ranges between 650 to 750 mm. The district often experiences drought with rainfall recording as low as 400 to 450 mm. Partur taluka records highest rainfall 887.6 mm whereas Mantha taluka registered lowest rainfall 420.9 mm.

1.5 Max. and min. temperature of the district

The hot season lasts for 2.0 months, from April to June, an average daily high temperature above 99°F. The hottest month of the year in Jalna is May, with an average high of 102°F and low of 80°F.

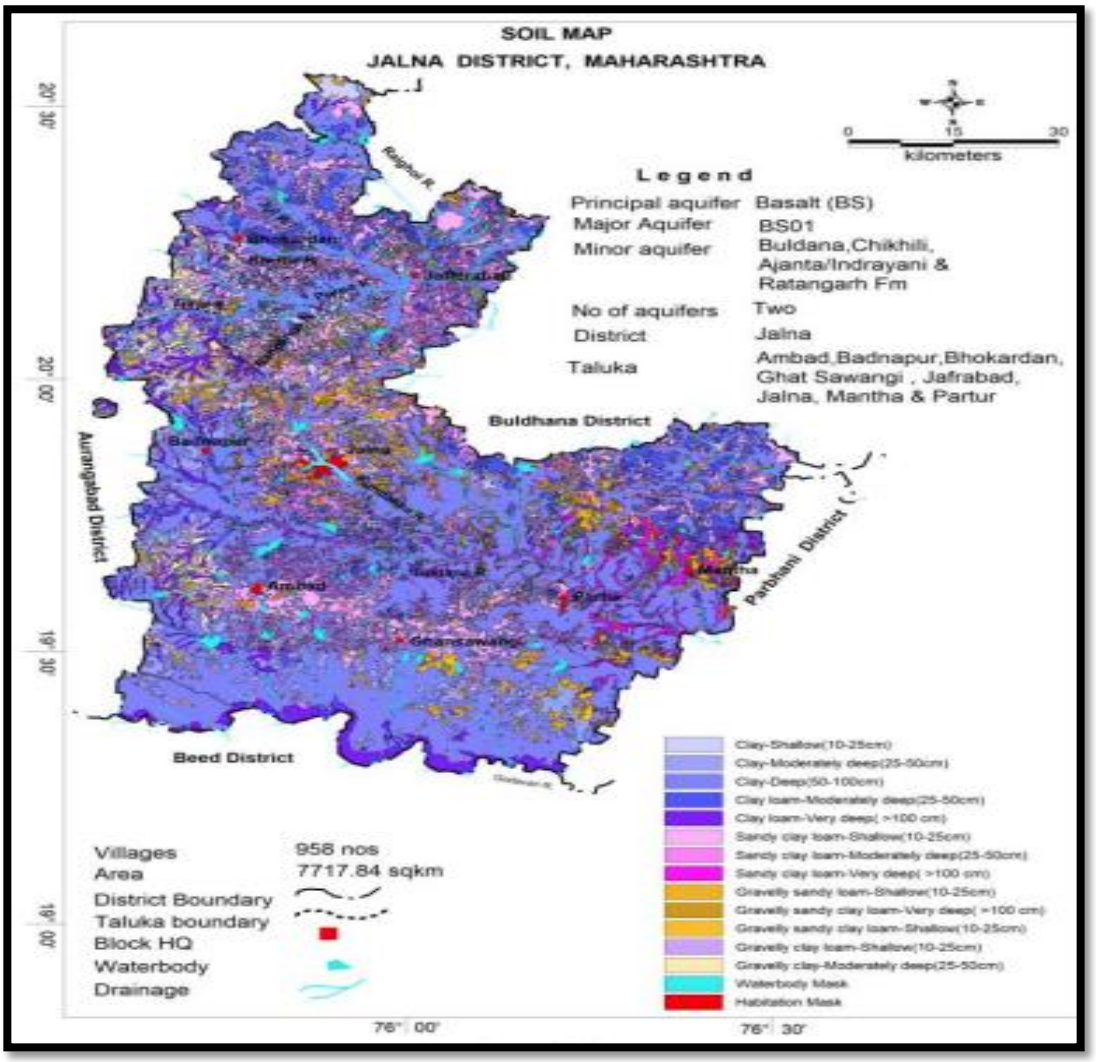
The cool season lasts for 2.9 months, from November to February with an average daily high temperature below 87°F. The coldest month of the year is December, with an average low of 57°F and high of 83°F.

1.6 River Network in the District

The most important river in Jalna district is Godavari, which flows for about 60 kms. along the Southern boundary of the district. Its principal tributaries are Dudhana, which flows from the Central part of the district and Galhati, which passes through Ambad tehsil. The river Purna, which is one of the tributaries of Godavari flows through the Northern part of the district. The other tributaries of Purna and Khelna are Girija and Dudhana respectively.

1.7 Soil formation in the district and type of soil

The soils of the district are black with considerable variation in texture and depth. They are light, medium and heavy soils. The soils along the river banks especially in Ambad and Partur blocks are deep black and quite fertile. The soils in northern parts of the district i.e. in Jalna, Bhokardan and Jaffrabad blocks are coarser.



1.8 Different zones according to prevailing agro-ecological situations.

Sr.No.	Agro climatic zone (ACZ)	Name of the AES	Blocks covered	Representative village
1	MR 7	Jaikwadi and Lower Dudhna command area with deep black cotton soil	Ghansawangi, Ambad Partur	Jogladevi
2	MR 7	Unerodable southern basaltic platue	Ambad, Ghansawangi, Partur	Asangaon
3	MR 7	Unerodable central basaltic platue of district	Jalna, Badnapur, Ambad, Partur, Mantha	Chikangaon
4	MR 7	Unerodable northen basaltic platue of district	Bhokardan, Jafrabad	Walsawangi
5	MR 7	Medium erodable with very Light soils.	Jalna, Ambad Mantha	Sondev
6	MR 7	Erodable area	Badnapur,Jafrabad Mantha	Asarkheda

Agro-climatic zone

Jalna district comes under the Agro Climatic Zone (ACZ) MR- 7 which is also known as Central Maharashtra Plateau. This is a transitional rainfall zone of as per the NARP classification. The soils are Medium Black/ deep Black or Shallow red and the annual precipitation is 643-825 mm.

AES I Constitutes the command area of Jaikwadi project and Lower Dudhna project which is most profitable and productive part compare to other AES. It is area with deep black cotton soils which is well known sugarcane belt.

AES II, III and IV is unerodable portion of district located in southern, central and northen part of district with slight change in cropping pattern. Cotton, soybean, tur and rabbi jowar are major crops. Sugarcane cotton is major crop of AES II while AES III is identified as horticulture belt. Kundlika, Dudhna are major rivers of this AES. And AES IV is northen unerodable part of district it is seed production area, maize and chilli are major crops.

AES V This area is with erodable soils and water scarcity zone, this is spread almost in all parts of tehsil. If provided irrigation area under horticulture can be increased, Jirdgaon is better example from this AES.

AES VI is area with highly erodable soils spread over Jafrabad, Bhokardan and Badnapur tehsil. Maize, bajra and tur are major crops.

AES	Name of the ACZ	Area (Ha.)	Geographical Area (%)	Name of AES
AES – I	MR 7	155.4	21	Command area of major projects
AES – II	MR 7	123.2	17	Southern unerodable par of Jalna, Ambad, Ghansawangi and Partur
AES – III	MR 7	166.7	22.5	Central unerodable part of district
AES – IV	MR 7	122.1	16.5	Northen unerodable part of district
AES – V	MR 7	102.5	13.9	Area with medium erodable soils
AES – VI	MR 7	76.4	10.3	Highly erodable soils
Total		746.3	101.2	

1.9 Irrigation Potential of the district

There is no major irrigation project in Jalna district. However, an area of about 51710 ha. in Jalna district is being irrigated by Jayakwadi project which is one of the major irrigation projects situated in Paithan taluka, Aurangabad district. There are 7 medium irrigation projects and 46 minor irrigation projects in Jalna district. In the year 1996-97, there were 30572 wells, 11506 electric pumps and 766 diesel pumps. An area of about 187000 ha. was brought under irrigation through various irrigation sources in the year 1996-97. However, there is shortage of water during summer seasons. Ghansawangi taluka had the maximum irrigated area whereas Mantha taluka with the least irrigated area. About 31.08% and 22.89% of the total irrigated area is utilized for cotton and Jowar respectively.

Chapter 2: Agriculture Profile of District

(Source: District Survey Report of Jalna District (Mining) 2021-22)

2.1 Land use classification of the district

Land is classified as below in the district as per their uses.

Sr.No.	Description	Area (000 Ha.)
1	Cultivable area	772.6
2	Forest area	4.9
3	Land under agricultural use	20.8
4	Permanent pastures	24.8
5	Cultivable waste land	15.9
6	Land under miscellaneous tree crops and groves	10.8
7	Barren and uncultivable land	7.3
8	Current fallows	98.7
9	Other fallows	18.1

2.2 Agriculture land holdings

Distribution according to sizes

Sr no.	Land Holding	No of farmers
1	Below 1.00 Ha Marginal farmers)	135764
2	1.00ha to 2.00 ha(Small farmers)	129675
3	2.00 to 4.00 Ha(Semi medium farmers)	89845
4	4.00 to 10 Ha (Medium farmers)	14823
5	More than 10 Ha (Large farmers)	1249

2.3 Different types of irrigation facilities/water resources available in the district

Sr no	Source of irrigation	Area covered by the source(ha)
1	Dams	99269
2	Wells	6431.2
3	Borewells	-
4	Farm ponds	7600
5	Rivers	-

2.4 Types of crops grown, cropping pattern, cropping intensity and farming systems

Historically (early seventies) the district was leading in cotton mung, bajra, rabbi jowar and maize production. The Kharif cotton plus Tur followed by Green Gram and Rabi Jowar in next year was the common pattern. Due to the population pressure and introduction of newer techniques the traditional pattern has changed.

Area under cotton and rabbi jowar has also reduced recently; in recent years this has been changed to soybean because of increase in production cost of cotton, also increase in area of sugarcane because of availability of irrigation facility, setting up of sugar co-operatives and comparatively good economic returns from sugarcane. In light soils Kharif is the main season. Cotton, soybean, Tur, Maize, Bajra, Mung are major kharif crops while, in Rabbi Jowar, Gram, Wheat, are the main crops.

In heavy soils double cropping is followed by, green gram, or Soybean in Kharif followed by Rabi Jowar, Gram or Wheat is a common practice. In Ghansawangi, Partur and Ambad block Safflower cultivation was predominant which is now diminishing due to fewer returns to the farmers. Similarly Rabi Jowar and Gram and wheat practiced in deep soils. In recent years the sole crop of soybean in Kharif followed by Rabi Jowar or gram is being extensively practiced across all the blocks. Cotton is cultivated in parts of all block. This is mainly due to better returns per acre compared to cultivation of food crops such as Kharif Jowar, mung .In Bhokardan, Jafrabad, Badnapur and Jalna blocks maize area is increased.

The season wise area (ha) under major crops is presented in the following tables

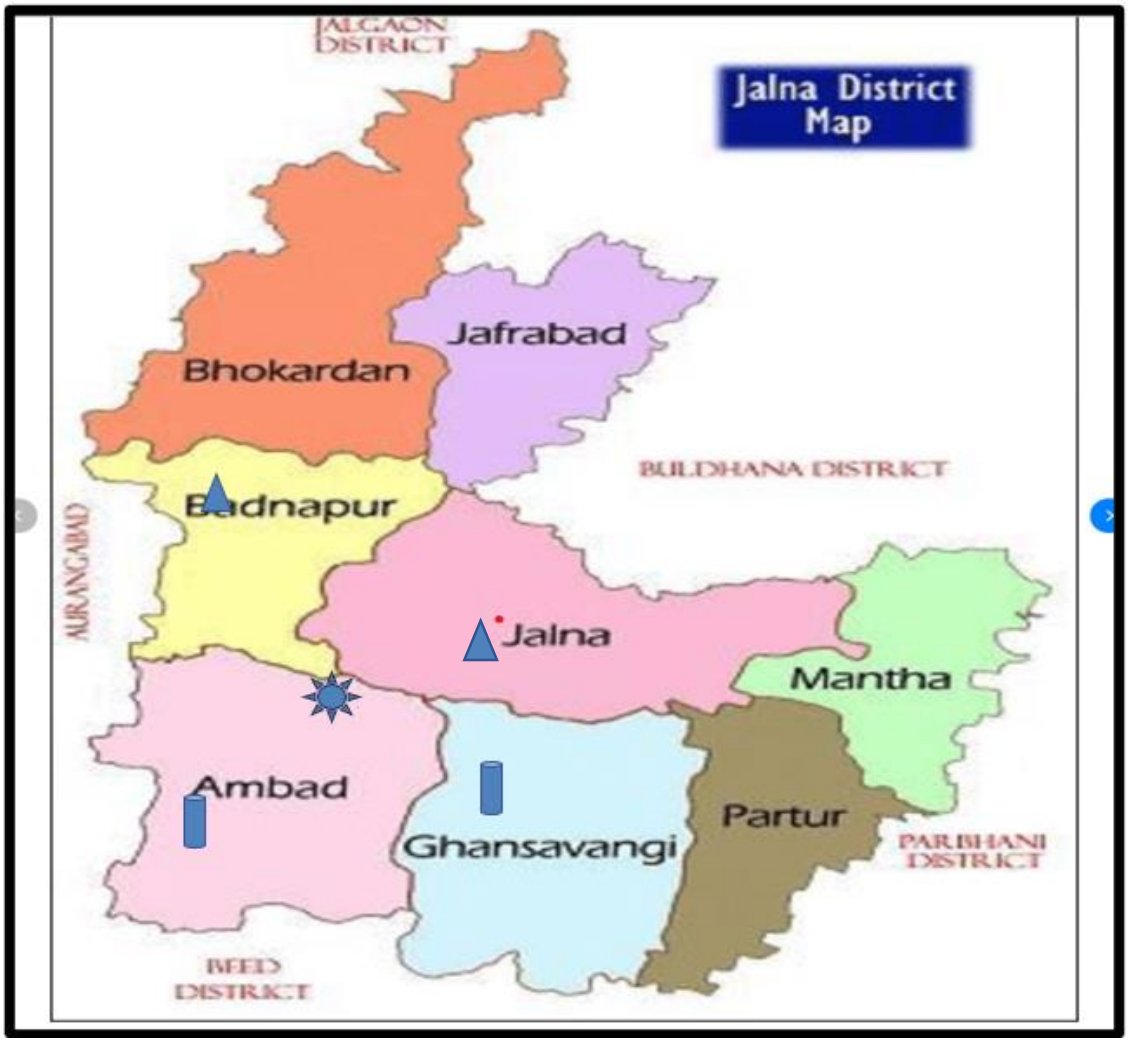
Block	Season	Crop	Area	Crop	Area	Crop	Area	Crop	Area	Cropping system
Bhokardan	Kharif	Cotton	485	Maize	320	Soybean	60	Tur	39	Jowar+ Tur Soybean+ Tur
	Rabbi	Gram	37	Wheat	24	R Jowar	15	Chilli	10	Soya and Jowar Tur and wheat
Jafrabad	Kharif	Cotton	285	Soybean	145	Tur	31	Maize	28	Soya and Jowar Tur and wheat
	Rabbi	Jowar	33	Wheat	32	Gram	15	Chilli	6	Soybean+ Tur
Jalna	Kharif	Cotton	427	Soybean	123	Tur	93	Maize	47	Tur and Gram
	Rabbi	Jowar	112	Wheat	59	Gram	38	Safflower	3	Maize and Gram Tur and wheat
Badnapur	Kharif	Cotton	310	Bajra0	90	Tur	51	Maize	48	Udid and Jowar
	Rabbi	Jowar	130	Wheat	18	Gram	7	Safflower	1	Cotton and Gram Soya and Jowar Maize and Gram
Ambad	Kharif	Cotton	420	Tur	105	Sugarcane	83	Mung	36	Udid and Jowar
	Rabbi	Jowar	132	Gram	44	Wheat	32	Safflower	3	Cotton and Gram Soya and Jowar Maize and Gram
Ghansawangi	Kharif	Cotton	417	Tur	85	Sugarcane	77	Soybean	45	Udid and Jowar Cotton and Gram
	Rabbi	Jowar	182	Gram	21	Wheat	15	Safflower	2	Soya and Jowar Maize and Gram
Partur	Kharif	Cotton	393	Tur	95	Soybean	95	Mung	35	Jowar and Gram
	Rabbi	Jowar	106	Gram	35	Wheat	29	Sunflower	5	Soya and Jowar Udid and Jowar
Mantha	Kharif	Cotton	243	Soybean	186	Tur	60	Mung	42	Jowar and Gram
	Rabbi	Jowar	65	Gram	21	Wheat	22			Soybean and Jowar Udid and Jowar

2.5 Year wise area, production and productivity of major crops

Sr. No.	Crop	Average Ha.	Average Productivity in Last 5 Years	2022			2023 (Proposed)		
				Area ha.	Production (in MT)	Productivity (kg/ha)	Area ha.	Production (in MT)	Productivity (kg/ha)
1	Cotton	309059	323.7	293780	114527.1	389.8	306352	131369.9	428.8
2	Soybean	138167	1338	200843	348579.3	1736	203000	387553.4	1909
3	Maize	53051.7	2368	33099	121361.1	3667	37004	149247.1	4033
4	Tur	53346.2	1066	49226	68039.19	1382	49329	74999.32	1520
5	green gram	31595.9	420.5	18035	12072.42	669.4	19921	14668.23	736.3
6	Udid	13626.1	541.6	8758	5448.177	622.1	8829	6041.508	684.3
7	millets	16723.7	776.6	8139	7303.939	897.4	10724	10586.09	987.1
8	others	4125.85	-	6383.2	-	-	3085	-	-
Total		619695	-	618263	-	-	638244	-	-

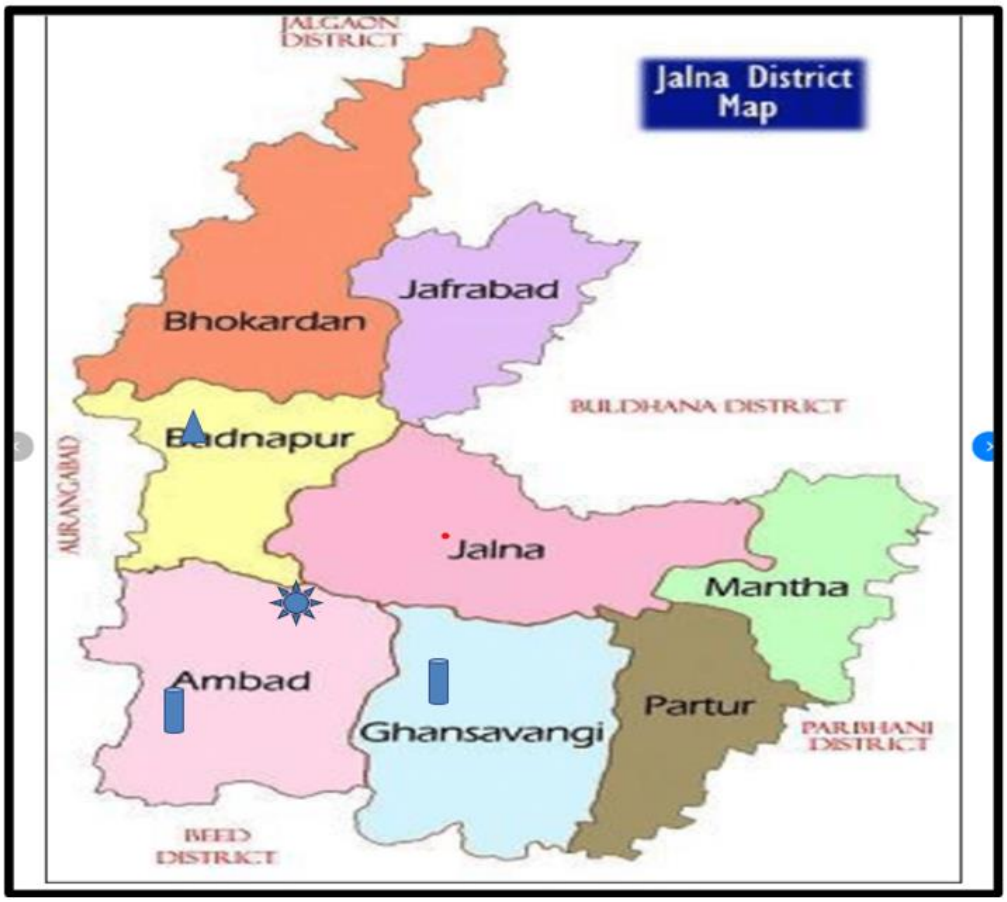
(Source-District Irrigation Plan, Jalna)

2.6 Other facilities…



KVK	**2**	▲
ACABC	**-**	●
Cold storages	**1**	✹
Soil/water/ fertilizer labs	**2**	▮

2.6.2 Farmer producer companies /SHGs and their businesses, Regulated markets, agriculture credit flow and related institutes, Agriculture education institutes.



FPC	**724**	
Agriculture Education Institutes	**02**	
APMC	**08**	

Chapter 3: Weather trend of district

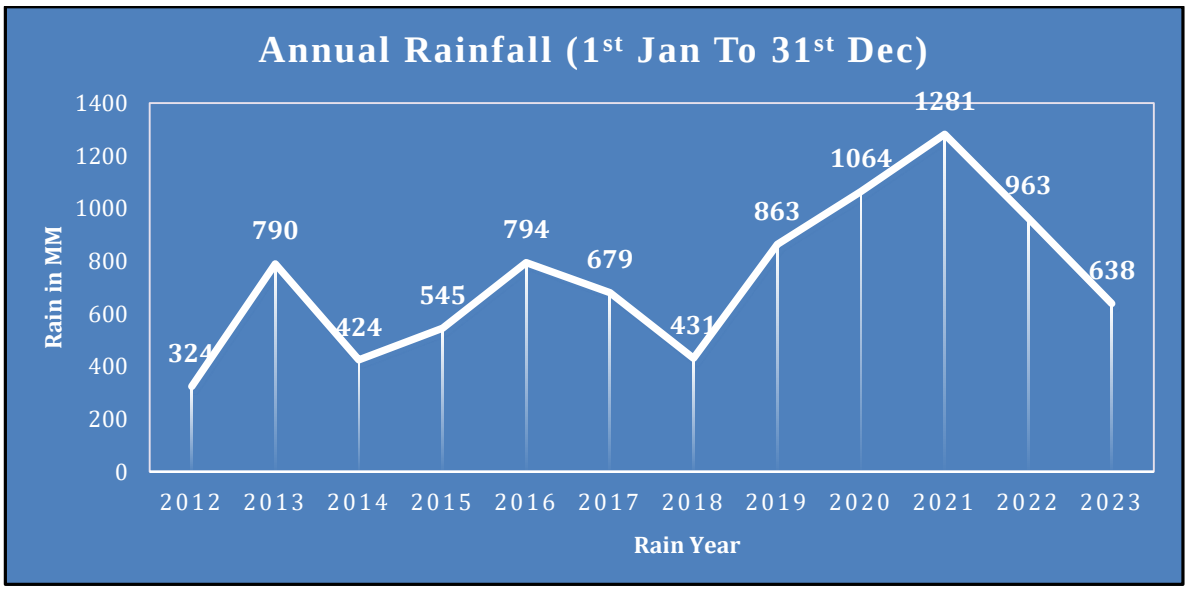
Introduction

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

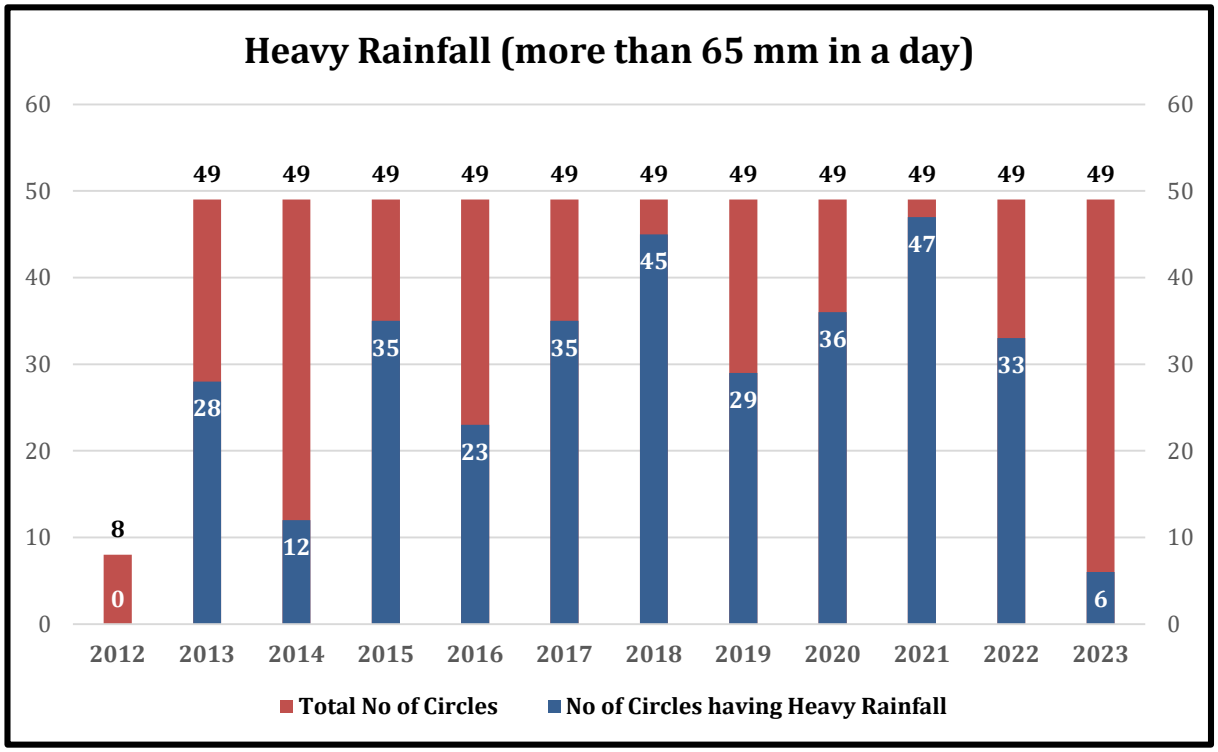
Normal or average rainfall is the amount of precipitation that we expect per year (in a given area). It is obtained and set by calculating the average (mean) of precipitation recorded in an area. Annual rainfall or precipitation is the sum of daily rainfall in a year.



The graph 3.1 presents annual rainfall data of Jalna district from 2012 to 2023, highlighting fluctuations in precipitation. Notably, the lowest recorded rainfall was in year 2012 at 324 mm, while the highest occurred in year 2021 with a total of 1281 mm annual average rainfall.

3.2 Heavy rainfall

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



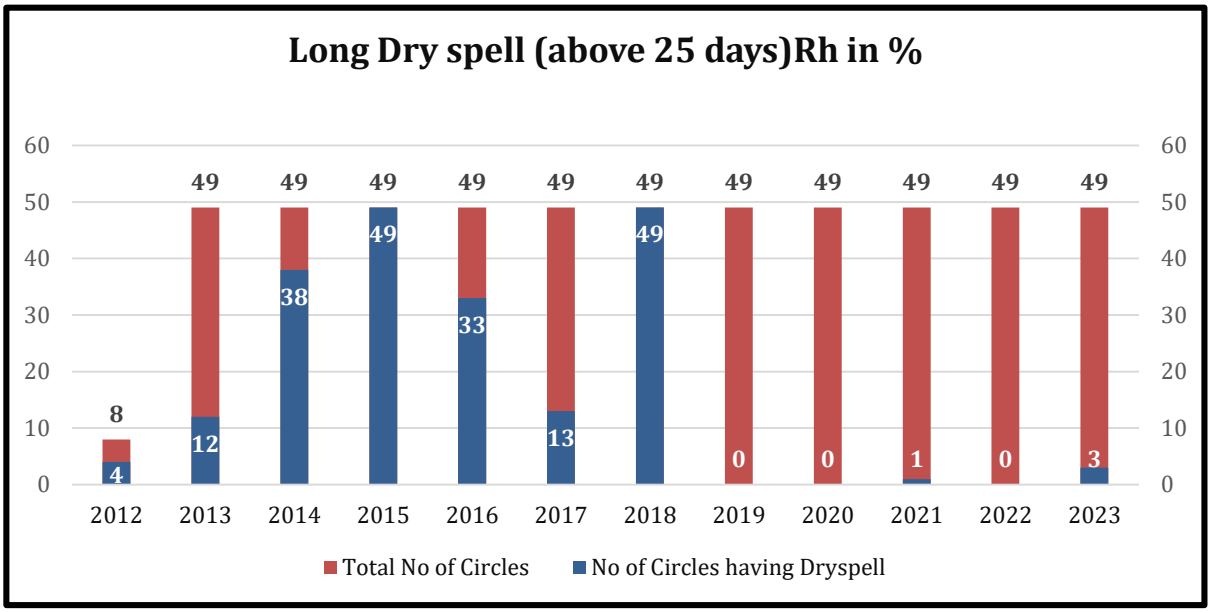
The provided graph 3.2 illustrates occurrences of heavy rainfall in circles within the Jalna district from year 2012 to 2023. Notably, in year 2021, heavy rainfall affected the maximum number of circles, with 47 circles out of the 49 circles experiencing such conditions. Conversely, the year 2023 recorded a lower incidence of heavy rainfall, with only 6 circles out of the 49 circles being affected in Jalna District.

3.3 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

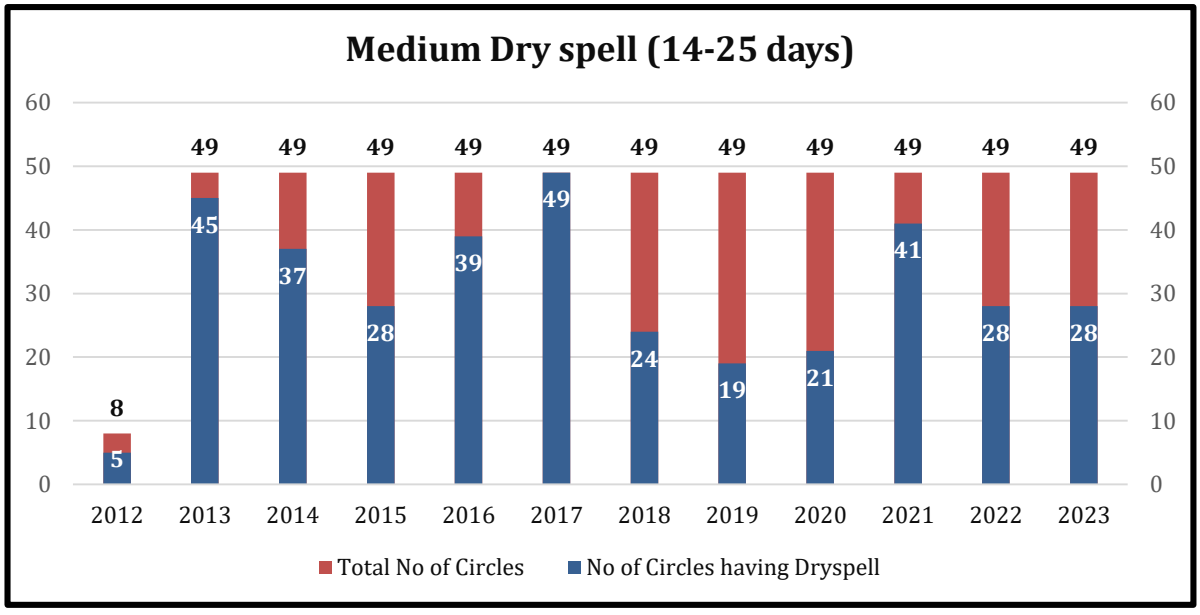
Long Dry spell is a prolonged period above 25 days of dry days in monsoon period



A graph (Graph 3.3.1) that shows the trend of long dry spells observed in a Jalna 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 2019, 2020 and 2022, there was no long dry spell, across all 49 circles in the district.

3.3.2 Medium Dry spell

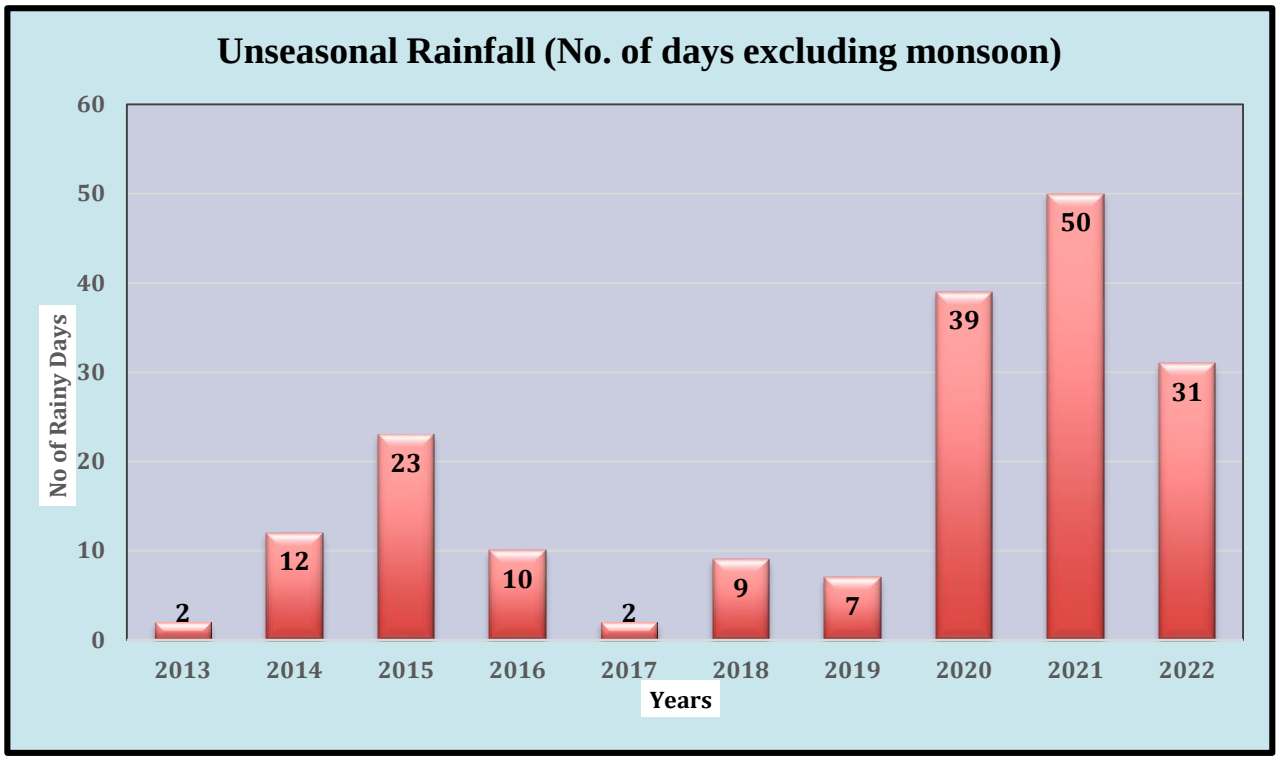
Medium Dry spell a period of 14-25 days of dry weather.



A graph (Graph 3.3.2) that shows the trend of medium dry spells observed in a Jalna district. The data covers the total number of circles and the circles that affected medium dry spell (14 to 25 days) in Jalna district from the year 2012 to 2023. The graph shows that in year 2017 all circles in the district experienced medium dry spells. Conversely, in year 2019, there was only 19 circles out of 49 circles experienced medium dry spell in the district.

Unseasonal rainfall.

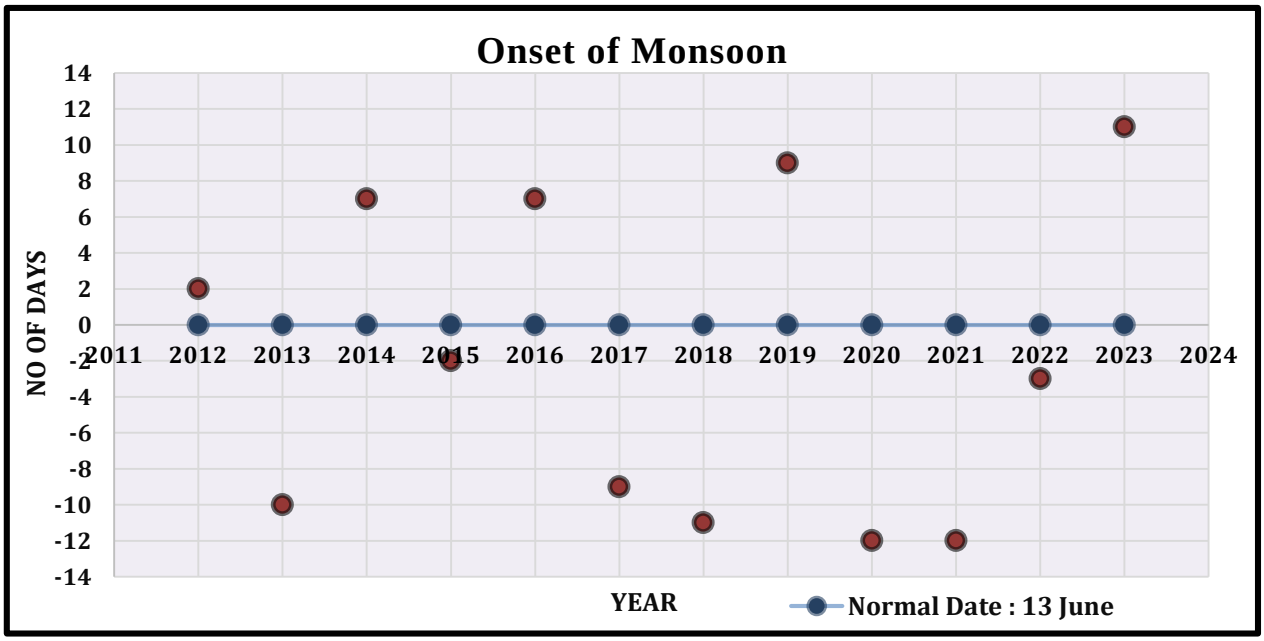
Rainfall received during non mosoon days is treated as unseasonal rainfall. Unseasonal rains-when there is a sudden change in atmospheric pressure, it can result in precipitation, even during non-monsoon seasons.



The graph 3.4 illustrates the annual occurrences of unseasonal rainfall in the Jalna district from year 2013 to 2022. The data reveals a variation ranging from 2 days to 50 days of unseasonal rainfall.

3.4 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 13th June in Jalna district.

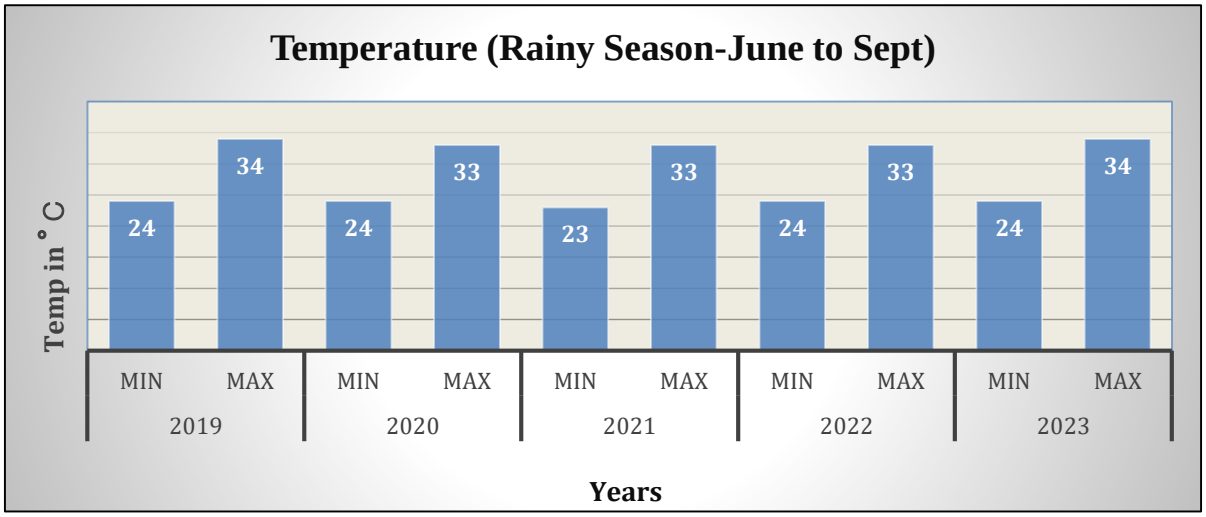


The graph 3.5 depicts the annual onset of the monsoon. The blue line represents the normal day of onset of monsoon. The onset days show variations ranging from -12 to 11 days. Notably, in year 2012, 2014, 2016, 2019 and 2023 the monsoon arrived delayed than the normal onset date. However, in remaining years the monsoon was notably arrived earlier.

3.5 Temperature.

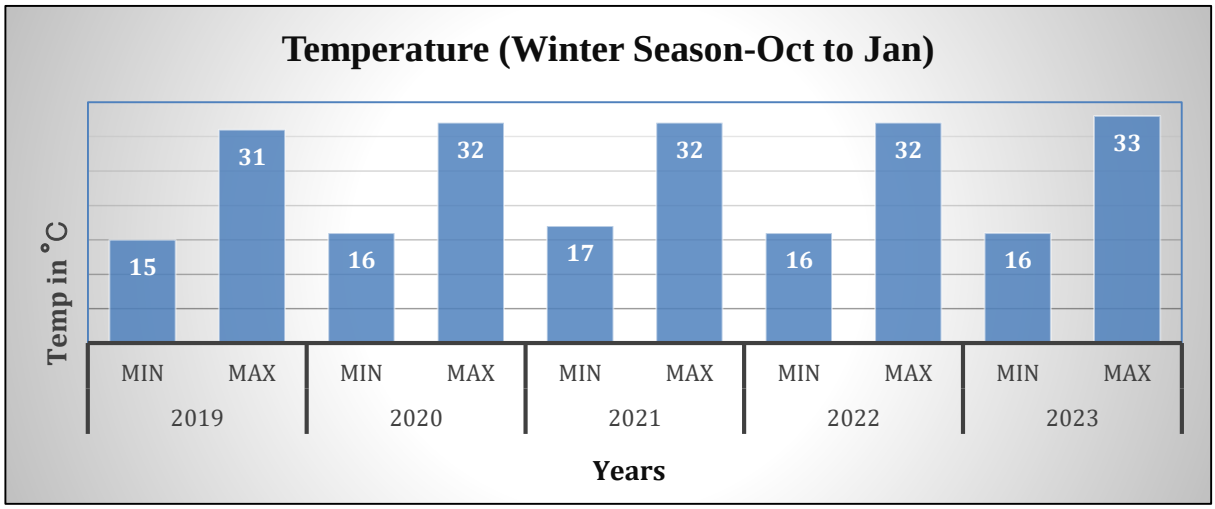
Temperature is a physical quantity that quantitatively expresses the attribute of hotness or coldness. The average temperature is 27.5 °C, with a minimum of 17°C and a maximum of 38°C. On the coldest nights, the temperature usually drops to around 15°C. On the warmest days, the temperature usually reaches around 40°C.

3.6.1 Temperature (Rainy Season-June to Sept)



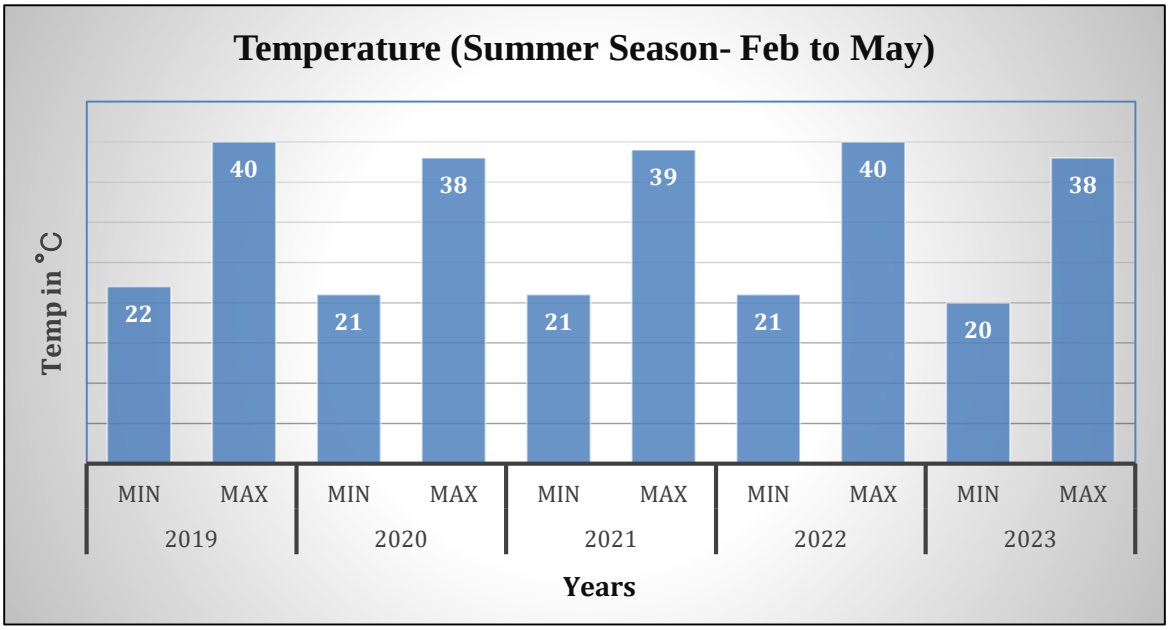
The graph 3.6.1 presents the temperature in the Jalna district during the rainy season from year 2019 to 2023 exhibited a consistent range, with minimum temperatures fluctuating between 23-24 °C and maximum temperatures ranging from 33-34 °C.

3.6.2 Temperature (Winter Season-Oct to Jan)



The graph 3.6.2 presents the temperature in the Jalna district during the winter season from year 2019 to 2023 exhibited a consistent range, with minimum temperatures fluctuating between 15-17 °C and maximum temperatures ranging from 31-33 °C.

3.6.3 Temperature (Summer Season- Feb to May)

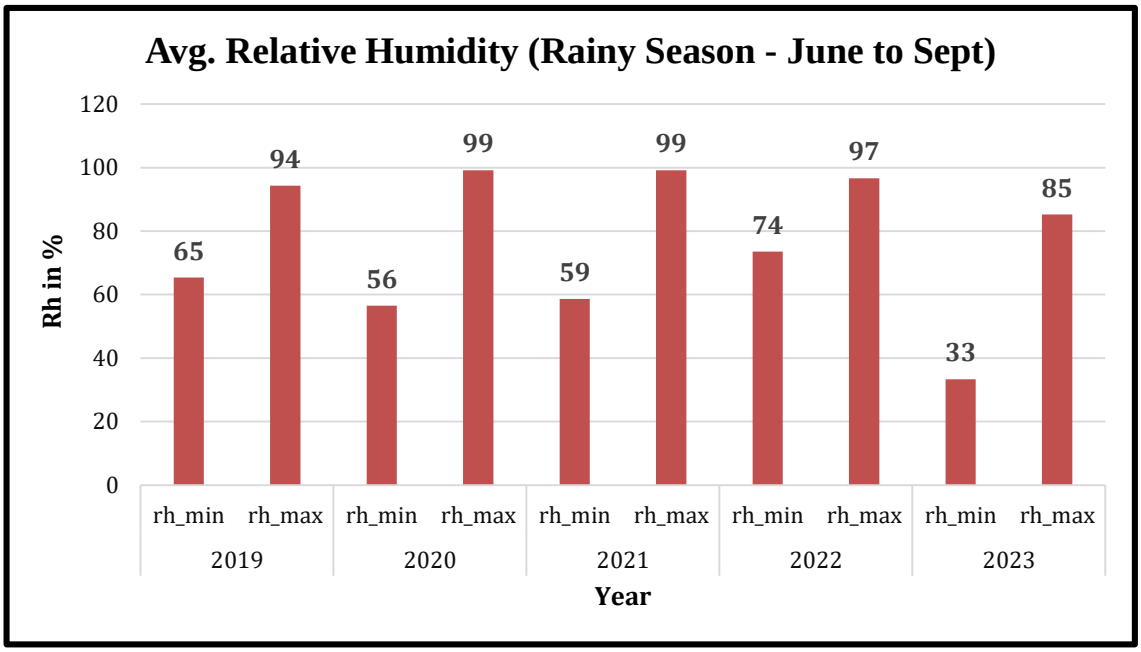


The graph 3.6.3 presents the temperature in the Jalna district during the summer season from 2019 to 2023 exhibited a consistent range, with minimum temperatures fluctuating between 20-22 °C and maximum temperatures ranging from 38-40 °C.

3.6 Relative Humidity

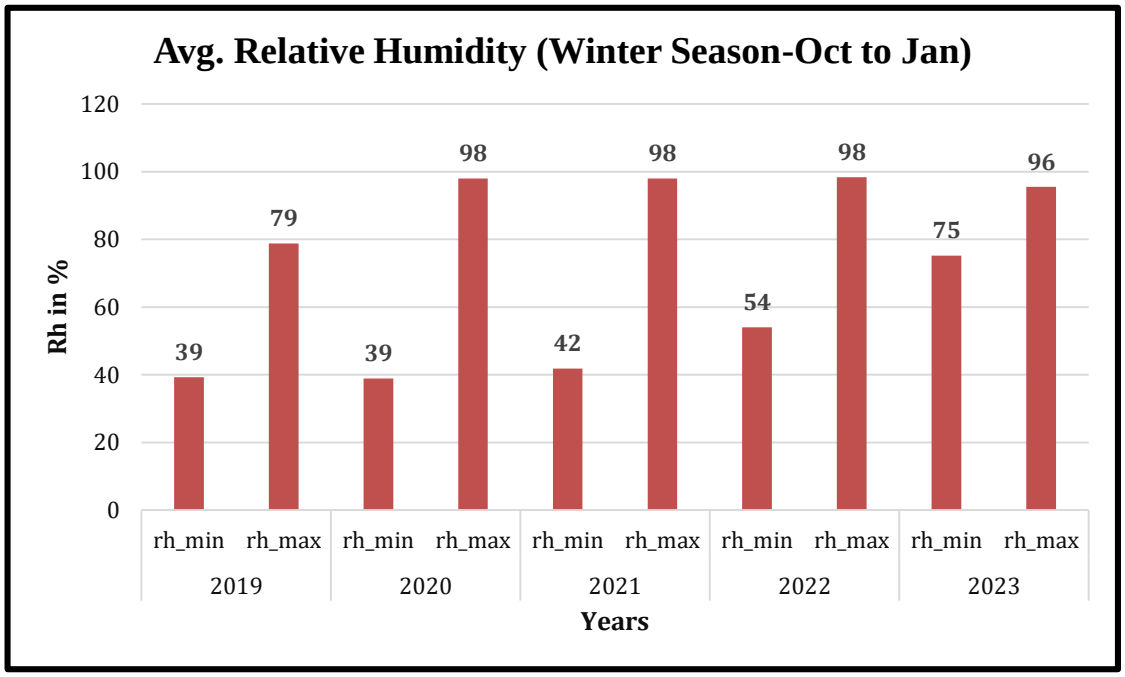
Relative Humidity is the ratio of the actual quantity of moisture at a certain temperature and pressure to the maximum it can hold at the same temperature and pressure. It is usually multiplied by 100 and expressed in percent.

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 Jalna district, revealing a variation in minimum humidity from 33% to 74% and maximum humidity ranging between 85% and 99%.

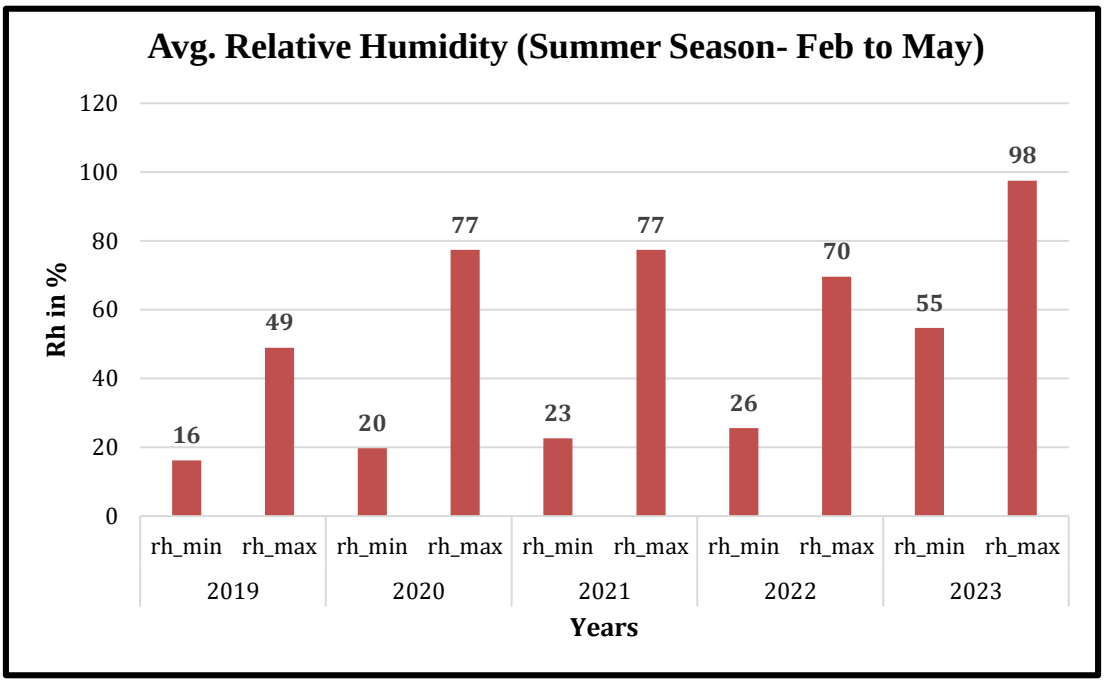
3.7.2 Avg. Relative Humidity (Winter Season-Oct to Jan)



The graph 3.7.2 illustrates humidity levels during the winter season in the Jalna district, revealing a variation in minimum humidity from 39% to 75% and maximum humidity ranging between 79% and 98%.

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 Jalna district, revealing a variation in minimum humidity from 16% to 55% and maximum humidity ranging between 49% and 98%.

Chapter 4 - Impact of climate variability on agriculture production

4.1 Impact of Temperature

Sr.No.	4.1 Impact of Temperature	Cotton	Pigeon Pea/Tur	Chick Pea/Chana
4.1.1	**crop growth and yield**	1. Stunted vegetative growth. 2. Dropping of square 3.Redning of leaves 4. Less number of boll formation resulting approximate 10 to 15 % yield losses.	1. Stunted vegetative growth. 2. Flower dropping 3. Small size grain 4. Approximate 20 to 25 % yield losses.	1. Stunted vegetative growth. 2. effect on setting of flowers. 3. Small size grain 4. Approximate 10 to 25 % yield losses
4.1.2	**Pest and Disease Infestation**	1. Increase Dahiya disease. 2.Increase Incidence of Thrips and White fly	1. Increase Incidence of leaf roller.	Increase incidence of pod borer.
4.1.3	**Water Availability**	1. Depletes ground water level 2. Increase evaporation and transpiration rate 3. Decrees soil moisture resulting stress in the crop.	1. Depletes ground water level 2. Increase evaporation and transpiration rate 3. Decrees soil moisture resulting stress in the crop.	1. Depletes ground water level 2. Increase evaporation and transpiration rate 3.Decreases soil moisture resulting stress in the crop.

4.2 Impact of Rainfall

4.2	Impact of rainfall on	Cotton	Pigeon Pea/Tur	Soybean	Chick Pea/Chana
4.2.1	Crop growth and yield.	1)stunted growth.2) reddening of leaves 3)yield losses	1)vegetative growth stunted 2)yield losses up to 20%	1) decreasing number of flower 2)vegetative growth stunted 3)yield losses up to 20%	1) germination problems 2)vegetative growth disturb 3) yield losses up to 10%

4.2. 2	Irrigation supply,	1)water level decrease 2)soil cracking 3)wilting of crop 4) stress on crop	1)water level decrease 2)soil cracking 3)wilting of crop 4) stress on crop	1)water level decrease 2)soil cracking 3)wilting of crop 4) stress on crop	1)water level decrease 2)soil cracking 3)wilting of crop 4) stress on crop
4.2. 3	Drought	1)application 0:52:34 fertilizer 2) Drenching of potash fertilizer. 3)making of farm pond 4) Use of BBF technology.	1)application 0:52:34 fertilizer 2) Drenching of potash fertilizer. 3)making of farm pond 4) Use of BBF technology	1)application 0:52:34 fertilizer 2) Drenching of potash fertilizer. 3)making of farm pond 4) Use of BBF technology.	1)application 0:52:34 fertilizer 2) Drenching of potash fertilizer. 3)making of farm pond 4) Use of BBF technology.
4.2. 4	flood	1)Yield losses up to 50%	1)Yield losses up to 30%	1)Yield losses up to 40%	1)Yield losses up to 40%
4.2. 5	Pests and diseases infestation and its management	1) The major pest occur in cotton are aphids, jassids, whitefly, thrips, pink bollworm etc. 2) The major disease on cotton are bacterial blight, Alternaria leaf spot, fusarium wilt etc. Management: -use NSK & dashparni arkas natural pesticides. also recommended chemical fertilizer to control them.	1) The major pest occur on tur is pod borer, stem borer & other. Lepidoptera pest. etc. 2) The major disease on tur are fusarium wilt, stem canker, collar rot etc. Management: use NSK &dashparni arkas natural pesticides. also recommended chemical fertilizer to control them	1)the major pest occur in soybean are stem borer, semilooper, gridle beetle etc. 2) The major disease on soybean are fusarium wilt, charcoal rot, root rot, YVM virus etc. Management: - use NSK &dashparni arkas natural pesticides. also recommended chemical fertilizer to control them.	1) The major pest occur on gram is pod borer, semilooper, cutworm etc. 2) the major disease on are Alternaria blight ,collar rot, fusarium wilt, dry root rot etc. Management: -use NSK &dashparni arkas natural pesticides. also recommended chemical fertilizer to control them.
4.2. 6	Soil erosion and nutrient loss.	1) Horticulture plantation. 2) Bamboo plantation.	1) Horticulture plantation. 2) Bamboo plantation.	1) Horticulture plantation. 2) Bamboo plantation.	1) Horticulture plantation. 2) Bamboo plantation.
4.2.7	Harvest and storage	1)boll rot	1)pod size decrease	1)pod size decrease	1)pod size decrease

Chapter 5: Measures to cope with climatic variability

5.1 Recommendations of universities

5.1.1	Rainfall condition	cotton	soybean	tur	gram
1	Heavy rainfall	1)seed treatment 2)application of fertilizer 3)ridges & furrow	1)increase spacing distance 2)BBF 3)fungicides spraying	1)trichoderma drenching 2)ridges furrow 3) short duration variety	1)increase spacing distance 2)BBF 3)fungicides spraying
2	Low rainfall	1)horizontal sowing on slope 2)dead furrow, short duration variety	1)horizontal sowing on slope 2)dead furrow, short duration variety	1)Nipping of apical bud 2)horizontal sowing on slope 3) dead furrow, short duration variety	1)Nipping of apical bud
3	Dry spells/water stress	1)application of ammonium nitrate potassium phosphate 2)application of fertilizer 3)don't cultivation of soil 4) irrigation	1) farm pond 2)GB 3)don't cultivation of soil	1) farm pond 2)GB 3)don't cultivation of soil	1) farm pond 2)GB 3)don't cultivation of soil
4	Terminal drought	1)spraying potassium phosphate& drenching 2)application of micro nutrient	1)spraying potassium phosphate& drenching 2)application of micro nutrient	1)spraying potassium phosphate& drenching 2)application of micro nutrient	1)spraying potassium phosphate& drenching 2)application of micro nutrient

5.1.2	Temperature condition	Cotton	Pigeon Pea/Tur	Soybean	Chick Pea/Chana
1	High temperature	1)Inter Cropping, additional irrigation 2) Selection of climatic crop like pearl milliet	Inter Cropping, additional irrigation 1)spraying potassium phosphate & drenching 2)application of micro nutrient	Inter Cropping, additional irrigation	Inter Cropping, additional irrigation
2	Cold waves/low temperature**.**	Irrigation in night	Irrigation in night	Irrigation in night	Irrigation in night
5.1.3	Soil degradation	1) Horizontal sowing on slope. 2)dead furrow, short duration variety 3)nala bunding	1) Horizontal sowing on slope. 2)dead furrow, short duration variety 3)nala bunding	1) Horizontal sowing on slope. 2)dead furrow, short duration variety 3)nala bunding	1) Horizontal sowing on slope. 2)dead furrow, short duration variety 3)nala bunding

(Source -Krishi Vigyan Kendra, Jalna)

5.2 Best practices by farmers in the district

(Source- TAOs and KVK)

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

6.1CRTs 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

Climate Resilient Technology plays the main role in growth in various conditions of crop stages. In our district, as the Soybean/Gram major crop is sown in both seasons, so from selection of variety up to harvesting. The stage of various cultivation practices depends upon the climate. As like optimum moisture is essential for sown crop. After germination in the vegetative stage, rainfall is necessary in the kharif season for the growth of crops, flowering, pod formation and needed moisture, so CRT technology is necessary to grow and increase yield.

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 Jalna 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
2020	1685	1487	1409	1199	885	747	1618	1380
2021	1867	1544	1521	1234	929	742	1753	1527
2022	1895.714	1685.714	1542	1257	1270	1081	1743	1508
Average	**1815.90**	**1572.24**	**1368.00**	**1128.75**	**1043.50**	**867.50**	**1704.67**	**1471.67**

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 15.50% 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 21.20% 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 20.29% 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 15.83% compared to the control plot.

6.3 Impact of BBF on yield crops.

BBF/Dibling of seed technology is promoted through a project for sowing of soybean crop 22 to 25 kg/Acre seed rate is required as compared to regularly sown, so they saved waste of money on seed impacts on germination also as BBF/Dibbling sown up to 4-inch soil/bed and plant to plant, row to row ration maintained by this method. Aeration, nutrient/fertilizer nutrients are supplied as per necessity of the crop, so it helps in the vegetative, flowering and pod formation stages. These activities increase in yield up to 4 to 5 Qt. on average.

6.4 Impact of zero tillage on yield crops. (District data)

In project Zero, tillage is an innovative activity adapted by farmers in our district, especially in Kharip, followed by Rabi soybean / Gram respectively. Due to zero tillage, there is no need for cultivation practices like ploughing, harrowing and inter-cultivation operations. As seed is sown by dibbling on a raised bed, the plant population is maintained as per requirement. Also, plant to plant and row to row, optimum distance is maintained and after germination, the crop has to spray weedicide, so there will be no growth of yield. A main purpose of zero tillage is to increase organic carbon in soil. So it helps in the productivity of crops and humus also developed in soil.

6.5 Impact of Neem based extracts on yield of crops. (District data)

Neem extracts are the main part of IPM, especially in paste management. In soybean after 30 days of sowing, the first spray is needed for paste management of the Girdle beetle, eggs of leaf eating caterpillars etc.5 % Neem extracts spray work as insecticides.

6.6 Impact of on farm biofertilizers production on crop yield. (District data)

To prevent extra use of chemical fertilizers farmers adopted bio fertilizers, PSB / Rhizobium used in seed treatments, which helps in fixation of N (Nitrogen). Farmers also use jeevamrut, Dashparni ark, Vermicompost /Vermiwash, so these activities help to increase production.

Chapter 7: Plan to cope with weather related contingencies of Jalna 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**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/Cropping system**	**Change in Crop/Cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks (June 4th week)	Medium deep to deepblack soils	Cotton	No Change	No Change	Linkage with MAU, MSSC and NSC for seed. Linkage with MAIDC for implements. Linkage with MAU, KVK for agro techniques
		Pearl millet	No Change	No Change	
		Maize	No Change	No Change	
		Pigeon pea	No Change	No Change	
		Green gram – sorghum / safflower / chickpea	No Change	No Change	
		Soybean	No Change	No Change	
	Shallow soils	Cotton	No Change	No Change	
		Pearl millet	No Change	No Change	
		Maize	No Change	No Change	
		Pigeon pea	No Change	No Change	
		Green gram – sorghum / safflower /chickpea	No Change	No Change	
		Soybean	No Change	No Change	

Condition			**Suggested Contingency measures**		
Early season drought(delayed onset)	**Major Farming situation**	***Normal* Crop/Cropping system**	**Change in Crop/Cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 weekJuly 2nd week	Medium deep to deep black soils	Cotton	Cotton + Pigeon pea 6:2 (BSMR 736, 853, BDN 708, 711)	Normal package of practices recommended by MAU, Parbhani or adopt 15-20 % more seed rate than recommended and reduce fertilizerdose by 25 per cent.	Linkage with MAU, MSSC and NSC forseed. Linkage withMAIDC for implements. Linkage with MAU, KVK foragro techniques
		Pearl millet	No change	Normal package of practices recommended by MAU, Parbhani	
		Maize	No change		
		Pigeon pea	NO change / Soybean + Pigeon pea 4:2 (JS-335,MAUS-71,81)		
		Green gram – sorghum / safflower /chickpea	Soybean + Pigeon pea 4 : 2 (JS-335, MAUS-71,81)		
		Soybean	No change / Soybean+ pigeon pea 4:2 row proportion (MAUS 71,81)	No change / Soybean+ pigeon pea 4:2 row proportion (MAUS 71,81)	
	Shallow soils	Cotton	Cotton + Pigeon pea 6:2 (BSMR 736, 853, BDN 708, 711)	Normal package of practices recommended by MAU, Parbhani or adopt 15-20 % more seed rate than recommended and reduce fertilizer dose by 25 per cent.	
		Pearl millet	No change	Normal package of practices recommended by MAU, Parbhani	
		Maize			
		Pigeon pea	NO change / Soybean + Pigeon pea 4 : 2 (JS-335, MAUS-71,81)	Normal package of practices recommended by MAU, Parbhani	

		Green gram – sorghum / safflower /chickpea	Soybean + Pigeon pea 4 : 2 (JS-335, MAUS-71,81)	**-do-**	
		Soybean	Soybean + Pigeon pea 4:2 row proportion (MAUS 71 , 81)	**-do-**	

Condition			**Suggested Contingency measures**		
Early season drought(delayed onset)	**Major Farming situation**	***Normal* Crop/Cropping system**	**Change in Crop/Croppingsystem**	**Agronomic measures**	**Remarks on Implementation**
Delay by 6 weekJuly 4th week	Medium deep to deep black soils	Cotton	Cotton + Pigeon pea 6:2 (BSMR 736, 853, BDN 708, 711)	Normal package of practices recommended by MAU, Parbhani oradopt 15-20% more seed rate than recommended and reduce fertilizer dose by 25 per cent.	Linkage with MAU, MSSC and NSC for seed. Linkage with MAIDC for implements. Linkage with MAU, KVK for agro techniques
		Pearl millet	No change	Normal package of practices recommended by MAU, Parbhani	
		Maize			
		Pigeon pea	NO change/ Soybean + Pigeon pea 4 : 2 (JS- 335, MAUS-71,81) + (BSMR 736 853, BDN 708, 711)	No change / Soybean+ pigeon pea 4:2 row proportion (MAUS 71,81) + (BSMR 736 853, BDN 708, 711)	
		Green gram – sorghum / safflower / chickpea	Soybean + Pigeon pea 4 : 2 (JS-335, MAUS-71,81) + (BSMR 736 853, BDN 708, 711)	**-do-**	
		Soybean	No change / Soybean+pigeon pea 4:2 row proportion (MAUS71,81) + (BSMR 736 853, BDN708, 711)	**-do-**	

	Shallow soils	Cotton	Cotton + Pigeon pea 6:2 (BSMR 736, 853, BDN 708, 711)	Normal package of practices recommended by MAU, Parbhani oradopt 15-20% more seed rate than recommended and reduce fertilizer dose by 25 per cent.	
		Pearl millet	No change	Normal package of practices recommended by MAU, Parbhani	
		Maize			
		Pigeon pea	NO change / Soybean + Pigeon pea 4 : 2 (JS-335, MAUS-71,81) + (BSMR 853, BDN 708, 711)	Normal package of practices recommended by MAU, Parbhani	
		Green gram – sorghum / safflower /chickpea	Soybean + Pigeon pea 4 : 2 (JS-335, MAUS-71,81) + (BSMR 853, BDN 708, 711)	**-do-**	
		Soybean	Soybean+ pigeon pea 4:2 row proportion (MAUS 71,81) +(BSMR 853, BDN 708, 711)	**-do-**	

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	***Normal* Crop/Cropping system**	**Change in Crop/Cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 8 weeks **Aug 2nd week**	Medium deep to deep blacksoils	Cotton	Pigeon pea (BDN 708, 711)	Prefer early maturing varieties recommended by MAU, Parbhani. Reduce intera row spacing and adopt 15-20% more seed rate than recommended	Linkage with MAU, MSSC and NSC for seed. Linkage with MAIDCfor implements. Linkage with MAU,KVK for agro

		Pearl millet	Pearl millet + Pigeon pea in 3:3 or4:2 row proportion	• Normal package of practices recommended by MAU, Parbhani. • Open conservation furrow after every 6-8 rows.	techniques
		Maize	No change. Alternatively go for castor (VI9, Aruna, GGH-4, 5, 6 and DCH-117 / 32)		
		Pigeon pea	No change and prefer early maturing varieties	Normal package of practices recommended by MAU, Parbhani	
		Green gram – sorghum / safflower / chickpea	Pigeon pea (BDN 708, 711) or Keep fallow and plan for Rabbi Crops like Sorghum, Chickpea, Sunflower and Safflower.	**-------do--------**	
		Soybean	Sunflower (Morden, SS-56, LSFH-35, BSH-1)	**-do-**	
	Shallow soils	Cotton	Pigeon pea (BDN 708, 711)	Prefer early maturing varieties recommended by MAU, Parbhani. Reduce intera row spacing and adopt15-20% more seed rate than recommended	
		Pearl millet	No change. Prefer intercropping with Pigeon pea	Open conservation furrow after every 6-8 rows	
		Maize	No change /fodder maize	-do-	

		Pigeon pea	Keep fallow and plan for early Rabbi Crops like Sorghum, Chickpea, Sunflower and Safflower.	Normal package of practices recommended by MAU, Parbhani	
		Green gram – sorghum / safflower / chickpea	Keep fallow and plan for early Rabbi Crops like Sorghum, Chickpea, Sunflower and Safflower.	**-do-**	
		Soybean	Sunflower (Morden, SS-56, LSFH-35, BSH-1)	**-do-**	

7.1.1.2 Early season drought(Normal Onset) Condition

Condition			**Suggested Contingency measures**		
Early season drought (Normal onset)	**Major Farming situation**	**Crop/Croppingsystem**	**Crop management**	**Soil nutrient & moisture Conservation measures**	**Remarks on Implementation**
Normal onset followed by 15-20 days dry spell after sowing germination / crop stand etc.	Medium deep to deep black soils	Cotton	Gap filling 7-10 days after sowing by pot watering within the rows with same cultivar or Pigeon pea to maintain at least 75% plant population. Raise cotton seedlings in polythene bags and transplant when sufficient soil moisture is available. Give protective irrigation whereverpossible	Making of conservation furrows for moisture conservation When the crop is 2 weeks old takeup interculture with harrow. Spray 2 % urea solution or 1% watersoluble fertilizers like 19-19-19, 20-20-20, 21-21-21 to supplementnutrition	Linkage with MAU, MSSC and NSC for seed.Linkage with MAIDC for implements. Linkage with MAU, KVK foragro techniques Linkage with DSAO for farm ponds and micro irrigation system through RKVY
		Pearl millet	Gap filling or transplanting of seedlings either from the same	Interculture with hoe.	

			field or from nurseryor gap filling with Pigeon pea.		
		Maize	Gap filling within the rows with same or short duration cultivar to maintain at least 75% plant population.	-do-	
		Pigeon pea		When the crop is 2 weeks old take up Interculture with hoe	
		Green gram – sorghum / safflower / chickpea	If the plant population is less than 75% of optimum, go for resowing of the alternate crops like sunflower / Pigeon pea. If possible give protective irrigation with sprinkler.	When the crop is 2 weeks old take up Interculture with hoe	
		Soybean	Gap filling within the rows with same or short duration cultivar to maintain at least 75% plant population or if the plant population is less than 50% re sow the crop	Avoid applying fertilizers till sufficient soil. moisture is available	
	Shallow soils	Cotton	Gap filling within the rows with same cultivar or Pigeon pea to maintain at least75% plant population. Raise cotton seedlings in polythene bags and transplant when sufficient soil moisture is available. Give protective irrigation wherever possible	Avoid applying fertilizers till sufficient soil. moisture is available Making of conservation furrows for moisture conservation Interculture with harrows	
		Pearl millet	Gap filling or transplanting of seedlings either from the same field or from nursery or gap	Interculture with hoe.	

			filling with Pigeon pea		
		Maize	Gap filling within the rows with same or short duration cultivar to maintain at least 75% plant population	-do-	
		Pigeon pea		When the crop is 2 weeks old takeup interculture with hoe	
		Green gram – sorghum / safflower / chickpea	If the plant population is less than 75% of optimum, go for resowing of the alternate crops like sunflower / Pigeon pea. If possible give protective irrigation with sprinkler.	When the crop is 2 weeks old take up interculture with hoe	
		Soybean	Gap filling within the rows with same or short duration cultivar to maintain at least 75% plant population	Interculture with hoe	

7.1.1.3 Mid-season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period

Condition			Suggested Contingency measures		
Mid-season drought	**Major Farming situation**	**Crop/Cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At vegetative stage	Medium deepto deep black soils	Cotton	Give protective irrigation whereverpossible Maintain weed free conditions	Avoid applying fertilizers tillsufficient soil moisture is available Making of conservation furrowsfor moisture conservation Interculture with harrows Two sprays of 2% MgSO4, Zn, Boron at weekly interval when the crop is encountered reddeningsymptoms Spray 2 % urea solution or 1% water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 to supplement nutrition.	Linkage with ongoing govt. scheme to encourageadoption of micro irrigation for better water use efficiency (WUE) Linkage with MAU and KVK foragro techniques Linkage with DSAOfor farm ponds and micro irrigation system through RKVY
		Pearl millet Maize	• Avoid top dressing of fertilizers till sufficient soil moisture is available. • Interculture with harrow for weeding and to create soil mulch. • Give protective irrigation if possible	• Opening of alternate furrowswith Balaram plough. • Mulching with crop residue • Spraying of 2% urea or DAP	

		Pigeon pea	Inter culture for weeding Protective irrigation if possible	Opening of alternate furrows with Balaram plough. Spraying of 2% urea and DAP	
		Green gram –sorghum / safflower / chickpea	Inter culture for weeding Protective irrigation if possible	-----do-----	
		Soybean	Interculture for weeding and to create soil mulch. Give protective irrigation whereverpossible	-----do-----	
	Shallow soils	Cotton	Give protective irrigation wherever possible Maintain weed free conditions	Avoid applying fertilizers till sufficient soil moisture is available Making of conservation furrowsfor moisture conservation Interculture with harrows Two sprays of 2% MgSO4, Zn, Boron at weekly interval when the crop is encountered reddeningsymptoms Spray 2 % urea solution or 1% water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 to supplement nutrition.	
		Pearl millet Maize	• Avoid top dressing of fertilizers till • sufficient soil moisture is available. • Interculture with	Opening of alternate furrows	

			harrow for weeding and to create soil mulch. • Give protective irrigation if possible		
		Pigeon pea	Inter culture for weeding Protective irrigation if possible	Spraying of 2% urea and DAP	
		Green gram – sorghum / safflower / chickpea			
		Soybean	Give protective irrigation wherever possible		

Condition			**Suggested Contingency measures**		
Mid season drought (long dryspell)	**Major Farming situation**	**Crop/Cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At flowering / fruiting stage orAt reproductive stage	Medium deepto deep black soils	Cotton	Give protective irrigation wherever possible	Avoid applying fertilizers till sufficient soil moisture is available. Making of conservation furrows formoisture conservation Interculture with harrows. Two sprays of 2% MgSO4, Zn, Boron at weekly interval when thecrop is encountered reddening symptoms. Spray 2 % urea solution or 1% water	Linkage with ongoinggovt. scheme to encourage adoption ofmicro irrigation for better water use efficiency (WUE) Linkage with MAUand KVK for agro techniques Linkage with DSAOfor farm ponds and micro irrigation system through RKVY

				soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 to supplementnutrition.	
		Pearl millet	Give protective irrigation	Mulching with crop residue@ 3-5 t/ha	
		Maize	If feasible spray anti-transparent 6% kaolin		
		Pigeon pea	Protective irrigation if possible	Opening of furrows with Balaramplough. Spraying of 2% urea and DAP	
		Green gram – sorghum / safflower /chickpea	Protective irrigation if possible	--	
		Soybean	Give protective irrigation wherever possible	Opening of alternate furrows withBalaram plough. Spraying of 2% urea and DAP	
	Shallow soils	Cotton	Give protective irrigation wherever possible	Avoid applying fertilizers till sufficient soil moisture is available Making of conservation furrows formoisture conservation. Interculture with harrows. Two sprays of 2% MgSO4, Zn, and Boron at weekly interval when thecrop is encountered reddening symptoms. Spray 2 % urea solution or 1% watersoluble fertilizers like 19-19-19, 20-20-20, 21-21-21 to supplement nutrition.	

		Pearl millet	-do-	Mulching with crop residue @ 3-5 t/ha	
		Maize	Give protection irrigation If feasible spray anti-transparent 6% kaolin. In case of severe stress harvest as green fodder	-do-	
		Pigeon pea	Protective irrigation if possible	Opening of furrows with Balaram plough. Spraying of 2% urea and DAP	
		Green gram – sorghum / safflower / chickpea	Protective irrigation if possible or in case of sever moisture stress use as fodder / green manuring	--	
		Soybean	Give protective irrigation wherever possible	Opening of alternate furrows with Balaram plough. Spraying of 2% urea and DAP	

Condition			Suggested Contingency measures		
Terminal drought	**Major Farming situation**	**Crop/Cropping system**	**Crop management**	**Rabbi Crop planning**	**Remarks on Implementation**
	Medium deep to deep black soils	Cotton	Give protective irrigation with drip Picking	If possible, adopt relay cropping of chickpea, safflower, rabbi sorghum	Linkage with MAIDC / DSAO for harvesting implements (thresher, harvester). Linkage with DSAO for farm ponds and micro irrigation system through RKVY Linkage with MAU, MSSC and NSC for seed. Linkage with MAU, KVK for agrotechniques
		Pearl millet	Life saving irrigation or harvest at physiological maturity	Plan for rabbi crops chickpea / safflower	
		Maize			
		Pigeon pea	Life saving irrigation Foliar spray of 2% KNO_3, urea and DAP	---	
		Green gram – sorghum safflower/ chickpea	Harvest at physiological maturity or in case of severe drought use as fodder/ green manuring	Plan for rabbi crops chickpea / safflower / rabbi sorghum / sunflower	
		Soybean	Give life saving irrigation or harvest at physiological maturity	Sowing of rabbi crops like sorghum, chickpea, safflower immediately after harvest of soybean with minimum tillage	
	Shallow soils	Cotton	Give protective irrigation with drip. Picking	If possible, adopt relay cropping of chickpea, safflower, rabbi sorghum	
		Pearl millet	Life saving irrigation or harvest at	Plan for rabbi crops chickpea /	

			physiological maturity	safflower	
		Maize	Life saving irrigation In case of severe stress harvest asgreen fodder	-do-	
		Pigeon pea	Life saving irrigation	Foliar spray of 2% KNO_3, urea and DAP	
		Green gram – sorghum / safflower / chickpea	Harvest at physiological maturity or in case of severe drought use asfodder/ green manuring	Plan for rabbi crops chickpea / safflower / rabbi sorghum / sunflower	
		Soybean	Give life saving irrigation or harvestat physiological maturity	Sowing of rabbi crops like sorghum, chickpea, safflower immediately after harvest of soybean with minimum tillage	

7.1.2 Irrigated situation

Condition			Suggested Contingency measures		
	Major Farming situation	**Crop/Cropping system**	**Change in crop / cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delayed / limited release of water in canals due to low rainfall	Medium deep to deepblack soils	Sugarcane Turmeric	No change/Cotton (Irrigated) Wheat	Limited irrigation	Supply of seed through MSSC, MAU, Village seed production programme
	Shallow soils	Sweet orange Ginger Vegetable crops	.Maize .Cotton	Alternate furrow irrigation Drip irrigation	
Non release of waterin canals under delayed onset of monsoon in catchment	Medium deep to deep blacksoils	Irrigated Cotton	Cotton	1.Recommended spacing (120 x 45 cm) and 80:40:40 NPK Kg/ha	
	Shallow soils	Ginger / Turmeric	Cotton and Maize	Alternate furrow irrigation	
Lack of inflows into tanks due to insufficient / delayedonset of monsoon	Medium deep to deepblack soils	Irrigated Cotton	Cotton	1.Recommended spacing (120 x 45 cm) and 80:40:40 NPK Kg/ha	Release of water at critical growth stages by Irrigation Department
	Shallow soils l	Ginger / Turmeric	Cotton and Maize	Alternate furrow irrigation	
Insufficient groundwater rechargedue to low rainfall	Medium deep to deep black soils	Irrigated Cotton	Cotton	1.Recommended Spacing (120 x 45 cm) and 80:40:40 NPK Kg/ha	Supply of seed through MSSC, NFSM, MAU, Village seed production programme
	Shallow soils l	Ginger / Turmeric	Cotton and Maize	Alternate furrow irrigation	

7.2 Unusual rains (untimely, unseasonal etc.) (For both rainfed and irrigated situations)

Condition	Suggested contingency measure			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity Stage**	**Post harvest**
Cotton	Drain excess water. Interculture at optimum soil moisture Apply 25KgN/Ha to cotton	Drain excess water	Drain out excess waterTimely harvest	Protect picked cotton from drenching and soiling Dry wet cotton and market
Maize	Drain out excess water as earlyas possible Intercultivation andEarthing up	Drain out excess water as early aspossible Intercultivation and Earthing up	Drain out excess water Harvest green cobs from dislodged plants for immediate marketing	Harvest cobs after proper dryingDry the grain to optimum moisture content before storage
Soybean, Pigeon pea and short duration pulses	Drain out excess water			Shift to safer place Dry the produce
Mango	Opening of field channels to drain out excess water and avoidsurface ponding, Interculture at optimum soil moisture	Opening of field channels to drain out excess water and avoid surfaceponding, Interculture at optimum soil moisture	Collect fallen fruits, gradeand market if feasible	Grading, cleaning and marketing of fruits
Sweet orange				
Heavy rainfall with high speed winds in a short span				
Cotton	• Drain excess water • Interculture at optimum soil Moisture. • Apply 25KgN/Ha to cotton	Drain excess water	Drain out excess waterTimely harvest	Protect picked cotton from drenching and soiling Dry wet cotton and marketing

Maize	Drain out excess water as early as possible	Drain out excess water as early as possible	Drain out excess water Harvest green cobs from dislodged plants for immediate marketing	Harvest cobs after proper drying. Dry the grain to optimum moisture content before storage
Soybean, Pigeon pea and short durationpulses	Drain out excess water			Shift to safer place Dry the produce
Mango	Drain out excess water	Provide support to prevent lodging and uprooting in young orchards	Apply multinutrient and hormonal spray to promote flowering	Shift produce to safer place
Sweet orange				
Outbreak of pests and diseases due to unseasonal rains				
Cotton	Apply soil drench of carbendazim 0.1% or COC @3g/litre at base of plants to prevent wilt in low lying patches	Apply foliar spray of streptocycline sulphate @ 6g/60 litre + COC @ 25g/10 litre to prevent bacterial leaf blight. Apply Sulphur 25g/10 litre (300mesh) to prevent grey mildew Apply MgSO4 25 kg/ha soil application or 1% MgSO4 foliarspray to prevent leaf reddening	Foliar spray of carbendazim 0.1% or Ditane M45 0.2% toprevent boll rot	-
Maize		Foliar application of Mancozeb at 0.25-0.5% at 8-10 days interval tocontrol Turcicum leaf blight		
Soybean	Manually remove infested plants or plant parts from belowthe girdles. Protect against semilooper when density reaches >4 larvae per meter row with foliar	-		

	spray of NSKE 5% or dimethoate 30 EC 1 ml/litre			
Mango	Spray Imidacloprid 0.3 ml or dimethoate 1 ml/liter to control hopper Drench the seedlings with COC 0.25% against root rot	Protect against hopper	Spray Dithane M 45 3g/litre or carbendazim 1g/lit against anthracnose Spray sulphur 0.5% to control powdery mildew	Maintain aeration in storage to prevent fungal infection and blackening or fruits
Sweet orange	Protect against Citrus Psylla with foliar spray of malathion 50 EC 10 ml or quinalphos 25 EC 10 ml or cypermethrin 25EC 4 ml per 10 liters	Protect against Citrus Psylla with foliar spray of malathion 50 EC 10ml or quinalphos 25 EC 10 ml or cypermethrin 25EC 4 ml per 10 liters	-	-

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				
Sweet orange	Frequent irrigation Shade temporary shade net Mulching	Irrigation and pruning of affected branches / twigs	Irrigation and pruning of affected branches / twigs. Apply 1% Bordeaux paste to cut ends	Immediate harvesting, grading and marketing
Cold wave				
Sweet orange	Protect with polythene sheet	Smoking, frequent and light irrigation during evening hours, basin mulching, apply supplementary dose of fertilizers	Smoking, frequent and light irrigation during evening hours, basin mulching, apply supplementary dose of fertilizers	

Chapter 8: Agro meteorological Advisory

8.1 Agro-Meteorogical advisory

8.1.1 Importance/ Need of Agromet advisory

Among the various factors affecting agricultural production, weather is the most important one. Every phase of growth and development in plant is affected by weather. Among the weather parameters, rainfall and its distribution fluctuate greatly than other parameters. Any variability in the rainfall during the crop season, such as delay in onset of monsoon, excessive rains and prolonged dry spells would affect the crop growth and finally the quality and quantity of the produce. Adoption of real time contingencies in crop management based on weather forecasts can minimize crop losses. Weather forecast and weather based agromet advisories help in increasing the economic benefit to the farmers with appropriate management practices.

8.1.2 Forecasts or advisories generated at district level

Weather forecast is normally issued at three levels viz., short range, medium range and long range. Long range weather forecasts provide guidelines for selection of crops best suited to the anticipated climatic conditions. The short and medium range weather forecasts help to advice the farmers on the actual and expected weather to make decision on day-to-day farming operations such as sowing, weeding, time of pesticides spray, irrigation scheduling, fertilizer application etc., in crop management. AAB is generated by using medium range weather forecasts.

8.1.3 Other source/ Sources of Agro-met advisory

Meghdoot: Meghdoot, a joint initiative of India Meteorological Department (IMD), Indian Institute of Tropical Meteorology (IITM) and Indian Council OF Agricultural Research (ICAR) aims to deliver critical information to farmers through a simple and easy to use mobile applications. The mobile application was developed by the Digital Agriculture research theme at International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad in collaboration with IITM, Pune and IMD, Delhi. The app seamlessly aggregates contextualized district and crop wise advisories issued by Agro Met Field Units (AMFU) & District Agromet Unit (DAMU) every Tuesday and Friday with the forecast and historic weather information to the fingertips of the farmers. The advisories are also issued in vernacular wherever available.

https://play.google.com/store/apps/details?id=com.aas.meghdoot

VNMKV, Parbhani: AAB is also available on Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani website

https://university.vnmkv.ac.in/WeatherBulletinpdf/_AAB_Parbhani.pdf

VNMKV, Parbhani: AAB is also available on Blogger

https://www.blogger.com/blog/posts/5278960244914681835?bpli=1&pli=1

8.1.4 Different apps/dashboards/channels/stations/means used to dissemination the information.

Damini: Lightning Alert: Damini Lightning apps is developed by IITM-Pune and ESSO. The apps is monitoring all lightning activity which are happening in specifically for all India. if lightning is happening near you by GPS notification. under 20 KM and 40 KM. Details description of instruction, precautions is provided in apps while in lightning prone area.
https://play.google.com/store/apps/details?id=com.lightening.live.damini

Dissemination of AAB through WhatsApp groups
Dissemination of AAB through All India Radio
AAB on IMD Website:
https://www.imdagrimet.gov.in/AGDistrictBulletin
YouTube Channel of VNMKV, Parbhani
YouTube Channel of Agriculture Dept. Govt Maharashtra –
"हवामानाचा अंदाज आणि कृषि तज्ञांचा सल्ला 2023"

8.1.5 Utilization of Agro-met advisory by farmer in changing climatic conditions.

Accuracy of forecast is improving day by day and trust of farmers was building up during last few years. Farmers are using AAB for their day-to-day farm management. Due to which they are able to minimize their losses due to weather hazards.

8.2 Advisory based on Pest surveillance activity.

8.2.1 Implementation status of CROPSAP.

CROPSAP activity is implemented by the agricultural department by field staff Agri. Assistant select two villages for which they select two fix plots each. And they take compulsory four reading weekly of fixed plot in two different selected villages. Agri. Super, CAO and TAO randomly take weekly readings in CROPSAP. Reading is taken in various crop stages, such as seedling, vegetative growth, and pod formation and after maturity

8.2.2 Impact on crop pests and diseases management.

Increased awareness among farmers relating to Pest Management.

Timely surveys have helped in early detection of pests attack, and in taking corrective measures. Yields of crops to farmers have increased. Scientific advisories to farmers have helped farmers to avoid wasteful expenditures on pesticides.

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

Sr. No.	major Crops	2019 -2020	2020-2021	2021-2022	2022 -2023
1	Jowar	124146	142106	230622	219888
2	Tur	384403	303853	13017	343583
3	Mung	68098	33572	25870	10315
4	Soybean	426986	473049	586702	1058622
5	Cotton	334052	379044	3151	-
6	Wheat	26555	125831	222899	219988
7	Maize	241104	223288	207002	175277
8	sweet lime	4394	26093	72293	80850

9.1.2 Year wise price variation of major crops.

Sr. No.	Major Crops	2019 -2020	2020-2021	2021-2022	2022 -2023
1	Jowar	2825	2124	1782	3350
2	Tur	4885	5862	6016	6875
3	Mung	5927	5642	5818	7000
4	Soybean	3424	3785	5584	5350
5	Cotton	5298	5541	8339	-
6	Wheat	1931	1657	1757	2400
7	Maize	1468	1190	1530	1900
8	sweet lime	1700	1946	1724	1400

9.1.3 Markets available in the district with commodities handled (e-NAM, e-Markets, APMC/Kharedi Vikri Sangh)

In Jalna district majorly soybean is traded at APMC's and private markets. Whereas Tur, Gram, Cotton and other commodities are traded at APMC's, NAFED at government level and also at private markets.

9.2 Constraints in existing value chain

1) It is necessary to selflessly guide the members and villagers to grow crops. 2) Consultancy, measuring laboratory for water testing, low-cost reports, crop cultivation strong as well as fertilizer pest, seed availability and guidance 3) Agricultural implements, availability of implements at low cost. 4) Various facilities, machines and implements for farming. 5) Sanitation centres, grading centers, necessary machinery, and guidance for post-harvest management. 6) Sales arrangement at village level, current market prices and future estimated values guidance. 7) System for increasing the weight of agricultural produce.

9.3 Potential for strengthening of commodity wise value chains

Potential for strengthening of commodity wise value chains Strengthening is going on using SMART, NDKSP AND MAGNET etc. These projects will focus on strengthening the traditional agricultural system to make it more market-oriented and broadening the participation of the private sector in the value chain. The project has the following major components.

1. Agri Input Sale, Agrimall, Custom Hiring center- These are the basic needs of farmers because day by day land holding capacity of farmers are decreasing and expenditure on agri inputs are increasing..

2. Cold Vahan and Transportation Vehicle- Transportation vehicles are very useful for those farmer who produce perishable crop like vegetables and fruits

3. Small Godown, warehouse, Cold Storage- Godowns and cold storage helps farmers for storage of produced goods, reduce damages and increase life of goods.

4. Continuous Training and Workshop of Marketing to FPCs and Farmers

5. Providing Weather Forecast Services to FPCs and Farmers at Village Level

6. Small Godown, warehouse, Cold Storage- Godowns and cold storage helps farmers for storage of produced goods, reduce damages and increase life of goods.

7. Special Finance Support from Bank to Farmer

8. Milk Processing Unit- it helps dairy farmers to get a good price for milk..

9. Cattle feed units- There are large numbers of dairy animals in the district but no cattle feed project exists in the district so there is a large scope for such projects.

12. Nursery Udyog- As day by day vegetable farmers are increasing, there is a huge need of seedlings in the district and available nursery's capacity are very less so such projects can run for a long time. And also will be a very profitable project.

9.4 FPCs' Contribution in value chain development

9.4.1 Status of FPCs in the district

In the District total 1344 number of FPC's registered on the portal. They applied for various type of activities like CHC, Drying Yard, Godown Construction etc. in our project. Till now we have disbursed 997 FPC's.

Sr. No.	Activity Name	Supported FPCs No.
1	Construction of Godown/ Small Warehouse	58
2	Establishment of Custom Hiring Centers	494
3	Food Processing Unit	3
4	Goat Breeding Center	5
5	Grain Processing Unit (Cleaning/Sorting/Grading Unit)	7
6	Milk Processing Unit	1
7	Oil Extraction Unit	6
8	Onion Storage Unit	12
9	Other Agribusiness Activity Mini Harvester	1
10	Other Agribusiness Activity Seed Processing Plant	1
11	Other Agribusiness Activity Sericulture Unit	1
12	Pulse Mill (Dal Mill)	7
13	Refrigerated Van or Vegetable/Fruit carrier/ vehicle	96
14	Seed Processing Equipment	1
15	Seed Storage/ Godown	4
Grand Total		**697**

9.4.2 Assessment of FPCs in the district

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 108 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:

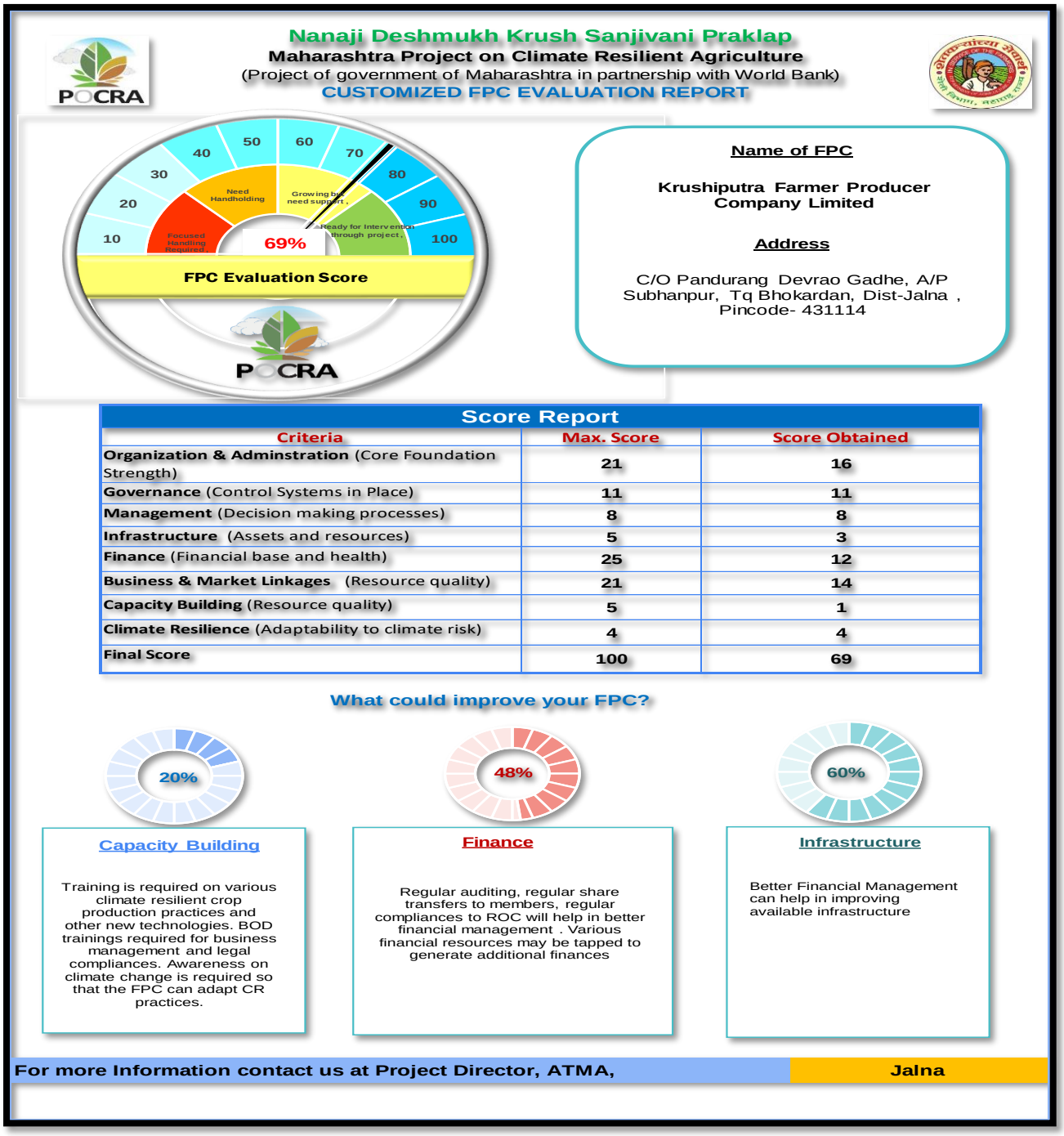
$$\textbf{Score}=\frac{\boldsymbol{Maximum\ Obtained\ Score}}{\boldsymbol{Maximum\ Obtainable\ Score}}\times\mathbf{100}$$

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 analyzed 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 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

10 20 30 40 50 60 70 80 90 100
Focused Handling Required
Need Handholding
Growing but need support
Ready for Intervention through project
69%
FPC Evaluation Score

Name of FPC

Krushiputra Farmer Producer Company Limited

Address

C/O Pandurang Devrao Gadhe, A/P Subhanpur, Tq Bhokardan, Dist-Jalna , Pincode- 431114

Score Report

Criteria	Max. Score	Score Obtained
Organization & Adminstration (Core Foundation Strength)	21	16
Governance (Control Systems in Place)	11	11
Management (Decision making processes)	8	8
Infrastructure (Assets and resources)	5	3
Finance (Financial base and health)	25	12
Business & Market Linkages (Resource quality)	21	14
Capacity Building (Resource quality)	5	1
Climate Resilience (Adaptability to climate risk)	4	4
Final Score	100	69

What could improve your FPC?

20%
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.

48%
Finance
Regular auditing, regular share transfers to members, regular compliances to ROC will help in better financial management . Various financial resources may be tapped to generate additional finances

60%
Infrastructure
Better Financial Management can help in improving available infrastructure

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

9.4.3 Information about FPCs supported by SMART/ NDKSP/ MAGNET

Name of project	No of Supported FPCs
SMART	26
NDKSP	697
MAGNET	-

9.4.4 Details of commodity transacted by the FPCs

SR NO	Name of FPCs	commodity
1	Jai Bhadra Shetkari Sway Sahayatta Gut	Vegetable/Fruit
2	Agritouch Farmers Producer Company Limited	Vegetable/Fruit
3	Aamhibaliraja Producer Company Limited	Oil seed
4	Mahalokseva Agro Producer Com. Ltd	Pulses
5	Jamuvant Agro Producer Company	Onion
6	Rajureshwar Shetkari Svaym Sahayyata Gat	Pulses
7	R Rasal Agro Producer Company Limited	Vegetable/Fruit
8	Mahrudra Agrotech Producer Company Limited	Goat Breeding
9	Pratham Shetkari Swayam Sahayyata Gat	Pulses

(Source: SMART, NDKSP projects data)

9.4.5 Details of services provided by FPCs

Sr. No.	ACTIVITY NAME
1	Construction of Godown/ Small Warehouse
2	Establishment of Custom Hiring Centers
3	Food Processing Unit
4	Goat Breeding Center
5	Grain Processing Unit (Cleaning/Sorting/Grading Unit)
6	Milk Processing Unit
7	Oil Extraction Unit
8	Onion Storage Unit
9	Other Agribusiness Activity. MINI HARVESTAR
10	Other Agribusiness Activity. SEED PROCESSING PLANT
11	Other Agribusiness Activity. sericulture Unit
12	Pulse Mill (Dal Mill)
13	Refrigerated Van or Vegetable/Fruit carrier/ vehicle
14	Seed Processing Equipment’s
15	Seed Storage/ Godown

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. Programs with Extension Plan

Convergence of government programs with extension plans is essential for ensuring the effective and coordinated delivery of services, particularly in the agricultural sector. Extension plans typically aim to transfer knowledge, skills, and technologies to farmers and rural communities.

Data Sharing and Integration: Encourage the sharing of data and information between government departments and extension services to understand the needs and priorities of the target populations better.

Training and Capacity Building:

Government personnel responsible for program implementation and extension agents should receive training on each other's roles, mandates, and objectives.

Stakeholder Involvement:

Engage stakeholders such as farmers, rural communities, NGOs, and private sector actors to ensure their needs and perspectives are integrated into both government programs and extension plans.

Community-Based Approaches:

Encourage community participation in the design and implementation of extension and government programs to ensure they are tailored to local needs.

III. Monitoring Mechanism for Village Adaptation Progress.

In this project individual, SHG/FPO, NRM activities implemented so monitoring done by regularly by departmental staff and third party evaluation done by NABARD.

IV. Strategy for revisiting of village adaptation plan

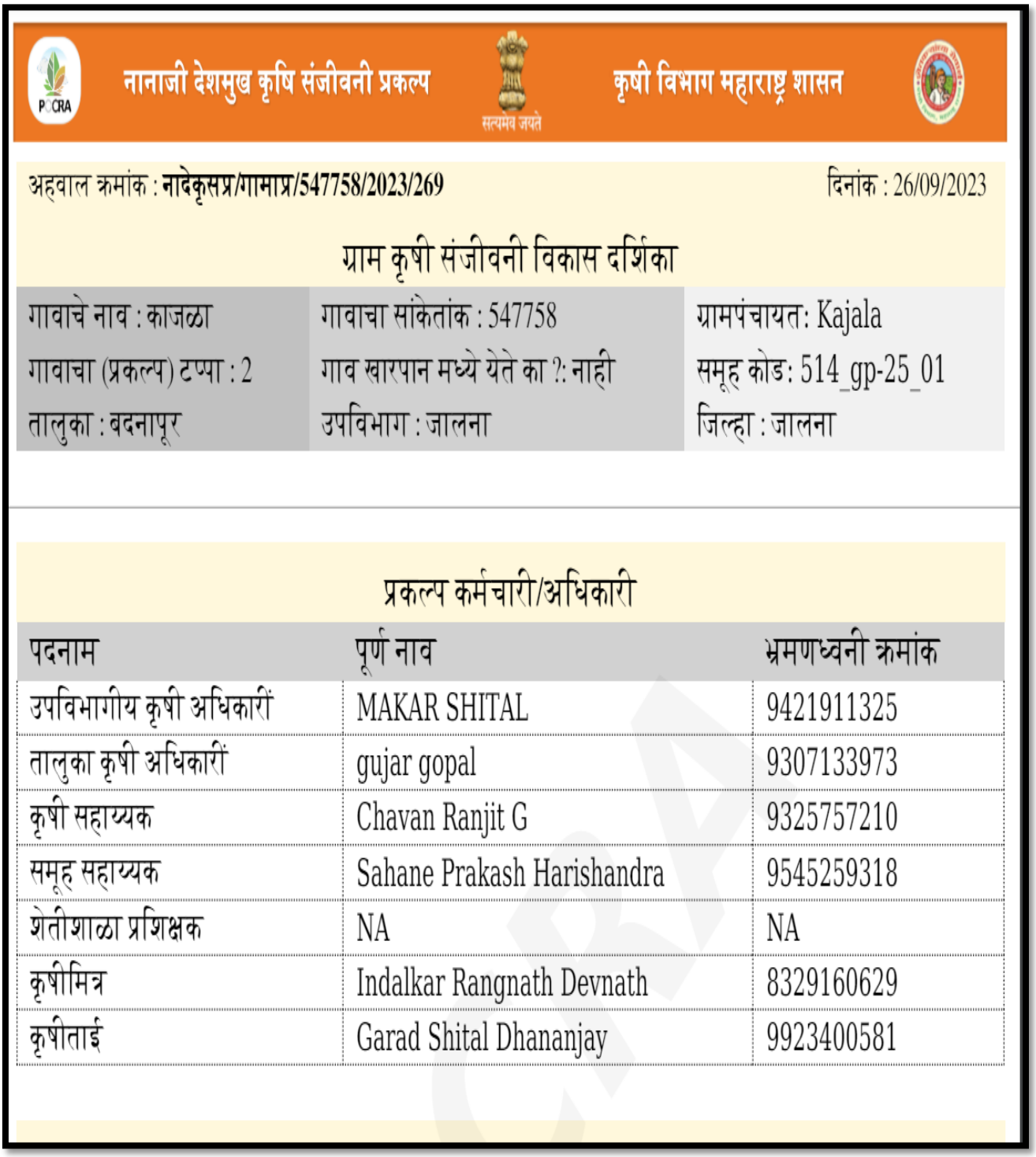
In project most of the activities implemented like individual, SHG/FPO and NRM we have already created awareness in village community for adaption of technology as per listed above. Also recommended post follow up, third party evaluation and through the social audit we have handed over all activities to concern VCRMC and Gram Panchayats.

Annexure I Sample Village Level Micro-Plan

अनुक्रमणिका

अ. क्र	तपशील	पृष्ठ क्र
1	प्रस्तावना व पार्श्वभूमी, प्रकल्पाची गरज	4
2	गावाचा विकास आराखडा तयार करण्यासाठी राबविलेला कार्यक्रमाचा तपशील	5
2.1	सुक्ष्मनियोजन प्रक्रिया कालावधी	5
2.2	ग्राम कृषि संजीवनी समिती रचना	6
2.3	ग्राम कृषि संजीवनी समिती स्थापनेबाबतचा ग्राम सभेचा ठराव	7
2.4	नानाजी देशमुख कृषि संजीवनी प्रकल्प व अन्य शासकिय योजनांची अंमलबजावणी करणारासाठी गावपातळीवर उपलब्ध कर्मचारीवृंद	7
2.5	लोकसहभागीय सुक्ष्मनियोजन प्रक्रिया राबविण्यासाठी उपलब्ध असलेले प्रशिक्षक व स्वयंसेवक यांचा तपशील	8
3	गाव व गावसमुह दर्शविणारा नकाशा	9
4	गावाची कृषि विषयक माहिती	10
4.1	गावाची एकूण लोकसंख्या	10
4.2	सुक्ष्मपाणलोट संख्या	10
4.3	भुमी उपयोगिता वर्गीकरण	11
4.4	क्षेत्र धारणेनुसार एकूण खातेदार संख्या	11
4.5	सामाजिक वर्गीकरणानुसार खातेदार संख्या	12
4.6	पिकनिहाय क्षेत्र	12
4.7	गावातील वृक्ष लागवड बदलाची स्थिती (फलोत्पादन सोडून)	12
5	पर्जन्यमान विषयक माहिती	13
5.1	पाऊसमान	13
5.2	गावातील भुजल स्थितीचा तपशील (पाणलोट निहाय):-	14
5.3	सूक्ष्म नियोजन आराखड्यानुसार गावतील सरासरी भुजल पातळी ----- (खोली मी मध्ये) निरीक्षण साठी निवडलेल्या विहिरीचा तपशील	15
5.4	पाण्याचा कार्यक्षम वापर	15
5.5	सिंचन स्त्रोतानुसार बागायतदार क्षेत्र	15
5.6	सुक्ष्म सिंचनाखालील क्षेत्र (2018-19 पर्यंत)	15
6	पाण्याचा ताळेबंद	16
6.1	गावाचा पाण्याचा ताळेबंद- सद्यस्थितीत	16
6.2	गावाचा पाण्याचा ताळेबंद- प्रस्तावित कामांनुसार	17
6.3	गावाचा पाण्याचा ताळेबंद- प्रस्तावित पिकरचनेनुसार	17
7	सामाजिक माहिती	17
7.1	शैक्षणिक तपशील	18
7.2	कौटूंबिक वर्गावारीनुसार उत्पन्न (प्रतिवर्ष :-)	18
7.3	स्थलांतरणाविषयी माहिती	19
8	पशुधन व चारा उपलब्धता	19

Annexure II Sample Village Profile



नानाजी देशमुख कृषि संजीवनी प्रकल्प — सत्यमेव जयते — कृषी विभाग महाराष्ट्र शासन

अहवाल क्रमांक : **नादेकृसप्र/गामाप्र/547758/2023/269** दिनांक : 26/09/2023

ग्राम कृषी संजीवनी विकास दर्शिका

गावाचे नाव : काजळा	गावाचा सांकेतांक : 547758	ग्रामपंचायत: Kajala
गावाचा (प्रकल्प) टप्पा : 2	गाव खारपान मध्ये येते का ?: नाही	समूह कोड: 514_gp-25_01
तालुका : बदनापूर	उपविभाग : जालना	जिल्हा : जालना

प्रकल्प कर्मचारी/अधिकारी

पदनाम	पूर्ण नाव	भ्रमणध्वनी क्रमांक
उपविभागीय कृषी अधिकारीं	MAKAR SHITAL	9421911325
तालुका कृषी अधिकारीं	gujar gopal	9307133973
कृषी सहाय्यक	Chavan Ranjit G	9325757210
समूह सहाय्यक	Sahane Prakash Harishandra	9545259318
शेतीशाळा प्रशिक्षक	NA	NA
कृषीमित्र	Indalkar Rangnath Devnath	8329160629
कृषीताई	Garad Shital Dhananjay	9923400581

नानाजी देशमुख कृषि संजीवनी प्रकल्प — कृषी विभाग महाराष्ट्र शासन

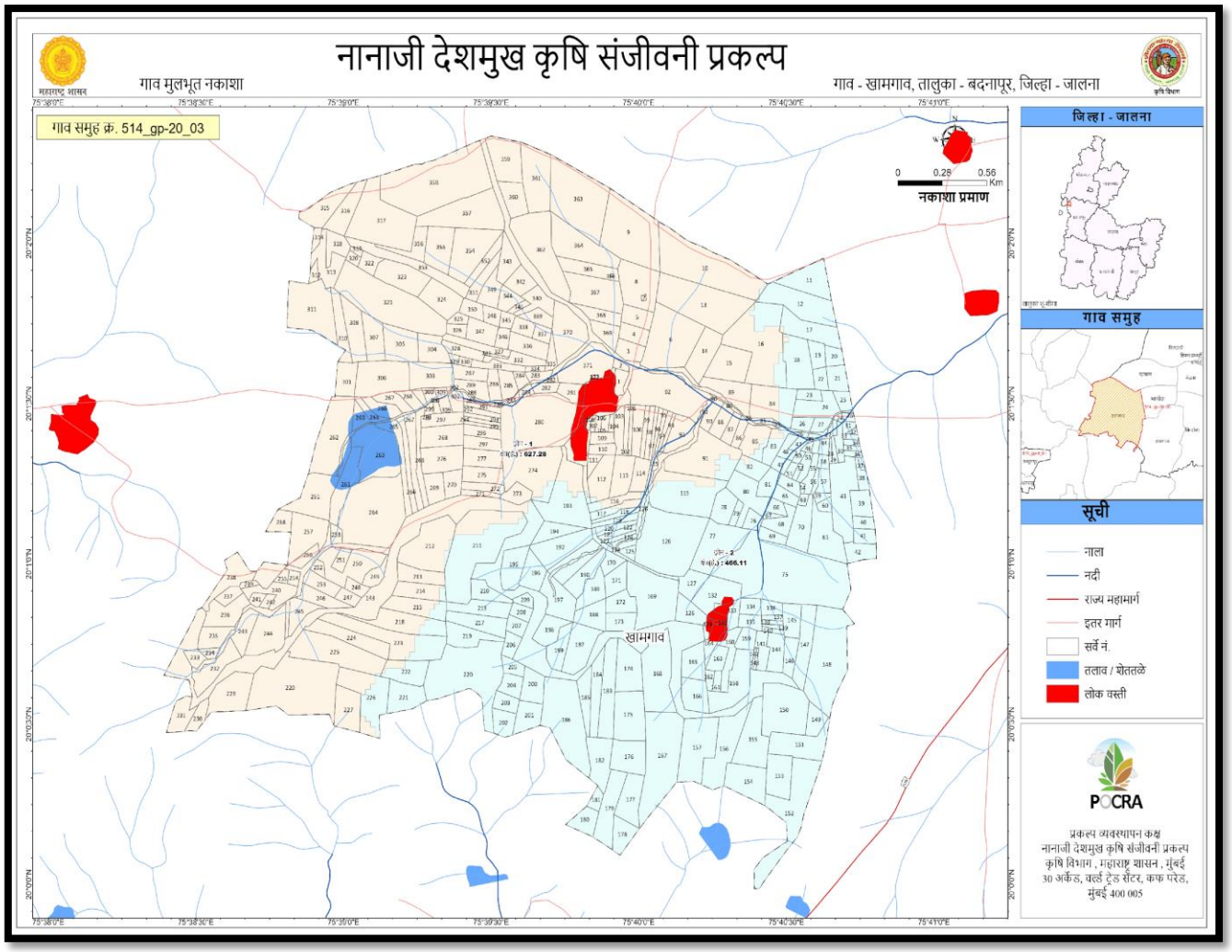
भौगोलिक तपशील

एकूण भौगोलिक क्षेत्र (हे.) - 1564	वनक्षेत्र (हे) - 192
निव्वळ पेरणी क्षेत्र (हे.) - 1177	बागायती क्षेत्र (हे.) - 1017
एकूण लोकसंख्या - 3210	एकूण कुटुंब संख्या - 626
शेतकरी संख्या - 844	शेतकरी (अनुसूचित जाती) - 403
अल्प व अत्यल्प भूधारक - 844	शेतकरी (अनुसूचित जमाती) - 172

हवामान अंदाज व पीक सल्ला

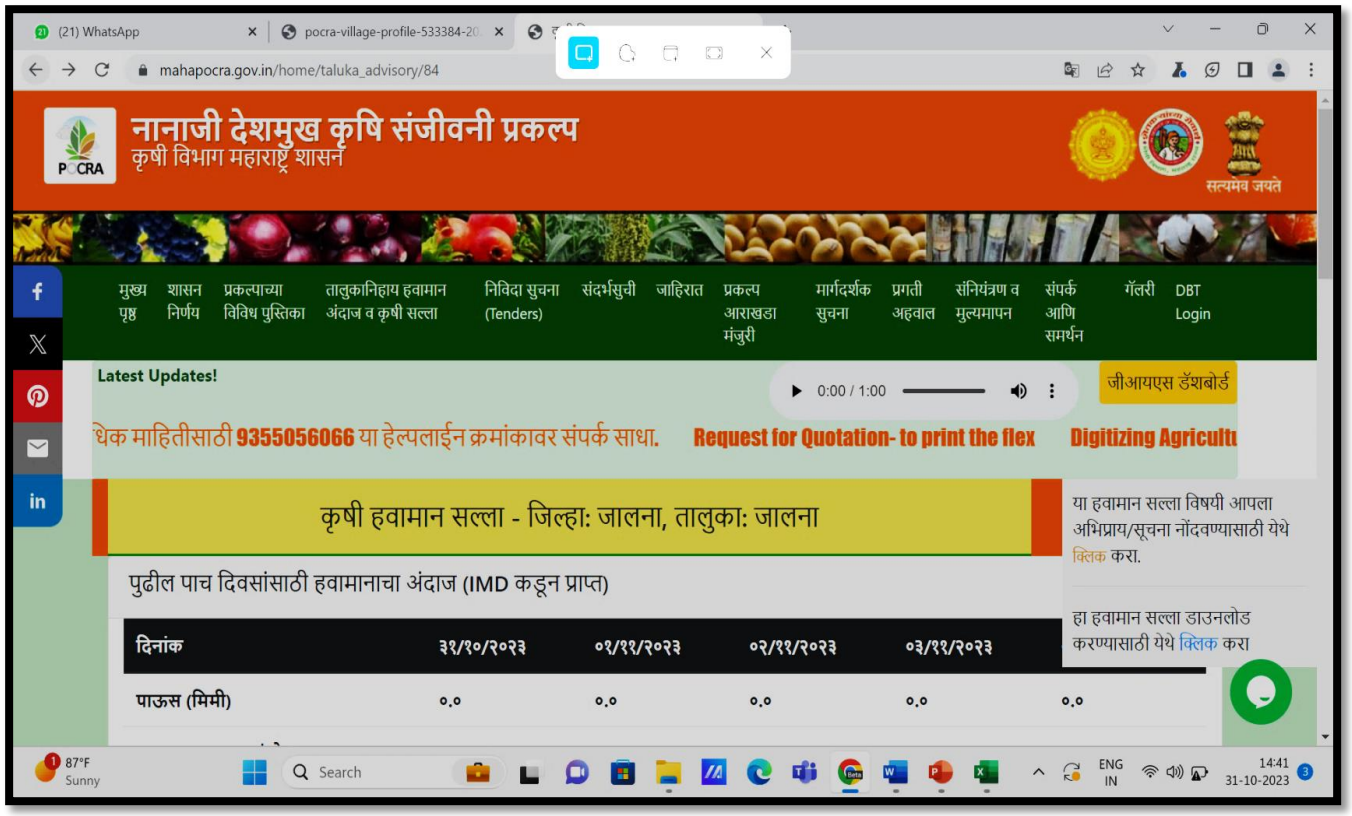
हवामान अंदाज	मध्यम स्वरुपात पाऊस असण्याची शक्यता. आकाश बहुतांश ढगाळ ते ढगाळ राहण्याची शक्यता. हळुवार वारा असण्याची शक्यता. तापमान २१.८ ते ३३.२ अंश से. दरम्यान असण्याची शक्यता.
पीक	पीक सल्ला
कापूस	कापूस या पिकावर गुलाबी बोंड अळी या किडीचा प्रादुर्भाव होण्याची शक्यता आहे. प्रादुर्भाव टाळण्यासाठी ५ % लिंबोळी अर्काची फवारणी करावी व एकरी ५ कामगंध सापळे लावावेत. कापूस या पिकावर गुलाबी बोंड अळी या किडीचा प्रादुर्भाव होण्याची शक्यता आहे. प्रादुर्भाव टाळण्यासाठी ५ % लिंबोळी अर्काची फवारणी करावी व एकरी ५ कामगंध सापळे लावावेत. कापूस या पिकावर पांढरी माशी या किडीचा प्रादुर्भाव होण्याची शक्यता आहे. प्रादुर्भाव टाळण्यासाठी पिवळे चिकट सापळे प्रति एकर 10 या प्रमाणात वापरावेत. कापूस या पिकावर फुलकिडे या किडीचा प्रादुर्भाव होण्याची शक्यता आहे. प्रादुर्भाव टाळण्यासाठी निळे चिकट सापळे प्रति एकर 10 या प्रमाणात वापरावेत. डोमकळया अळयासहीत नष्ट कराव्यात. फुल किडीसाठी फिप्रोनिल ५ टक्के एससी ३० मिली किंवा स्पिनेटोरम ११.७ टक्के एससी ८.४ मिली व बोंडअळयासाठी थायोडीकार्ब ७५ डब्लूपी @ २० ग्रॅम किंवा इमामेक्टीन बेन्झोएट ५ एसजी ४ प्रति १० लिटर पाण्यात मिसळून फवारणी करावी. - 2023-09-25
सोयाबीन	सोयाबीन या पिकावर पाने खाणारी अळी या किडीचा प्रादुर्भाव होण्याची शक्यता आहे. प्रादुर्भाव टाळण्यासाठी ५ % लिंबोळी अर्काची फवारणी करावी व एकरी ५ कामगंध सापळे लावावेत. चारकोल रॉटसाठी कार्बेन्डाझिम २५ %+ मॅन्कोझेब ५०% डब्लुएस @ २ ग्रॅम किंवा पेनल्फुफेन १३.२८% + ट्रायफ्लोक्झीस्ट्रॉबीन १३.२८% एफएस @ १ मीली प्रति लिटर पाण्यातुन फवारणी करावी. - 2023-09-25

Annexure III Sample Village Map (गावाचा मुलभूत नकाशा)



Annexure IV Sample Agro-met Advisory

(तालुका निहाय हवामान अंदाज व कृषी सल्ला)



कृषी हवामान सल्ला - जिल्हा: जालना, तालुका: बदनापूर

या हवामान सल्ला विषयी

पुढील पाच दिवसांसाठी हवामानाचा अंदाज (IMD कडून प्राप्त)

हा हवामान सल्ला डाउन

दिनांक	२६/०३/२०२४	२७/०३/२०२४	२८/०३/२०२४	२९/०३/२०२४	३०/०३/२०२४
पाऊस (मिमी)	०.०	०.०	०.०	०.०	०.०
कमाल तापमान (अं.से.)	३८.७	३९.३	३९.७	४०.७	३५.५
किमान तापमान (अं.से.)	२२.९	२३.४	२३.३	२५.९	२२.१
सकाळची सापेक्ष आर्द्रता (%)	२०	२५	२६	२६	२९
दुपारची सापेक्ष आर्द्रता (%)	१२	१२	१२	१२	१९
वा-याचा वेग (किमी / तास)	१२	१०	१२	१३	१३
वा-याची दिशा	उत्तर - वायव्य	उत्तर	उत्तर	उत्तर - वायव्य	उत्तर - वायव्य
ढग स्थिती (आकाश)	स्वच्छ	स्वच्छ	अंशतः स्वच्छ	अंशतः ढगाळ	अंशतः ढगाळ