Nanaji Deshmukh Krushi Sanjeevani Prakalp

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

Prepared by

Agricultural Technology Management Agency(ATMA), Wardha

and

Project Management Unit

Nanaji Deshmukh Krushi Sanjeevani Prakalp, Mumbai

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.

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Chapter 1: General Profile of the District

1.1 Geographical area and location of the district

The Wardha district (20°28' to 21°21 N. and 78°30' to 9°15' E.) occupies the western portion of the Nagpur plain and lies at the foot of the Satpura hills adjoining Berar region. Wardha naturally divides itself into two parts, the north being hilly from an inlying spur of the Satpura range, while to the south lies an undulating plain intersected by streams and broken here and there by isolated hills rising abruptly from the surface. The district lies over 628914.00 ha in the valley of the Wardha river.

1.2 Tehsil details the number of villages

Wardha district stretches over an area of 6309 Sq. Kms. which constitutes 2% of the total area of Maharashtra. There are 8 tehsils, Wardha, Deoli, Seloo, Hinganghat, Samudrapur, Arvi, Ashti and Karanja including 1376 villages (973 are inhabited) covered by 537 Gram panchayats.
(Source: Census 2011 and SREP 2019-2024)

1.3 Demographic information

As per the census 2011, Wardha district has a population of around 13.00 lakh of which male & female were 6.68 lakhs and 6.32 lakhs respectively. Wardha district population constituted 1.16 percent of total Maharashtra population. Sex ratio of the district is 919 per 1000 male.
(Source: census 2011 and SREP 2019-24)

1.4 Annual average rainfall of the Wardha district:

The Wardha district normal rainfall varies from 985 mm to 1100 mm and the rainfall progressively increases from north western to south eastern part of the district. The average rainfall of the last ten years in the district varies from 809 mm (Ashti tehsil) to 1152.5 mm (Seloo tehsil).
(Source: Ground water information of Wardha district by govt. of India, ministry of water resources, central groundwater board 1763/DDR/2013.)

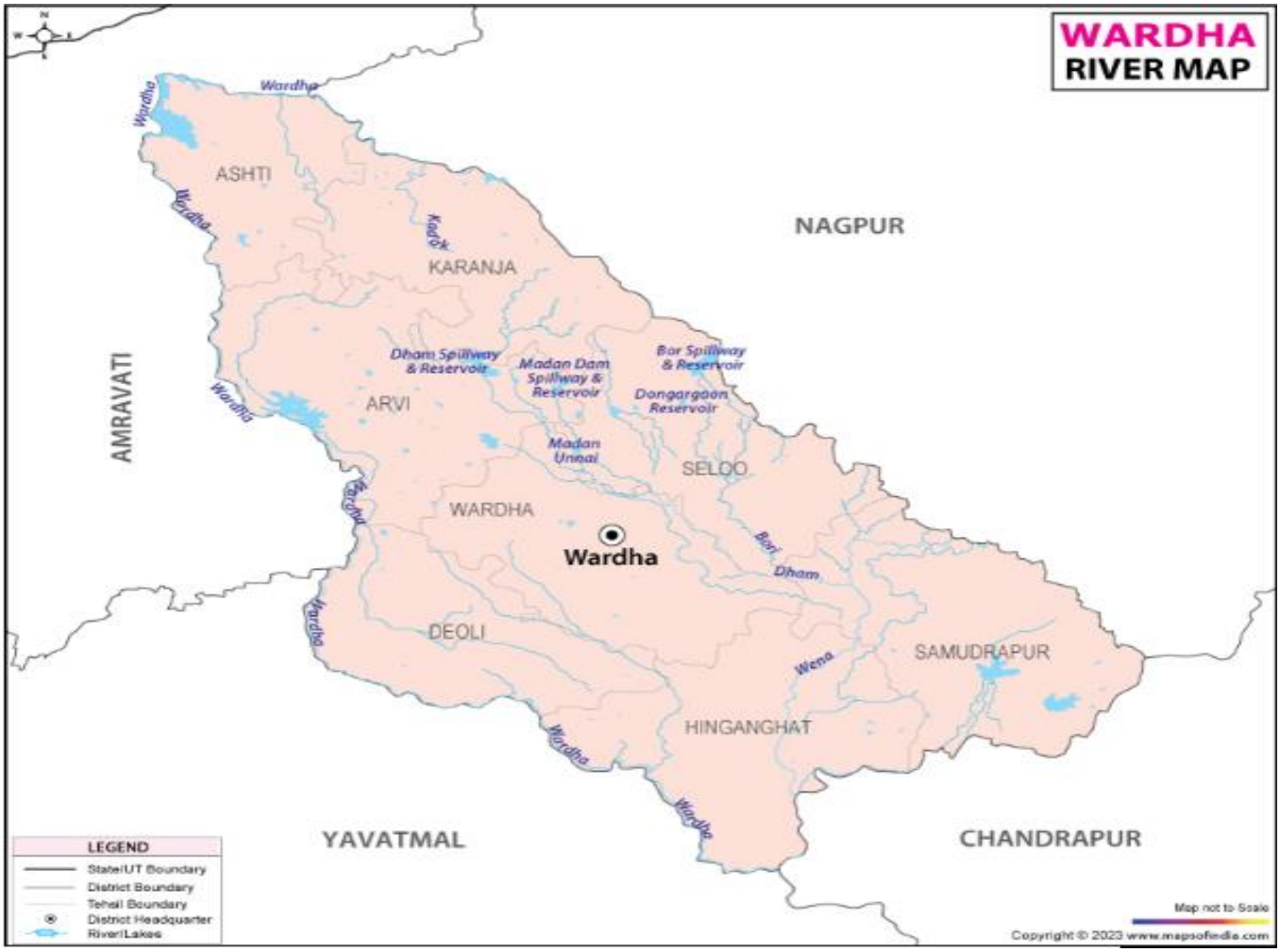
1.5 Temperature of the district

The average temperature of Wardha is around 28°C although it varies from around 21°C during Winter in December to 37°C during the Summer in May. The hottest month of the year is May with temperature varies from 30.4°C to 44.4°C. The coolest month of the year is December, with temperature varying from 11.9°C to 27.8°C. Hinganghat witnesses the warmest weather in May 2021, with temperatures averaging a high of 43.7°C and a low of 32.7°C.
(Source: https://www.worldweatheronline.com)

1.6 River network in the district

All the rivers of the district originate from the various mountain peaks of the Satpura hill ranges from the northern side. The Wardha is the most important river in the district. The other important river in the district is Vana River, which flows from adjoining Nagpur district to the Hinganghat tehsil to merge with the Wardha River at village Sawangi. Yashoda river, Vana and Bakli are the main tributaries of the Wardha River. Bor and Dam rivers originate from the Arvi tehsil and merge with the Vana river at Mandgaon of Samudrapur tehsil, whereas the river Yashoda originates from Arvi, also flows in Deoli tehsil and further merges into the Wardha River.

River Map


WARDHA
RIVER MAP
Wardha
Wardha
ASHTI
Wardha
Kadak
KARANJA
NAGPUR
AMRAVATI
Dham Spillway & Reservoir
Madan Dam Spillway & Reservoir
Bor Spillway & Reservoir
Dongargaon Reservoir
ARVI
Wardha
Madan Unnai
SELOO
Wardha
WARDHA
Wardha
Bori Dham
DEOLI
Wena
SAMUDRAPUR
HINGANGHAT
Wardha
Wardha
YAVATMAL
CHANDRAPUR
LEGEND
State/UT Boundary
District Boundary
Tehsil Boundary
District Headquarter
River/Lakes
Map not to Scale
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1.7 Irrigation potential of the district:

Area in Ha.

Sr. No.	Name Of Irrigation Dept.	Capacity	Actual Irrigation Year 2019-20				Actual Irrigation Year 2020 -21			
			Kharif	Rabbi	Summer	Total	Kharif	Rabbi	Summer	Total
1	**Irrigation Department**									
A.	Big Project	96475	20714	26063	325	47102	35577	43000	200	78777
B	Medium	28547	4454	13535	0	17989	5580	13370	0	18950
C	Small	8202	66	3770	0	3836	2000	3950	0	5950
D	Kolhapuri Bandharas	425	0	200	0	200	110	200	0	310
	Total	**133649**	**25234**	**43568**	**325**	**69127**	**43267**	**60520**	**200**	**103987**
2	**Water Resource Department**									
A	Kolhapuri Bandharas	600	250	200	0	450	250	250	0	500
B	Other	827	20	100	27	147	110	205	0	315
	Total	**1427**	**270**	**300**	**27**	**597**	**360**	**455**	**0**	**815**
3	**Minor Irrigation Department (Z.P)**									
A	Small Lake	1938.140	30.40	190.30	0	220.70	111.000	228.00	0	339.00
B	Kolhapuri Bandharas	4311.31	0	1450.04	0	1450.04	93.00	1555.00	0	1648.00
C	Storage Bandharas	2145.34	0	922.29	0	922.29	30.00	892.00	0	922.00
D	Cement Bandharas	715.70	0	563.52	0	563.52	129.00	383.00	0	512.00
	Total	**9110**	**30.40**	**3126.15**	**0**	**3156.55**	**363.00**	**3058.00**	**0**	**3421**
Total Wardha		**144186.49**	**25534.4**	**46994.2**	**352**	**72881**	**43990**	**64033**	**200**	**108223**

(Source: ATMA SREP 2019, Wardha)

1.8 Different types of soils of the districts

Nearly the whole area of the district consists of a thin covering of black or dark brown soil over a sheet of trap rock. The soil varies in depth from ten feet to a few inches, the average thickness being about two feet. The remaining area of the Arvi tehsil is hilly and undulating and contains the largest proportionate area of inferior soil. The north-east of Wardha tehsil is also hilly but the center and south of Wardha and nearly the whole of Hinganghat consist of an undulating plain. Hinganghat has the largest area of black soil. The area occupied by good black or brown soil is 90 percent of the total under cultivation in Hinganghat, 85 per cent in Wardha and 72 per cent in Arvi. Khardi is a poor and shallow dark soil, mixed with sand. This extends over 12 per cent of the area in cultivation. Bardi or hilly land strewn with stones occupies 4 per cent. While retari or regular sandy soil and kachhar or alluvial land on the banks of streams are found in insignificant quantities. The above statistics indicate the high proportion of fertile land contained in the district.
(Source: ATMA SREP2019, Wardha)

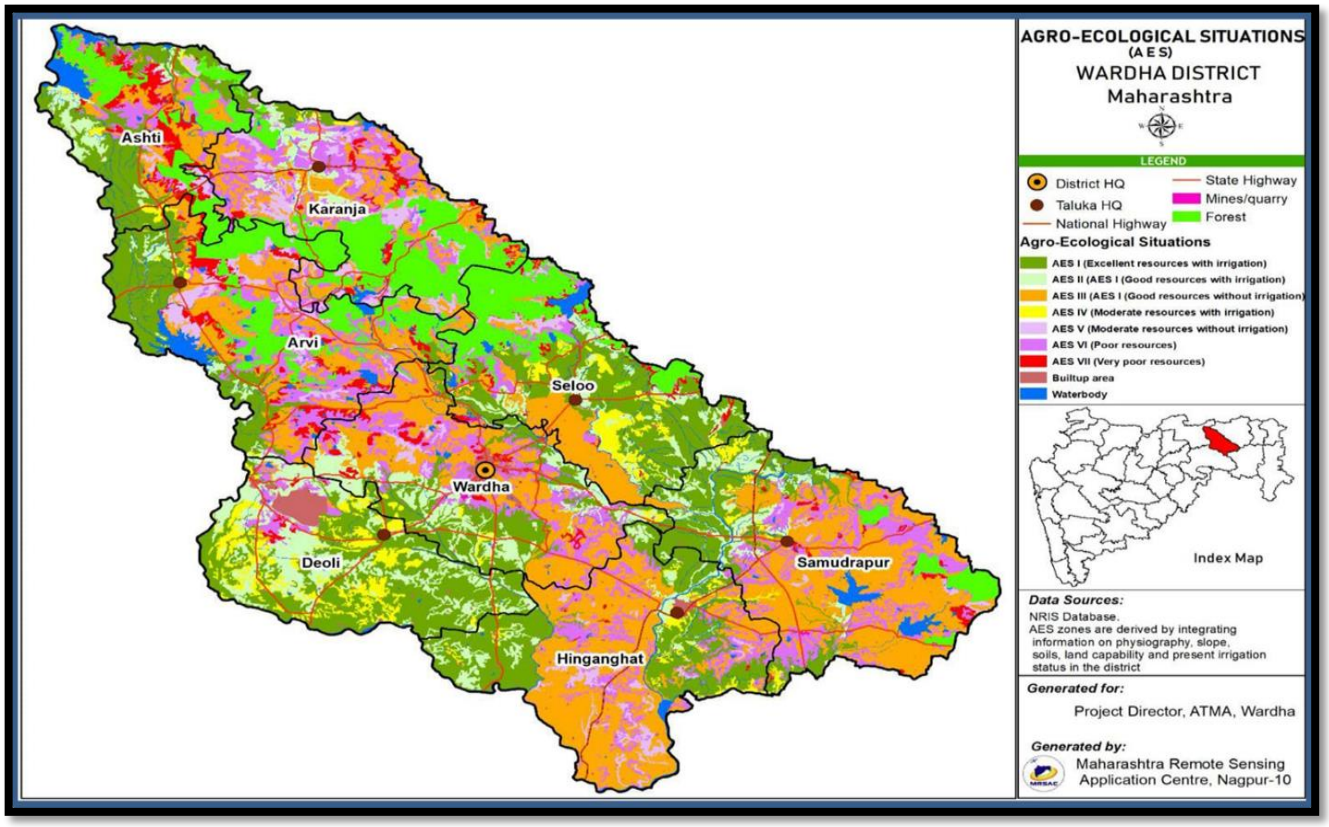
1.9 Different zones according to prevailing agro-ecological situations

Agro Ecological Situations (AES)

Sr. No	Agro Climatic Zone	Characteristics	Tehsils
1	AES I	Excellent resource with irrigation.	Arvi, Samudrapur and Ashti.
2	AES II	Good Resources with irrigation.	Deoli, Karanja, Hinganghat.
3	AES III	Good resources without irrigation.	Wardha, Samudrapur, Seloo.
4	AES IV	Moderate resource with irrigation.	Wardha, Deoli, Seloo.
5	AES V	Moderate resource without irrigation.	Karanja.
6	AES VI	Poor resources.	Hinganghat.
7	AES VII	Very poor resources	Arvi & Ashti.

(Source: ATMA SREP2019, Wardha)

Agro Ecological Situations (AES) Map

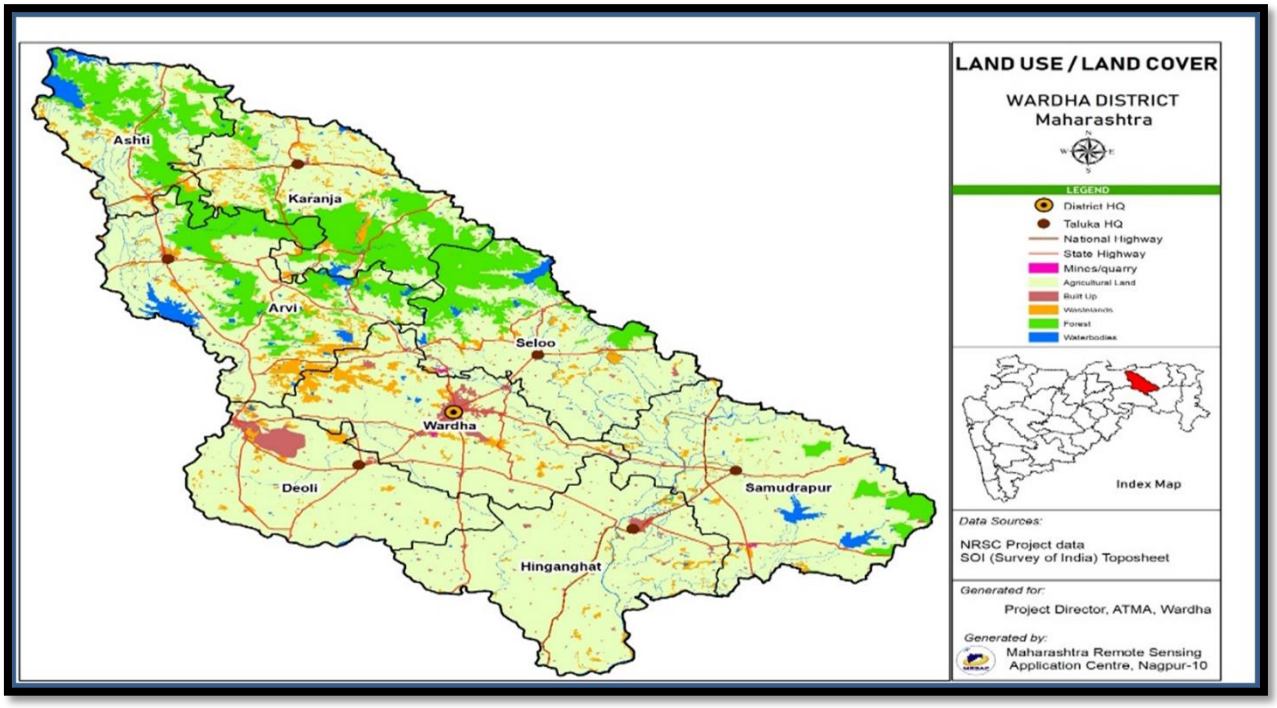


Chapter 2. Agriculture Profile of District

2.1 Land use classification of the district *(Area in ha.)*

Tehsils	Total Land	Agricultural Land	Non-Agricultural Land	Forest Land	Waste Land
Ashti	45494.00	24964.00	11961.00	5659.00	2083.00
Karanja Gh.	60911.00	39803.00	7558.00	8999.46	3816.00
Arvi	111008.00	52081.00	16655.00	4807.00	6407.00
Seloo	70593.00	45143.00	366.53	11058.00	2070.00
Wardha	81589.00	61338.00	10241.00	2138.60	3924.00
Deoli	69732.00	58330.00	603.00	1243.45	2384.00
Hinganghat	89919.00	82079.87	2501.00	2649.45	7243.00
Samudrapur	99668.00	93307.64	3562.00	4475.39	4476.00
Total	628914.00	457046.58	53447.53	41030.35	32406.00

(Source: District Economic & Social Commentary Report 2023, director of finance & statistical, planning department, govt. of Maharashtra.)



2.1.1 Area under cultivation:

Season	Area (Ha)
Kharif	4,11,937
Rabbi	71,293
Summer	2108

(Source- year 2023, Statistics branch of DSAO, Wardha.)

2.2 Agriculture land holding- its distribution according to land sizes

Sr. No	Farmer	No. of Farmers (in Lakh)
1	Below 1 Ha (Marginal Farmer)	53.06
2	1 to 2 Ha (Small Farmer)	36.06
3	2 to 4 Ha (Semi Medium Farmer)	22.74
4	4 to 10 Ha (Medium Farmer)	8.65
5	More than 10 Ha (Large Farmer)	0.87
	Total	**121.38**

(Source: ATMA SREP2019, Wardha)

2.3 Availability of Water Resources:

Sr. No	Source of Irrigation	Area Covered by the Source (Ha)
1	Dam	84,348
2	Well (59005)	57,500
3	Borwell (4883)	4340.7
4	Farm Ponds (972)	4,860
5	Rivers	14,222

(Source: Irrigation department, Wardha)

2.4 Cropping pattern:

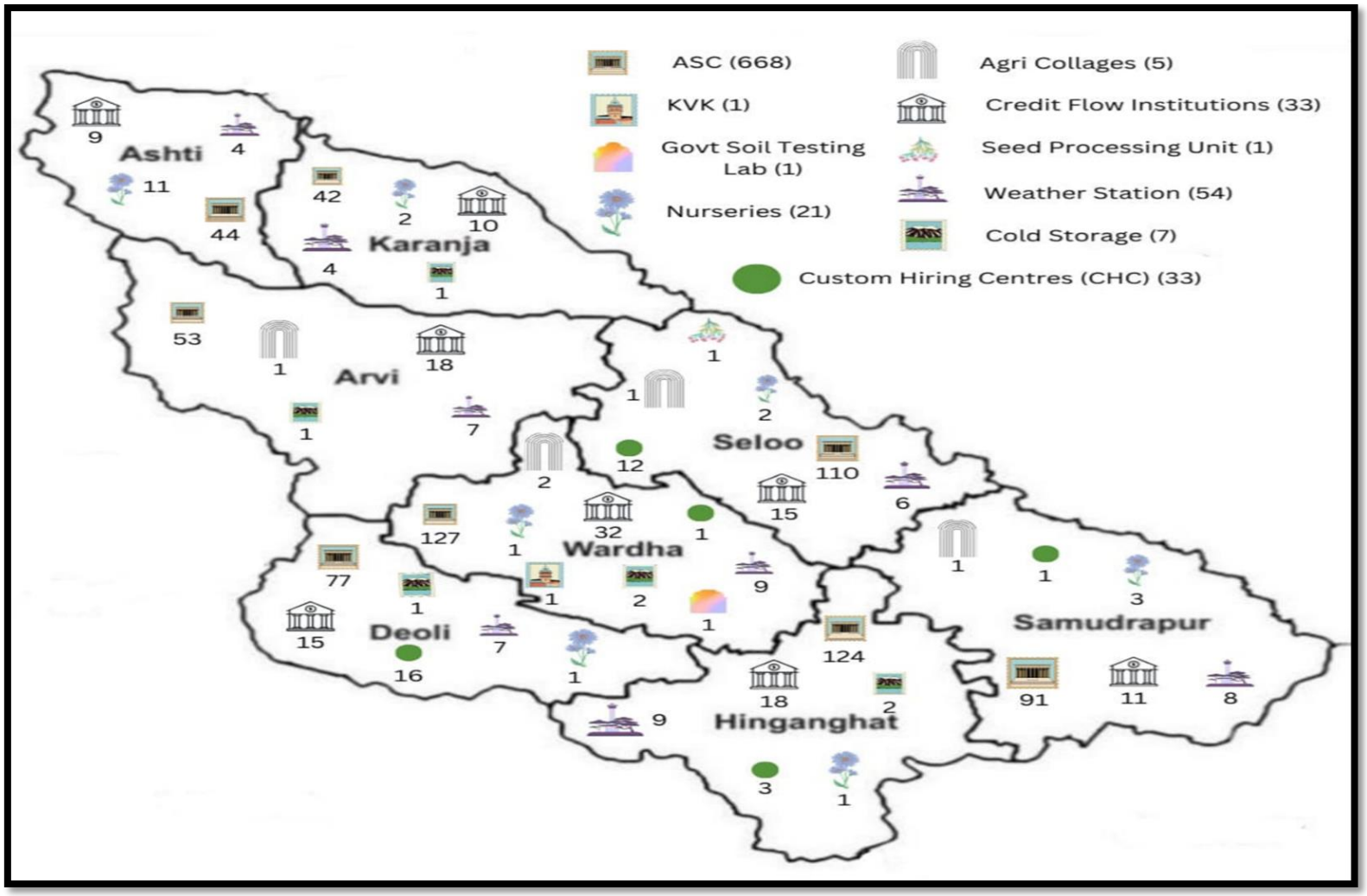
The major crops grown in Kharif season are Cotton, Soybean and Pigeon Pea. Since 2017-18, about 50% area is covered by Cotton crop followed by Soybean which cover around 24% area. Pigeon pea crop is mostly grown as intercrop in Cotton and covers 12.14% area remaining area includes Jawar, Groundnut, Pulses, Maize & Sugarcane. Out of 4,75,000 Ha., 20% of the area is under irrigation and 80% of the Kharif crops are grown as rainfed crops. The time of sowing of Kharif crops begins from the first week of June to the last week of July. The Soybean crop, which is ready for harvest between October midweek to November midweek, is followed by Rabbi Crop Chick Pea or Wheat and miniscule area under Turmeric and Linseed. *(Source: ATMA SREP2019, Wardha)*

2.5 Year wise Area, Production and Productivity of Major Crops for the Last 5 years.

Sr. No.	Crop	2018-2019			2019-20			2020-21			2021-22			2022-23		
		Area (Ha.)	Production (MT)	Productivity (Kg/Ha)	Area (Ha.)	Production (MT)	Productivity (Kg/Ha)	Area (Ha.)	Production (MT)	Productivity (Kg/Ha)	Area (Ha.)	Production (MT)	Productivity (Kg/Ha)	Area (Ha.)	Production (MT)	Productivity (Kg/Ha)
1	Soybean	1185.08	1551.69	1309.35	1138.28	1474.10	1304.19	1257.00	680.00	541.00	1222.87	1488.72	1618.10	1310.33	1495.13	1141.03
2	Cotton	2430.02	6552.47	458.40	2507.59	6896.07	467.51	2435.00	5949.00	415.00	2531.06	7521.04	505.15	2276.23	5540.48	413.79
3	Tur	748.12	832.44	1112.70	745.38	1008.04	1352.38	716.33	1328.00	1855.00	783.13	1091.21	1393.40	585.64	363.56	620.78
4	Jowar	22.69	5.53	243.82	7.47	1.67	223.09	7.40	1.60	215.00	6.52	1.40	214.30	3.03	0.11	36.56
5	Ground Nut	6.8	10.40	1538.10	10.31	25.78	2500.00	12.85	20.69	1610.59	12.85	26.52	2064.31	15.33	10.73	700.00
6	Wheat	127.5	217.00	1699.90	139.79	193.22	1382.22	158.88	342.46	2155.00	158.09	363.80	2301.25	334.09	436.40	1306.22
7	Gram	325.5	442.00	1359.00	417.41	423.29	1014.08	477.37	806.64	1690.00	330.90	501.50	1515.57	857.46	1044.39	1218.00
	Total	**4845.71**	**9611.53**	**7721.27**	**4966.23**	**10022.17**	**8243.47**	**5064.83**	**9128.39**	**8481.59**	**5045.42**	**10994.19**	**9612.08**	**5382.11**	**8890.80**	**5436.38**

(Source- year 2023, Statistics branch of DSAO Wardha)

2.6. Other Facility Map:



Chapter 3: Weather trend of district

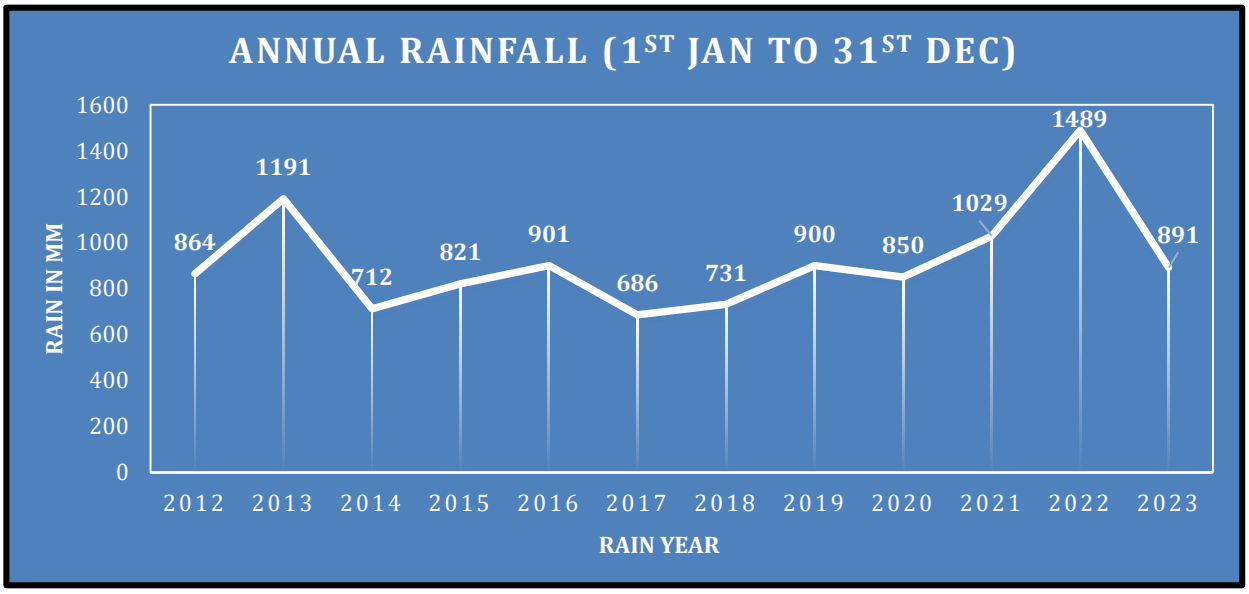
Introduction

Mahavedh project is operationalized 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.

3.1Annual average rainfall of last twelve years.

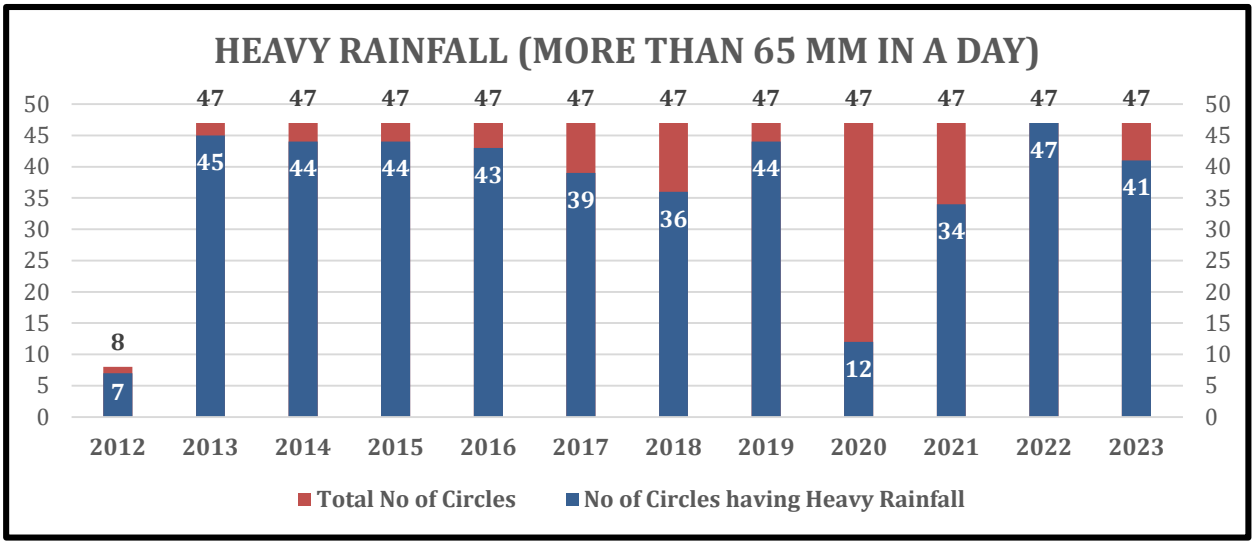
Normal or average rainfall is the amount of precipitation that we expect per year (in a given area). It is obtained and set by calculating the average (mean) of precipitation recorded in an area. Annual rainfall or precipitation is the sum of daily rainfall in a year.



The graph 3.1 Presents annual rainfall data of Wardha district from 2012 to 2023, highlighting fluctuations in precipitation. Notably, the lowest recorded rainfall was in year 2017 at 686 mm, while the highest occurred in year 2023 with a total of 1489 mm annual average rainfall.

3.1 Heavy rainfall

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



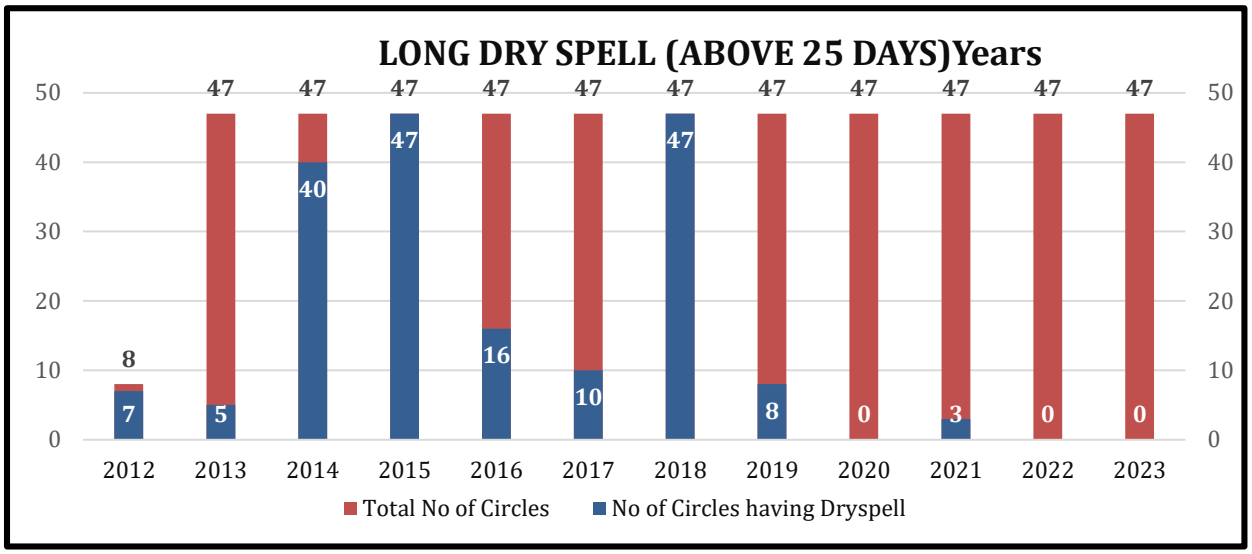
The provided graph 3.2 illustrates occurrences of heavy rainfall in circles within the Wardha district. Notably, in year 2022, heavy rainfall affected the all circles of the district. Conversely, the year 2020 recorded a lower incidence of heavy rainfall, with only 12 circles out of the 47 circles being affected in Wardha 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.

3.2.1 Long Dry spell

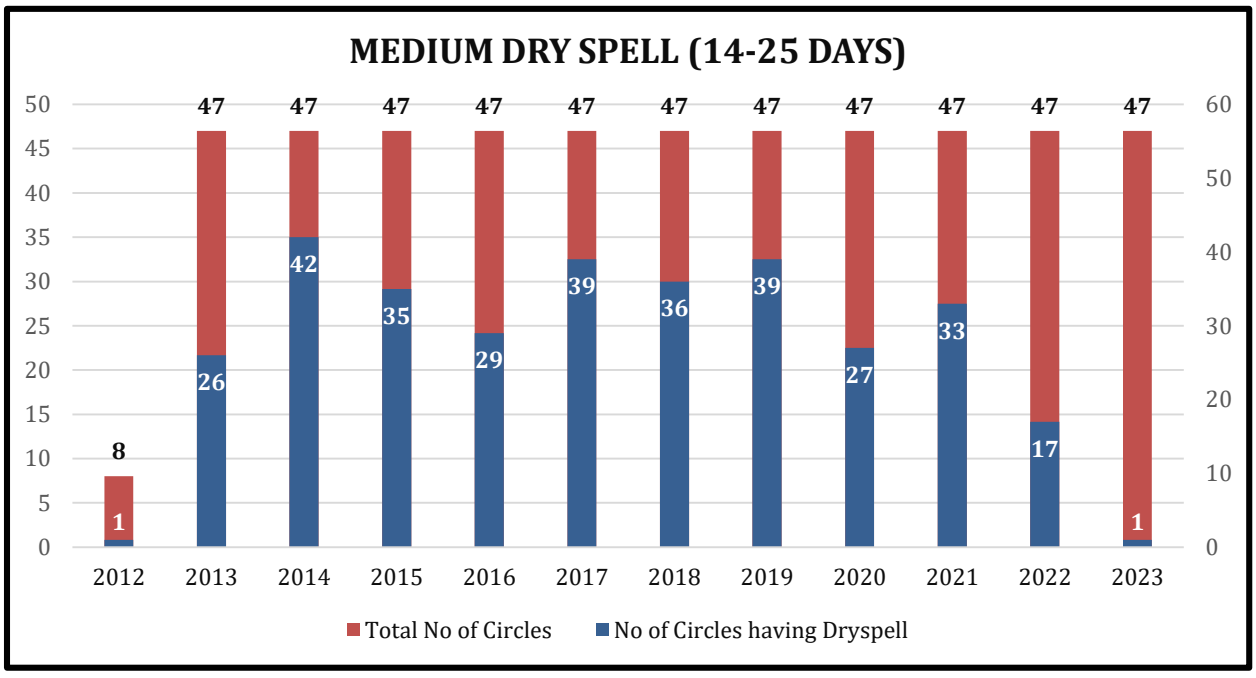
Long Dry spell is a prolonged period above 25 days of dry days in monsoon period



A graph (Graph 3.3.1) that shows the trend of long dry spells observed in a Wardha 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 2018, all circles in the district experienced long dry spells. Conversely, in year 2020. 2022 and 2023, there was no long dry spell, across all 47 circles in the district.

3.2.2 Medium Dry spell

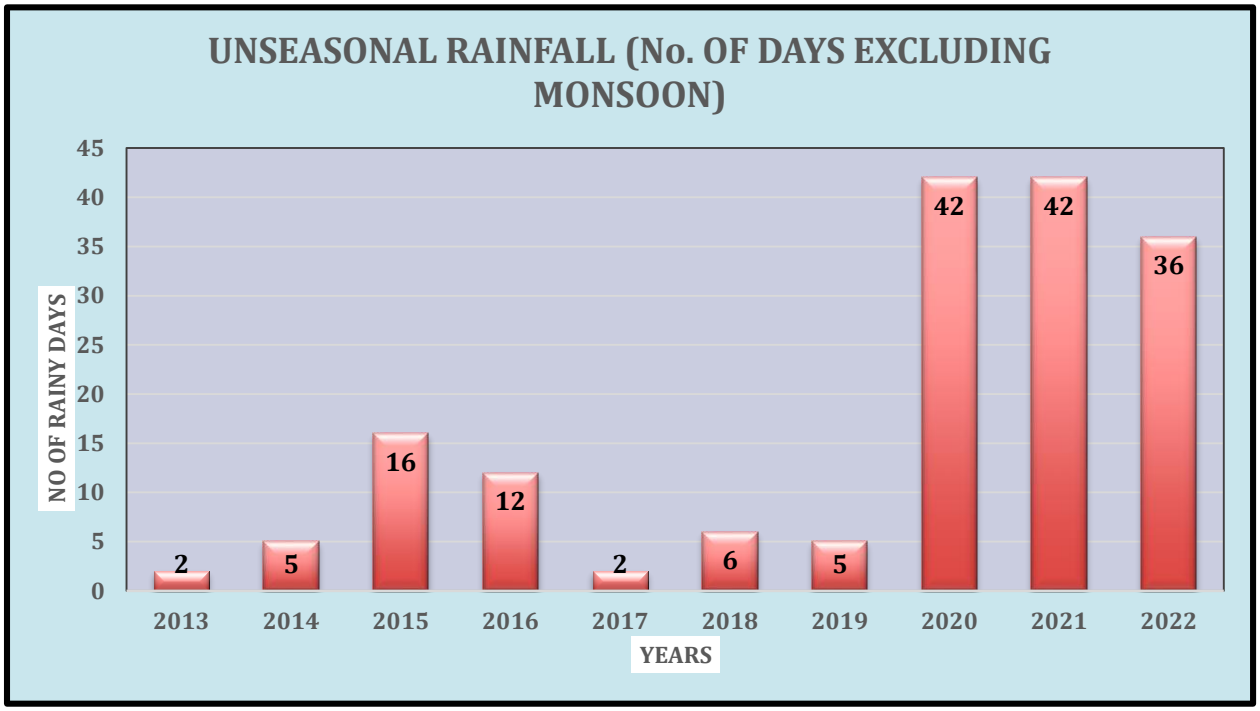
Medium Dry spell a period of 14-25 days of dry weather.



A graph (Graph 3.3.2) that shows the trend of medium dry spells observed in a Wardha district. The data covers the total number of circles and the circles that affected medium dry spell (14 to 25 days) in Wardha district from the year 2012 to 2023. The graph shows that in year 2014, out of 47 circles 42 circles in the district experienced medium dry spells. Conversely, in year 20203 there was only 1 circle out of 47 circles experienced medium dry spell in the district.

3.3 Unseasonal rainfall

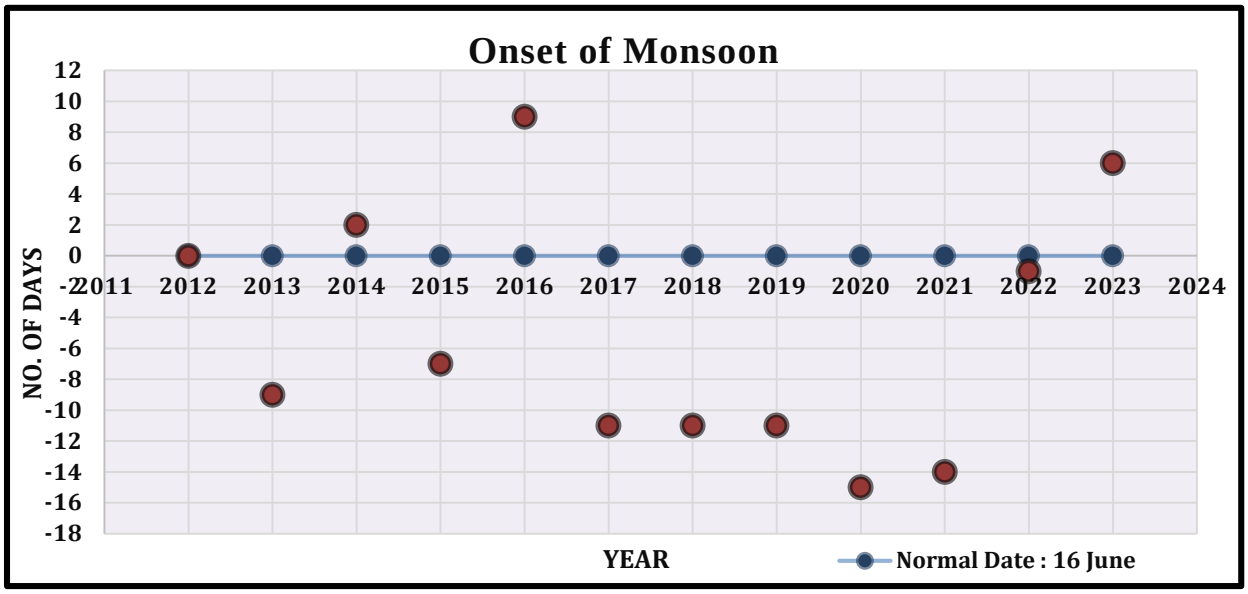
Rainfall received during non-monsoon days is treated as unseasonal rainfall. When there is a sudden change in atmospheric pressure, it can result in precipitation, even during non-monsoon seasons.



The graph 3.4 illustrates the annual occurrences of unseasonal rainfall in the Wardha district from year 2013 to 2022. The data reveals a variation ranging from 2 days to 42 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 16th June in Wardha district.

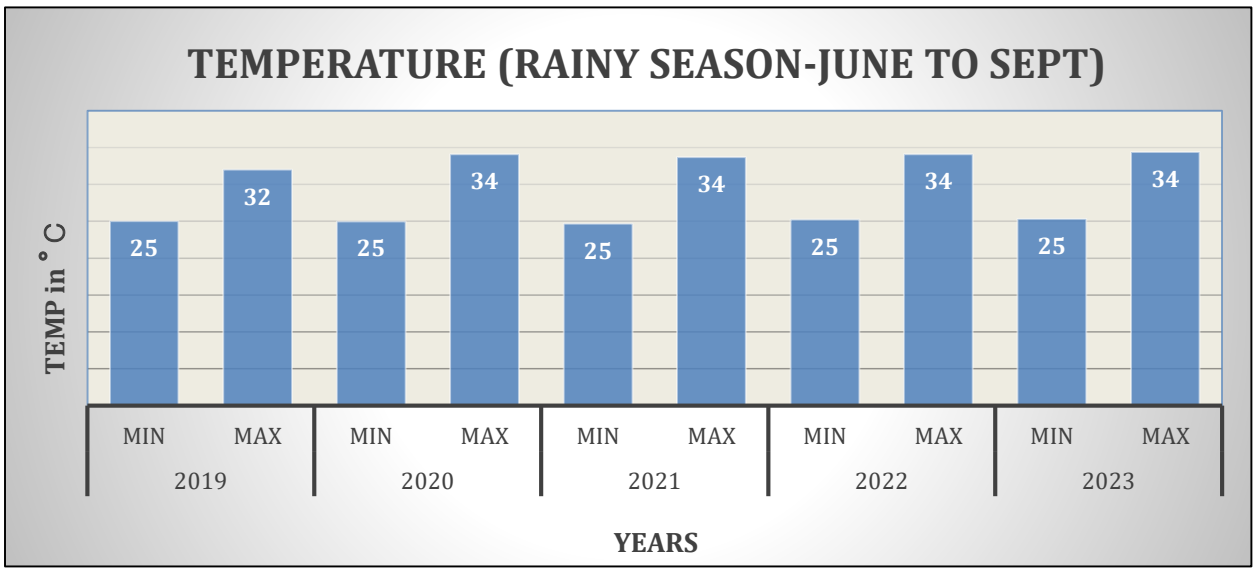


The graph 3.4 depicts the annual onset of the monsoon. The blue line represents the normal day of onset of monsoon. The onset days show variations ranging from -15 days to + 9 days. Notably, in year 2014, 2016 and 2023 the monsoon arrived late than the normal onset date. In year 2012 the monsoon arrived on time. However, in remaining years the monsoon was notably arrived earlier.

3.5 Temperature.

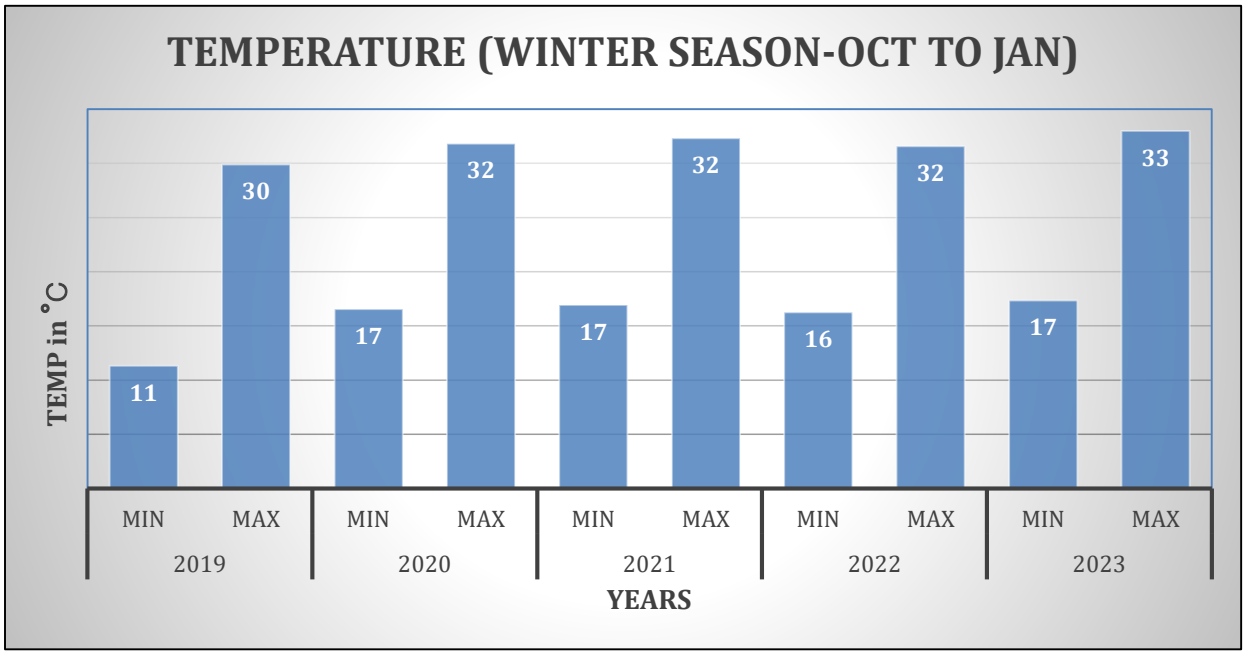
Temperature is a physical quantity that quantitatively expresses the attribute of hotness or coldness. The average temperature is 28 °C (82.4 °F), with a average minimum of 19°C (66.2 °F) and a average maximum of 37°C (98.6 °F). On the coldest nights, the temperature usually drops to around 13°C (55.4 °F). On the warmest days, the temperature usually reaches around 40°C (102.2 °F).

3.5.1 Temperature (Rainy Season-June to Sept)



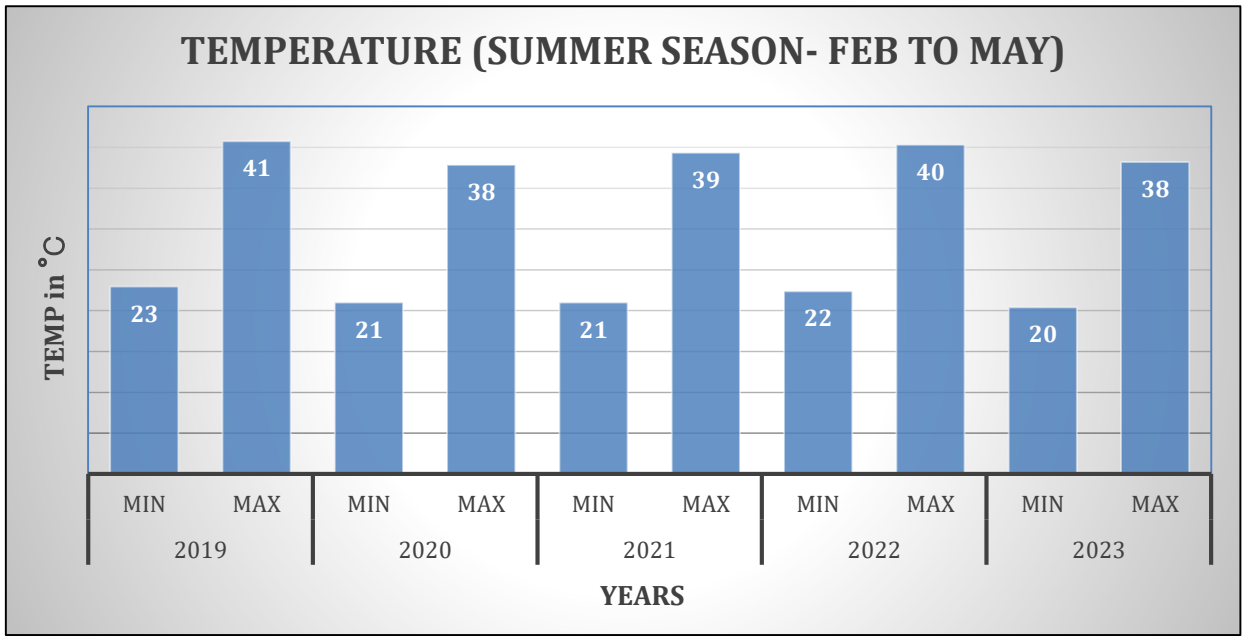
The graph 3.5.1 presents the temperature in the Wardha district during the rainy season from year 2019 to 2023 exhibited a consistent range, with maximum temperatures ranging from 32-34 °C, minimum temperatures 25 °C in Wardha district.

3.5.2 Temperature (Winter Season-Oct to Jan)



The graph 3.5.2 presents the temperature in the Wardha 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 30-33 °C.

3.5.3 Temperature (Summer Season- Feb to May)

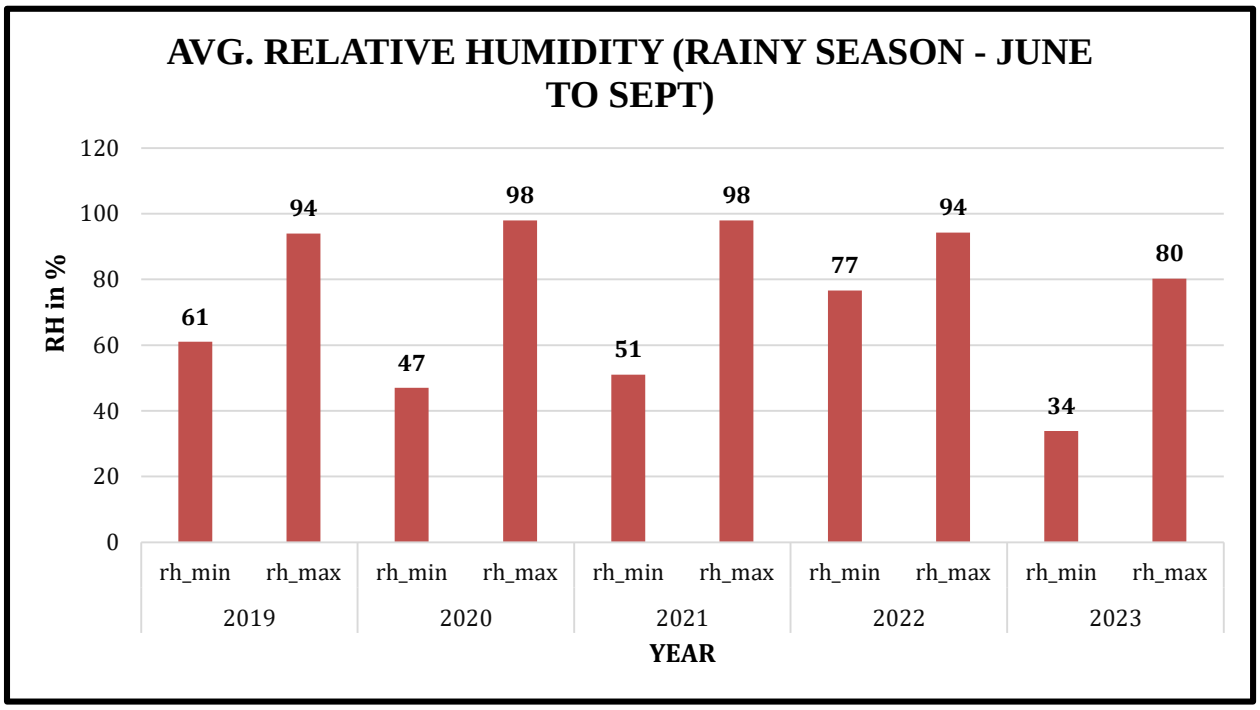


The graph 3.5.3 presents the temperature in the Wardha district during the summer season from year 2019 to 2023 exhibited a consistent range, with minimum temperatures fluctuating between 20-23 °C and maximum temperatures ranging from 38-41 °C.

3.6 Relative Humidity

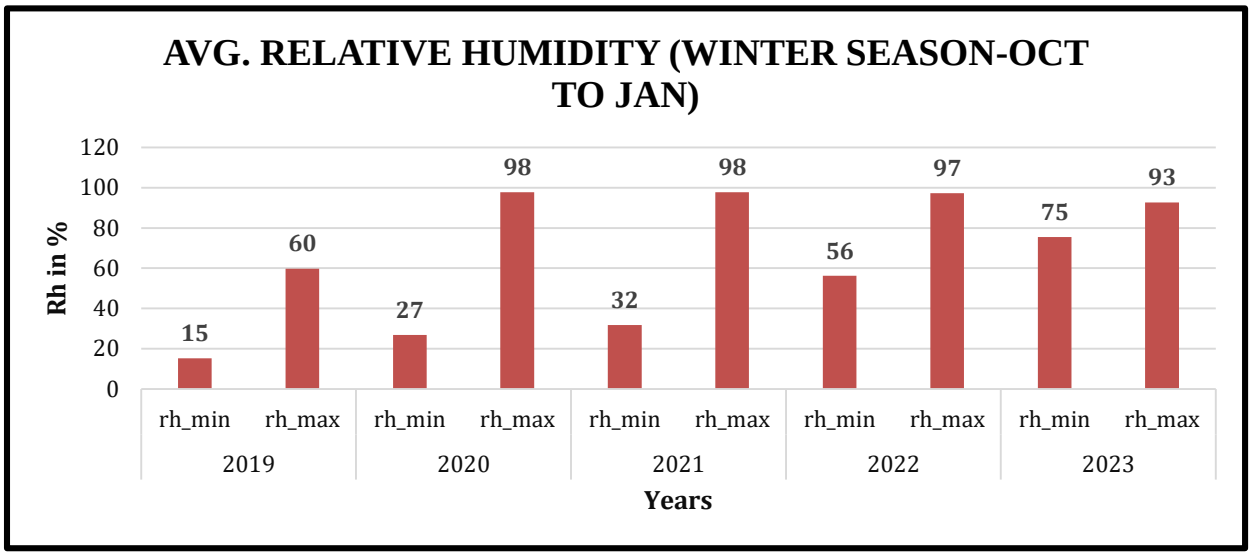
Relative Humidity is the ratio of the actual quantity of moisture at a certain temperature and pressure to the maximum it can hold at the same temperature and pressure. It is usually multiplied by 100 and expressed in percent.

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



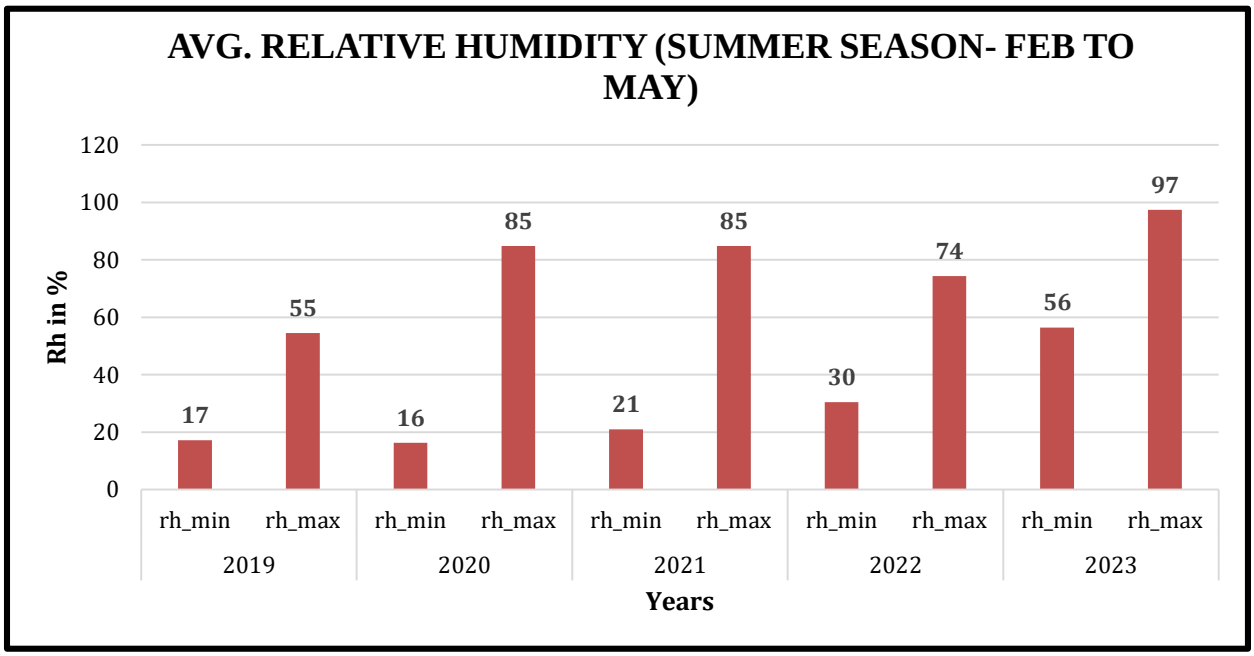
The graph 3.6.1 illustrates humidity levels during the rainy season in the Wardha district, revealing a variation in minimum humidity from 34% to 77% and maximum humidity ranging between 80% and 98%.

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



The graph 3.6.2 illustrates humidity levels during the winter season in the Wardha district, revealing a variation in minimum humidity from 15% to 75% and maximum humidity ranging between 60% and 98%.

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



The graph 3.6.3 illustrates humidity levels during the summer season in the Wardha district, revealing a variation in minimum humidity from 16% to 56% and maximum humidity ranging between 55% and 97%.

Chapter 4 - Impact of climate variability on agriculture production

Sr. No.	Climate Variability	**Kharif Temperature range** (27 °C – 40 °C)			**Rabbi temperature range** (27 °C – 40 °C)	
		Cotton	**Soybean**	**Tur**	**Gram**	**Wheat**
1	**Impact of temperature**					
	Crop Growth and Yield	The Optimum temperature 24-30°C. Cotton seed germinate well when soil temperature ranges from 20-30°C. High temperatures above 35°C can negatively impact cotton pollination, potentially leading to a decrease in boll formation. Extreme temperatures, especially above 40°C, can cause heat stress,	The optimum temperature for soybean is 20-30°C, the optimum soil temperature for germination and early seedling growth is 25 to 30°C. Temperatures exceeding 31° C can result in a decreased number of pods while temperatures above 37° C. severely limit pod formation. For every 1°C increase, soybean yield decreases by an	Optimal temperature 20-30°C. Soil temperature plays a crucial role in germination and early seedling growth, with an optimum range of 25 to 30°C. Temperatures exceeding 31°C may lead to a reduction in the number of pods formed. Severe limitations in pod formation can occur when temperatures rise above 37°C. For every 1°C increase	Bengal gram requires a cool climate for growth and high temperature for maturity. The crop performs better at 20-25°C temperature, cool temperature for germination and early seedling moderate temperature for flowering and pod formation. 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.	Optimal temperature 15-24°C during the vegetative and reproductive stages. cool temperature for germination and early seedling. Wheat is particularly sensitive during its reproductive stage, including flowering and grain filling. High temperatures during these stages can lead to reduced grain setting and negatively impact yield. 1°C increase in temperature beyond the optimal range during

		affecting overall plant health. More than optimum temperature may result in reduction in the number of bolls and affect fiber quality. Cooler temperatures during the flowering period can lead to delayed maturity and impact yield.	average of 17%. warm temperatures and periods of decreasing the number of flowers, vegetative growth stunted causes yield losses up to 20%.	beyond the optimal range, red gram yield may experience an average reduction of around 17%. During the red gram crop's flowering to pod formation stage, if the temperature falls below 7 degrees Celsius, early morning fog can lead to flower and pod scorching. Smoke treatment is applied during night hours to mitigate this issue.		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. Warmer temperatures may favor the development of specific pathogens and pests.
	Pest and Diseases Infestation	**Diseases**: Lalya, Alternaria leaf spot, Angular leaf spot, etc. **Pest:** thrips, Whitefly. Cotton plants undergo transpiration, where water is taken up by the	**Pest:** Whitefly. Higher temperatures generally lead to increased evaporation rates from the soil surface. Higher temperatures often lead to increased transpiration rates. If temperatures are	Elevated temperatures, coupled with inadequate water availability, can result in water stress for red gram crops. Water stress can negatively impact plant growth, flowering, and pod	Bengal gram requires a cool climate for growth and high temperature for maturity. The crop performs better at 20-25°C temperature, cool temperature for germination and early seedling moderate temperature for flowering and pod	Wheat often requires a period of exposure to cold temperatures (vernalization) for proper flowering. Warmer temperatures during the flowering stage can lead to increased water demand. Elevated temperatures, especially

		roots and released into the atmosphere through small pores in the leaves (stomata). 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. Water stress during critical growth stages, such as flowering and boll development, can negatively impact yield and fiber quality.	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.	development, potentially leading to a decrease in yield. Higher temperatures often lead to increased transpiration rates, contributing to the overall water demand of the crop.	formation. 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.	during critical growth stages, can exacerbate water stress in wheat crops. Prolonged exposure to high temperatures, especially during the grain-filling stage, can result in heat stress and impact yield. Elevated temperatures during the grain-filling period can affect grain quality. High temperatures can lead to reduced kernel weight and negatively impact the protein content of wheat grains.

2	**Impact of Rainfall (Rainfall of 2022-23 Lowest 1274.6 mm to 1491.7 mm)**					
	Crop Growth and Yield	1) Critical Stage: Cotton is highly sensitive to water stress during flowering and boll formation. Inadequate rainfall during this period can lead to flower and boll shedding, reducing the potential for high yields. 2) Critical Stage: Adequate moisture during boll development is crucial for fiber elongation and quality. Insufficient rainfall during this stage can result in reduced fiber length and quality. 3) Excessive rainfall and high humidity can create favorable	1) Adequate rainfall is essential for the germination of soybean seeds. 2) Critical Stage: Soybeans are particularly sensitive to water stress during flowering and pod formation. Inadequate rainfall or drought during this period can lead to poor pod development and reduced yield. 3) Critical Stage: Adequate moisture is crucial during seed filling to ensure optimal development and size of soybean seeds. Insufficient rainfall during this stage can result in smaller and fewer seeds, leading to	1) Critical Stage: Adequate moisture during pod filling is crucial for the development and filling of seeds. Insufficient rainfall can result in smaller and fewer seeds, reducing overall yield. 2) Red gram is known for its relatively higher drought tolerance compared to some other pulse crops. However, prolonged drought can still have negative effects on yield. 3) Excessive rainfall near the harvest period can delay harvesting and may increase the risk of seed damage, particularly from	1) Critical Stage: Bengal gram is sensitive to water stress during flowering and pod formation. Insufficient rainfall during this period can lead to poor pod setting and reduced yields 2) Critical Stage: Adequate moisture during pod filling is crucial for the development and filling of seeds. Insufficient rainfall can result in smaller and fewer seeds, impacting overall yield	1) Wheat plants require sufficient water during tillering and vegetative growth for the development of a robust root and shoot system. This supports the formation of tillers and contributes to a higher potential yield. 2) Critical Stage: a) Jointing and Booting, b) Heading and Flowering. c) Gain filling during these stages Inadequate rainfall can lead to reduced grain number per spike, poor pollination and reduced grain filling, leading to lower yields, also smaller and lighter grains.

		conditions for certain cotton diseases, including fungal infections. 4) Excessive rainfall during harvest period can delay cotton harvesting can decrease fiber quality deterioration and yield losses due to boll rot.	reduced yields. 4)Excessive rainfall, in poorly drained soils, can lead to waterlogging,	sprouting or fungal infections.		
	Irrigation supply					
	a) Drought	In Wardha district around 2008 and 2016 is drought prone year in that year the losses happened around 30-40%.				
	b) flood	In the year of 2022 the district had heavy rainfall, Especially in Sahur and Rohana Mandal of Arvi tehsil reported heavy rainfall that reduces production up to 50-80 %. In Hinganghat Allipur and Wadner Mandal is severely affected.				
	Pest and Diseases infestation and its management	**Low Rainfall**: Low rainfall and cloudy weather provide favorable conditions to grow pests like spotted pod borer, plume moth, spiny pod borer, aphid, jassids, thrips, white fly etc. **High Rainfall:** In heavy rainfall pests like *heliothis sp.,* tobacco leaf eating caterpillars washed away also increasing fungal diseases. And wilting diseases increase in humidity.		Optimal rainfall has positive impact such as uniform emergence, healthy and vegetative growth, good flowering and pod setting, quality seed development Excessive rainfall can lead to	Insufficient rainfall/drought: can lead to reduced germination, stunted plants, reduced leaf area, and limited biomass production. Reduced tiller formation, limiting the potential number of grains per spike.	

				waterlogging, causing oxygen deprivation in the soil and inhibiting root growth, disease susceptibility.	Drought during grain-filling stages can result in smaller and fewer grains, reducing overall yield. 2)Excessive rainfall/ flood a) Waterlogging, Disease susceptibility, reduced root functionality, affecting nutrient uptake
	Soil erosion and nutrient loss	**Low Rainfall**: NA **High Rainfall:** In heavy rainfall a high amount of soil erosion occurs which results in nitrogen losses.			
	Harvest & Storage	**Low Rainfall**: NA **High Rainfall:** if rainfall happens during harvesting farmers face yield losses and while storage there is chance to increase moisture.			

3	**Impact of other calamities (Cyclones and hail storms etc.)**					
	Crop Damage and Loss	1) The cotton damages caused by hail exhibit different relationships with hail diameter and hail fall density and the cotton damages also vary with different growth	1) Shedding of flowers and pods. Hail can cause physical damage to soybean plants, including bruised leaves, broken stems, and damaged pods.	1) Hail can cause physical damage to developing pods, leading to pod bruising, splitting, and reduced seed quality, stems and leaves, impacting the plant's ability to	1)Wilt disease Increases dropping of flowers and pods. A hailstorm caused some damage to the standing rabi crop due to lodging and led to delays in harvesting, with a potential output	1) Hailstorm can cause physical damage to developing wheat heads, resulting in the breaking of stems and damage to grain-filled heads, 2) Physical damage to developing wheat

		stages. Defoliation rate, branch injury rate, and boll falling rate increase with increasing hail diameter and hail fall density. Hail can cause physical damage to cotton plants, resulting in bruising and staining of the lint fibers. Hail damage can lead to reduced fiber quality, affecting the market value of the cotton. The percentage of yield and fiber quality loss in cotton due to hailstorms can vary, depending on the severity and timing of the hail event. Losses can range from 10% to more than 50%.	2) Severe hailstorms may lead to defoliation, affecting the plant's ability to photosynthesize and produce energy. 3) Hailstones hitting developing pods can result in pod damage, reducing seed development and overall yield 4) Depending on the severity, a hailstorm & cyclone both can lead to varying degrees of yield loss, ranging from 10% to more than 50%. 5) Cyclones can cause lodging, where the plants are flattened, making harvesting difficult, cyclones can lead to waterlogging, affecting root health and nutrient uptake.	photosynthesize. Hail can dislodge seeds from developing pods, resulting in yield loss. 2) Cyclones can lead to lodging, where the plants are flattened, making harvesting challenging. Also negatively affecting root health and nutrient uptake. Strong winds and heavy rain can cause physical damage to pods and stems. 3) Cyclones & hailstorms can cause varying degrees of yield loss in red gram, with percentages ranging from 10% to over 50%, depending on the severity of the cyclone.	loss of around 10% in case of Chana, steam & branches injuries, flower & pod falling also led by hailstorm. Hail can cause physical damage to developing pods, leading to pod bruising, splitting, and reduced seed quality. The percentage of yield loss in Bengal gram due to hailstorms can vary, depending on the severity and timing of the hail event. Losses can range from 10% to over 50%.	heads, resulting in the breaking of stems and damage to grain-filled heads. 3) Hail damage can lead to reduced kernel quality, affecting the market value of the wheat. 4) Hailstorm & Cyclones can cause varying degrees of yield loss in wheat, with percentages ranging from 10% to over 50%, depending on the severity of the hail storm cyclone.

(Source: KVK, Selsura, Wardha)

Chapter 5: Measures to cope with climatic variability

Recommendations of universities

Sr. No.	Climate Variability	Kharif			Rabbi	
1	**Rainfall**	**Cotton**	**Soybean**	**Tur**	**Gram**	**Wheat**
	Heavy rainfall	Seed treatment with fungicides	Increase spacing, BBF sowing, fungicide.	Trichoderma, drenching, ridges & furrow, short duration variety	BBF Sowing, seed treatment with Trichoderma	1) Short duration variety
	Low rainfall	Horizontal sowing on a slope, dead furrow, short duration variety	sowing across the slope, opening of dead furrow, short duration variety	Nipping of apical bud, horizontal sowing on a slope, dead furrow, short duration variety	Nipping of apical bud	Selection of short duration variety
	Dry spells / water stress	Application of ammonium nitrate, potassium phosphate, application of fertilizer, don't cultivation of soil, Irrigation			Foliar application of liquid nutrient. Don't Cultivation of Soil /adopt zero tillage method. Irrigation by sprinkler /drip Dug Farm Pond.	Foliar application of liquid nutrient. Don't Cultivation of Soil /adopt zero tillage method. Irrigation by sprinkler /drip Dug Farm Pond.
	Terminal drought	Spraying potassium phosphate & drenching, application of micro nutrient				
	Late onset of monsoon	Selection of late duration varieties like Supper cot, Jamgi, Prabhaat etc. Selection Climatic crop like Kabbadi, Panmga, BDN 711, 93-5 etc.			NA	NA

Sr. No.	Climate Variability	Kharif			Rabbi	
		Cotton	**Soybean**	**Tur**	**Gram**	**Wheat**
2	**Temperature condition**					
	High temperature	Selection of climatic crops like millets.	Provide protective irrigation, mulching to rabi crops and replace rabbi cropping patterns into dragon food, bear etc.			
	Cold waves/low temperature	Smogging in the field and providing irrigation to crops.				
3	**Hailstorms**	Sowing of dense and dwarf crop varieties. Use of hailnets.				
4	**Soil degradation**	Conservation tillage can reduce soil erosion and runoff, resulting in less surface loss of nitrogen. Horizontal sowing on a slope. Remove the excess water through dead Farrow. Sowing of busy, dwarf crop Variety. Take soil conservation measure like graded bunding, loose boulder, Nala Bunding. Horizontal sowing on a slope, Dead furrow, short duration variety, Nala bunding.				

(Source: KVK, Selsura)

5.1 Remedies to cope-up with climate variability:

Recommendations of universities OR division wise emergency crop planning Vidarbha region

Panjabrao Deshmukh Agricultural University, Akola has given the following measures for the districts of Amravati, Akola, Buldhana, Washim, Yavatmal, Nagpur, Wardha, Chandrapur, Gadchiroli, Bhandara and Gondia. From the point of view of agro-meteorology, Vidarbha is divided into three sub-divisions namely monsoon region, medium rainfall region and high rainfall region. All these three sub-divisions receive roughly simultaneous rainfall. The university has given some prominent recommendations for these departments at the end of the study.

1) If regular monsoon starts more than four weeks late (16th to 22nd July) crops should be planned as follows.

- Generally, ***20 to 25 Percent more seeds*** should be used. The use of chemical fertilizers should be reduced by at least 25 percent.
- Greater use of straight improved varieties should be done by reducing the area under hybrid varieties.
- Timely preventive in view of possible infestation of weevil/stem borer on sorghum; Also, immediate measures should be taken as soon as the infestation is noticed.
- Moong, urad crops should be sown as little as possible i.e. only on fallow areas and the area under these crops should be reduced.

2) If monsoon begins more than five weeks late (July 23 to 29) -

- Cotton should not be sown if possible. However, if some areas are to be sown, only straight improved varieties of indigenous cotton should be used. Seed should be sown *using 25 to 30 percent more*. The number of rows of cotton should be ***reduced to 1 or 2 rows*** of cotton.
- Do not sow jowar. If sorghum is to be grown in some areas, the seed rate should ***be increased by 30 percent***. Anticipating the possibility of a stem fly infestation in sorghum, control measures should be prepared. Seasonal risk is reduced if tur is harvested after three or six rows in sorghum.
- Soybean crop should be sown by 25th July only. Use seeds near you for sowing. Intercropping turmeric with soybeans. At this time, the number of rows of soybeans should be reduced.
- Moong and urad crops should not be sown at all.

3) For rainfall conditions with a later onset than.

- Intercropping methods should be adopted to reduce (risk) in crop production.
- Considering labor shortage, mechanization should be adopted for water conservation at the root. For this, machines are being made available on subsidy under the Agricultural Mechanization Programme.
- Care should be taken to create farms to supply water in the sensitive stage of crops. Water the crop.

- Farmers should plan the crop according to the recommendations given by the agricultural universities taking into consideration the actual onset of rain in their respective regions.

5.2 Best practice developed/followed by farmers in the district to cope with climate variability.

Farmers from the Wardha district have adopted changes in cropping pattern and agriculture technologies as following

*1. Shri. Ramesh Patil at Kanholi, Tal. Hinganghat, Dist. Wardha (**Strawberry Farming**)*

Mr. Ramesh Patil has changed cropping pattern cotton to Strawberry farming. Similarly the area of strawberry cultivation increases up to 11 acres across the district. Wardha district has temperature during winter is 21°C to 28°C which fevourable to strawberry cultivation. After production the district agriculture department has provided stalls in district level occasions and daily marketing. At present the cropping pattern is becoming popular among the farmers and they are trying to adopt it. According to the farmer this year they will earn 50 to 70 lakhs in 5-acre strawberry production.

वर्ध्याची स्ट्रॉबेरी मुख्यमंत्र्यांना भावली; म्हणाले, “माझ्या स्ट्रॉबेरीपेक्षा उत्तम...”

समुद्रपुर तालुक्यातील पाथरी येथील पाटील कुटुंब पूर्णतः शेतीत रमणारे. नव्या पिढीनेही हा वारसा आता चालविला आहे.

Written by लोकसत्ता टीम

वर्धा | December 18, 2023 12:36 IST

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वर्ध्याची स्ट्रॉबेरी मुख्यमंत्र्यांना भावली; म्हणाले, “माझ्या स्ट्रॉबेरीपेक्षा उत्तम...” (छायाचित्र – लोकसत्ता टीम)

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 Wardha 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	825	812	1140	942	600	525	2268	1963
2021	1488	1352	1290	1112	727	630	2094	1885
2022	1561	1318	1494	1281	422	348	2167	1987
Average	**1291**	**1161**	**1308**	**1112**	**583**	**501**	**2176**	**1945**

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 11.26% 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 17.66% 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 16.37% 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 18.89% compared to the control plot.

6.3 Impact of BBF and SRT on yield of crops (2022-23)

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/dribbling down up to 4-inch soil/bed and plant to plant and row to row ratio 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 Qtl. on average.

Taluka	BBF		SRT	
	No. of farmers	Area (ha.)	No of farmers	Area (Ha.)
Wardha	79	33	5	3.80
Deoli	238	257	1	0.60
Hinganghat	190	178.4	0	0.00
Arvi	657	535	9	26.5
Asti	116	92	0	0.00
Karanja	169	140	2	1.8
Seloo	42	65	1	0.4
Samudrapur	68	120.8	0	0.00
Total	**1460**	**1421.2**	**18**	**33.1**

(Source: www.ffs.mahapocra.gov.in)

6.4 Impact of Zero tillage on yield crops.

Farmer Name: Shri. Ulhas Hitkarrao Savalkar, Village Name: Choramba, Taluka: - Arvi

In project Zero tillage is an innovative activity adapted by farmers , especially in Kharif, 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.

Eg. In Arvi Subdivision in the year of 2023-24 about 30-acre area is under cultivation of zero Tillage. *Mr. Ulhas Hitkarrao Savalkar* in the year 2022-23 had cultivate pigeon pea crop on 4 acre he gets production of around 16 Qtl. in that with use of very less fertilizers and pesticides especially No intercultural operations such as weeding, hoeing etc. he almost saves 20,000 on Intercultural Operations.

शून्य मशागतीतून पिकविलेल्या तुरीचे पीक लगडले शेंगांनी

लोकमत न्यूज नेटवर्क

रोहणा : स्थानिक शेतकरी उल्हास सावळकर यांनी शून्य मशागत तंत्रज्ञानातून चार एकर शेतीत तुरीच्या पिकाची लागवड केली. कोणताही मोठा खर्च न करता सध्या ते पीक शेंगांनी लगडले असून अत्यंत कमी लागत खर्चात त्यांना एकरी १० क्विंटलच्या वर उत्पादन होण्याची आशा आहे.

शून्य मशागत तंत्रज्ञानानुसार त्यांनी सन २०२१-२२ या वर्षात खरीप हंगामात शेतात कापसाचे पीक घेतले होते ते पीक निघाल्यानंतर त्यांनी कापसाची झाडे उपडण्याऐवजी जमिनीपासून एक इंच वरून कापून घेतली. नंतर उन्हाळ्यात कोणतीच वाही न करता तसेच ठेवले. जुलै २०२२ मध्ये पूर्वीच्या कापसाच्या तासांवर तुरीची लागवड केली. सदर लागवड मागील वर्षीच्या कापसाच्या बेडंवर असल्याने अतिवृष्टीतही तुरीचे पीक जळाले नाही. दरम्यान, सदर शेतात कोणतीच मशागत न करता केवळ दोन तणनाशकाच्या फवारण्या केल्या. आता डिसेंबर २०२२ ला शेंगा पोखरू नये म्हणून एक कीटकनाशकाची फवारणी केली. सध्या हे पीक फार कमी खर्चात छान बहरले आहे.

<u>Earthworms are grown in the 2nd year zero tillage plot</u>.

6.5 Impact of Neem based extracts on yield crop

1) Reduces cost of production because all the ingredients we utilize for preparation of neem-ark and dashparni are easily available in the nature.
2) It is the best organic method to reduce insects and pests
3)By using Neem Extracts on crop survival of beneficial Insects such as Ladybird Beetle, Syrphid flies happen due to the fact that they help to reduce Insects.

Ex. In the Bodhad village of Arvi tehsil around 12-15 farmers have made dashparni ark collectively that reduces around 2 spraying of chemicals. They created 200 lit. of dashparni ark that is used for around 100 acres of cotton, pigeon pea and soybean crop. 200 Lit. of dashparni ark saves around 12000-15000 Rs. of farmers.

6.6 Impact of farm biofertilizers production on crop yield.

1) Availability of nutrients happen which are fixed into the soil.

2) Due to the availability of nutrients it reduces cost of chemical fertilizers and also reduces total cost of cultivation.
3) Now a days it is a very popular method because it increases soil activities with the help of microorganisms that may increase availability of nitrogen, phosphorus and potash majorly.
Ex. In The Panjara Gondi village Tal.Karanja. We told farmers about the biofertilizers, how it is used, its purpose and benefits. The farmers are highly influenced by that. They started using it and they got lots of benefits. Around 20-30 kg of fertilizers is reduced by using biofertilizers. Farmers start using biofertilizers especially for the seed treatment process. Around 99% farmers do seed treatment, around that about 30-40% farmers are started using the biofertilizers.

Chapter 7: Plan to cope with weather related contingencies (District: Parbhani)

(*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 (delayedonset)	**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- 1st July	Deep & Mediumdeep black soils	Bt. Cotton	No change	Normal recommended Package of Practices by Dr. PDKV, Akola	
		Cotton + Tur Intercropping	No change	Normal recommended Package of Practices by Dr.PDKV, Akola (Cotton + Pigeon pea 6:2 & Cotton+Greengram/Black gram 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/haSeed 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 rowsof 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 Imidacloprid 70 WS 7g/Kg Seed Sulphur 4g/Kg Seed	

	Shallow blacksoils	Soybean	No change	Normal recommended Package of Practices by Dr. PDKV, Akola (Test GP% Use seed rate @ 75-80kg/haSeed 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		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 / Croppingsystem**	**Change in crop / cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 weeks 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 +Tur Intercropping	Use early varieties of American /Deshi cottonvarieties No change in varieties for Pigeon pea	Use 20-25% more than recommended seed rate and reduce fertilizer dose by 25% for Cotton. Replace the hybrids with improved varieties in cotton. (American Cotton: - AKH-8828,PKV Rajat,AKH-081, Deshi 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: pigeonpea: sorghum (6:1:2:1) intercropping system.	Linkage with PDKV / MSSC NSC

		Soybean	No Change in varieties	Follow Normal Recommended Package of Practices	
		Pigeon pea	Change in variety AKT 881,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 in var.	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 3gm+ Carbendazim 1gm+*Trichoderma* 4 gm/Kg of seed	
		Green gram	Replace Green gram & Black gram by SoybeanVarieties JS-335, JS-93 -05	Follow Normal Recommended Package of Practices Seed Treatment with *Rhizobium*+ PSB (250gm each /10Kg seed + Thiram 3 gm+ Carbendazim 1 gm + *Trichoderma* 4 gm/Kg of seed	
		Black gram			

Condition	Suggested Contingency measures				
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop / Cropping system**	**Change in crop / cropping system includingvariety**	**Agronomic measures**	**Remarks on Implementation on**
Delay by 6 weeks 23-29 July	Deep to Medium deepblack soils	Bt. Cotton	Sole Pigeon pea AKT-8811, Vipula, PKV Tara,BSMR-736. Sunflower (hybrids) / sesame AKT64/ castorAKC-1,GCH-4, 5, 6& DCH-117, 32/pearl millet. PKV Raj Shradha, Saburi Pearl millet + pigeon pea inter-cropping (2:1,.4:2)	Do-	For Seed Source and Technology contact Dr.PDKV / KVK/MSSC/ NSC.
		Cotton +Tur Intercropping	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).	Do-	
		Soybean	Sole Pigeon pea AKT-8811, Vipula, PKV Tara,BSMR-736. Sunflower (hybrids) / sesame AKT64/ castorAKC-1,GCH-4, 5, 6& DCH-117, 32/pearl millet. PKV Raj Shradha, Saburi Pearl millet + pigeon pea inter-cropping (2:1, 4:2).	Do-	For Seed Source and Technology contact Dr. PDKV / KVK/MSSC/ NSC.
		Pigeon pea	Pigeon pea AKT-8811, Vipula, PKV Tara, BSMR-736.	Do-	Do-
		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 RajShradha, Saburi Pearl millet + pigeon pea inter-cropping (2:1, 4:2).	Adopt closer spacing (60x30 cm) forPigeon pea Follow *in-situ* moisture conservationmeasures	
	Shallow black soils	Soybean	Sole Pigeon pea AKT-8811, Vipula Sunflower (hybrids) / sesame AKT64/ pearl millet.PKV Raj Shradha, Saburi pearl millet + pigeon peainter-cropping (2:1, .4:2).	Do-	
		Green gram	Do--	Do-	
		Black gram	D0--	Do-	

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures		
Early season drought (Delayed onset)			**Change in crop / cropping system including variety**	**Agronomic measures**	**Remarks on Implementation**
Delay by 8 Weeks 6-12 August, 32nd MW		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)for Pigeon pea Follow *in situ* moisture conservation measures	
	Deep to Medium deep blacksoils	Cotton +Tur Intercropping	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 *in situ* moisture conservationmeasures	
		Soybean	Sole Pigeon pea AKT-881,Vipula,Sunflower (hybrids) / Sesame AKT64/ CastorAKC-1, GCH-4, 5, 6 & DCH-117, 32/pearl millet. PKV Raj Shradha, Saburi	-do-	
		Pigeon pea	Pigeon pea Varieties KV Tara, BSMR-736,	-do-	
		Sorghum (Kh. Jowar)	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) for Pigeon pea Follow *in situ* moisture conservationmeasures	
	Shallow black soils	Soybean	Sunflower (hybrids) / sesame AKT64/pearl millet. PKV Raj Shradha, Saburi,	Follow *in situ* moisture conservationmeasures	
		Green gram	Do-	Do-	
		Black gram TAU -1, 2 and AKU-15	Do-	Do-	

7.1.1.2. Early season drought (Normal onset)

Condition	Major Farming situation	Normal Crop/croppingsystem	Suggested Contingency measures		
Early season drought (Normal onset)			**Crop management**	**Soil nutrient & moisture conservationmeasures**	**Remarks on Implementation**
		Bt. Cotton			
Normal onset followed by 15-20days dry spell after sowing	Deep to Medium deepblack soils	Cotton +Tur Intercropping	Give protective irrigation wherever possible. Raise cotton seedlings in nursery & transplant at sufficient soil moisture or Gap filling to be done by pot watering 7-10 days after sowing when crop stand is less than 80%	Avoid applying fertilizer till sufficient moisture in soil.	Sowing on BBF
leading to poor germination/cropstand etc.	Deep to Medium deepblack soils	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	One hoeing	Do-
		Sorghum (Kh. Jowar)	Follow thinning to maintain optimum plantpopulation.	One hoeing. Fertilizer application at sufficientmoisture	Do-
	Shallow blacksoils	Green gram	Protective irrigation if possible.	Do-	
		Black gram	Protective irrigation if possible.	One hoeing is to be donefor conservation of soil moisture.	

7.1.1.3. Mid-season drought (long dry spell)

Condition	Suggested Contingency measures				
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 deepblack soils	Bt. Cotton	Weeding, Intercultivation to create soil mulch to 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 system Intercultivation implements/ machineries to be popularizedthrough Govt. schemes.
		Cotton +Tur Intercropping			
		Soybean			
		Pigeon pea			
		Sorghum (Kh. Jowar)			
	Shallow black soils	Soybean	-do-	-do-	
		Green gram	Intercultivation to createsoil mulch to conserve moisture. Protective irrigation if possible.	Spraying of 2 % urea or DAP.	
		Black gram			
At flowering/ fruiting stage	Deep to Mediumdeep black soils	Bt. Cotton	Protective irrigation ifpossible.	Spraying of 2 % urea orDAP.	
		Cotton + Pigeon pea Intercropping		-do-	
		Soybean		-do-	
		Pigeon pea			
		Sorghum (Kh. Jowar)			
	Shallow black soils	Soybean	-do-	Spraying of 2 % urea or DAP.	
		Green gram	-do-	-do-	
		Black gram	-do-	-do-	

7.1.1.4 Terminal Drought

Condition	Suggested Contingency measures				
Terminal drought (Early withdrawal of monsoon)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Rabi Crop planning**	**Remarks on Implementation**
	Deep to Mediumdeep black soils	Bt. Cotton	Giving life saving supplemental irrigation, if available or taking up harvest at physiological maturity with some realizable yield.	-	-
		Cotton + Pigeon pea Intercropping		-	-
		Soybean		Plan for *rabbi* season	
		Pigeon pea			
		Sorghum (Kh. Jowar)		Plan for *rabbi* season	
	Shallow black soils	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/croppingsystem**	**Change in crop/croppingsystem**	**Agronomic measures**	**Remarks on Implementation**
Delayed release of water in canals due to low rainfall	Deep to Medium deep black soils	Wheat & Chickpea	Wheat to be replaced byChickpea/ Safflower/ Mustard	Follow alternate row irrigation/irrigate at criticalstages/ Stream cutoff	Tapping of other sources of irrigation. Sprinkler Irrigation
	Shallow black soils	Chickpea	Safflower/Mustard	Do-	-do-
Limited release of water in canals due to low rainfall	Deep to Medium deep black soils	Wheat & Chickpea	Wheat to be replaced by Chickpea/Safflower/Mustard/Linseed/Sesamum	Follow alternate row irrigation/irrigate at critical stages/Stream cutoff	Tapping of other sources of irrigation. Sprinkler irrigation
	Shallow black soils	Chickpea	Safflower/Mustard	-do-	-do-
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.) (Both rainfed and irrigated situations)

Condition	Suggested contingency measure			
Continuous high rainfall ina short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post- harvest**
Cotton	Opening of field channels to removesurface ponding, Foliar spray of 2% Urea Interculture at optimum soil moisture toimprove soil aeration	Opening of field channels toremove surface ponding, Nutrient spray to arrest flowerdrop	Opening of field channels to remove surface ponding,	
Soybean				
Green gram				
Black gram				
Pigeon pea				Shifting to safer place for drying
Horticulture				
Acid Lime and 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 avoidlosses	Fungal removal followedby Washing & waxing
Heavy rainfall with high-speed winds in a short span				
Cotton	Opening of field channels to removesurface ponding. Improved drainage and drenching with	Opening of field channels toremove surface ponding, Improved drainage and drenching	Occurrence of greymildew- control by sulphur spray @ 25 g/10 lit.	Shifting to safer place for drying
	Copper oxy chloride to avoid wiltingincidence.	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.		
Soybean	Opening of field channels to remove surface ponding	Opening of field channels toremove surface ponding		Shifting to safer place fordrying
Green gram				
Black gram				
Pigeon pea				

Horticulture				
Nagpur Mandarin	Support by bamboo if < 3 years plants.	Support by bamboo if < 3 years plants. Opening of field channels toremove surface ponding,	Opening of field channels to remove surface ponding,	Fungal removal followedby Washing & waxing
Acid lime and sweet orange				
Outbreak of pests anddiseases due to unseasonable rains	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post- harvest**
Cotton	To control Jassids and Thrips spray withAcetamiprid 20 SP @ 1.5 g/ 10 lit.	Jassids and Thrips will increasespray 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.	To control semi-looper sprayNSKE 5% or quinalphos 25 EC 20 ml/10 lit.	-	-
Green gram	To control Powdery mildew penconazole 5ml or dinocap 10 ml or triadomorph 5 ml or Sulphur spray @ 30 g/10 lit. of water.	To control Powdery mildew penconazole 5 ml or dinocap 10 mlor triadomorph 5 ml or Sulphur spray @ 30 g/10 lit. of water.	-	-
Black gram	Do-	Do-	-	-
Pigeon pea	Improved drainage and drenching with copper oxy chloride @25g/10 lit of waterto avoid incidence of wilt and root rot	Improved drainage and drenching with copper oxy chloride @25g/10 lit of water to avoid incidence of wilt and root rot	-	-
Horticulture				
Mandarine Orange	To control Citrus *psylla* Malathion 50EC 10ml Or Quinalphos 25EC 10mlOr Cypermethrin 25 EC 4 ml/10 lit	To control Citrus *psylla* Malathion 50EC 10ml Or Quinalphos 25EC 10ml Or Cypermethrin 25 EC 4 ml/10 lit	Immediate harvesting	Selling
Sweet Orange	Do-	Do-	Do-	Do-

7.3 Extreme events: Heat wave / Cold wave

Extreme eventtype	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 ofantitranspirant. Mulching, Pruning ofdamaged parts	Increase the frequency of irrigation, Spraying of antitranspirant. Mulching, Prunning of damaged parts, Application of Bourdaeux 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 Bourdeux paste
Cold wave				
Horticulture	Covering with poly tunnel, floodirrigation 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 ofNAA 20 ppm + 1 % urea.	Harvesting and grading

Chapter 8: Agro meteorological Advisory

1. Importance / Need of Agromet advisory

Agromet-advisory services are the farm decisions taken in response to past, current and future weather change. Agro advisory services provide timely and accurate weather forecasts and miscellaneous agricultural operations to be carried out for better crop growth. An ultimate goal of agromet advisory is to extend and fully deploy knowledge of atmospheric and related processes to optimize agricultural production, and hence to increase profitability, decrease risk, and feed an expanding global population.

2) Forecasts or advisories generated at district level:

At Wardha district farmers refer Agro one, Government YouTube channels etc. on the other side institutions like India Meteorological Department and Agriculture Universities also provide weather forecasts for the farmers. District Agro Meteorological Unit, Nagpur Provides block level weather forecast on every Tuesday and Friday through mail, WhatsApp newspaper, radio, television etc.

3) Other sources of Agromet advisories at district level:

Farmers refer Nanaji Deshmukh Krushi Sanjivani Prakalp (NDKSP) portal and Krushi Vigyan Kendra for Block level agromet advisory at Wardha

4) Different apps/dashboard/channels/stations/means used to disseminate the information at district level:

In the era of information technology farmers refer the mobile apps to get easy access to agro met advisory like Meghdoot, Damini, Mausam, Agri Central, Kisan Suvidha, APEDA farmer connect, e-NAM, Agri Market, Digital Mandi, Krushik etc. farmer refers other farmers opinion for using this kind of advisory or forecast.

5) Utilization of Agro-met advisory by farmers in changing climatic condition:

Name of Farmer: Vrushab Gajanan Wani
Crop: Cotton
Village Arvi.
Tal. Arvi
Mobile no: 8766473742

Crop Stage	Source Of Agro Advisory	Action Taken By Farmer	Impact
Before sowing	White gold trust & YouTube	Seed treatment with fungicide, insecticide and rhizobium.	Good germination of seed above 75%. less impact of Stem fly & stem borer.
after 30 days of sowing	White gold trust & YouTube	Rihnash 20ml, refresh 40 ml and 19:19:19 spraying.	30 cm growth of plants with low infections.
after 60 to 80 days	White gold trust & YouTube	Imam, Neem-ark, sulja-boost, prichoboast 500 gm/acre drenching.	Low incidence of bollworm and white fly Trichoderma drenching help to avoid the dumping of cotton.
Harvesting	-	-	Yield increases 10 quintal/acre.

6) Sample of Agromet Advisory given by District agro Meteorological Unit

Weather Parameters	Weather Forecast (Valid for 21stOctober to 25th October 2023)				
Date	21-Oct	22-Oct	23-Oct	24-Oct	25-Oct
Rainfall (mm)	0	0	0	0	0
Tmax (^{0}C)	33.5	33.3	32.9	33.1	33
Tmin (^{0}C)	21.6	21.4	21.2	20.8	20.5
RH-I (%)	74	72	71	73	70
RH-II (%)	54	52	51	53	50
Wind Speed (km/hr)	5	5	5	5	5
PM Wind Direction	40	89	99n	27	27
Cloud cover	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy

(Source: *https://imdnagpur.gov.in/pages/agromet_main.php?adta=1126&adtb=E*)

Crop	Stage	Weather Based Agro Advisory
Forecast	-	Today's forecast for the district indicates dry weather very likely during 20 - 24 Oct 2023.
General	-	Farmers should monitor the crops for pests and diseases regularly and undertake timely plant protection measures.
Soybean	Harvesting / Maturity	It is advisable to harvest the crop at change in pod color (physiological maturity) in order to minimize the yield losses due to shattering. Complete the harvesting of matured soybean crops, ensure safe storage of harvested produce. For likely use of soybean for seed purpose in the next season, it is advised to thresh the soybean at 13 to 15% seed moisture content and at 350 to 400 RPM thresher to avoid the loss of seed germination. For storage soybean seed moisture should be 12% or less.
Cotton	Squaring / Flowering/ Boll formation	Foliar spray of 2% DAP at boll development stage is advisable for better productivity. Foliar spray of 1% urea and 1% Magnesium sulfate in the boll development stage is advisable to avoid reddening of cotton in later crop stage. Monitor for presence of pink bollworm larvae within flowers/ buds. Collect and destroy rosette flowers/ buds. If infestation is more than 10% (ETL) spray of Profenofos 50% EC @ 20 ml OR chlorpyriphos 50% EC @ 20 ml per 10 liters of water is advisable. Use trichocard 3 / acre as a parasitoid to kill the pest in the egg stage. To control above ETL infestation of aphids, jassids, thrips, white fly (10 aphids, 2-3 jassid,10 thrips10 whitefly per leaf), undertake spray of Imidacloprid 17.8% SL 2.5 ml OR Buprofezin 25% EC @ 20 ml per 10 liters of water.
Pigeon pea	Branching	Install pheromone traps @ 5/ha for monitoring of *Helicoverpa*. Monitor for presence of eggs & small larvae. Monitor for the presence of eggs and small larvae. Erect bird perches randomly in the field to encourage predation by insectivorous birds. For leaf folder remove the webbed leaves along with larvae and destroy them.
Rabi Sorghum	Sowing	Irrigated sorghum (PKV Kranti) can normally be sown by October end. Undertake seed treatment with Azotobacter + PSB (each 25 g / kg seed) and biofungicide Trichoderma @ 4 g per kg seed is advisable. Recommended fertilization for irrigated sole crop is @ 80:40:40 kg NPK/ha with N in 2 splits.

Safflower	Sowing	Complete the sowing irrigated safflower upto last week of October. Undertake seed treatment with Azotobacter PSB (each 25 g / kg seed) and bio-fungicide Trichoderma @ 4 g per kg seed is advisable.
Linseed	Sowing	Irrigated linseed (PKV-NL-260, NL-97) can normally be sown by the first week of November. Feasible intercropping systems include linseed+chickpea (4:2) or linseed+safflower (4:2). Seed treatment with Azotobacter PSB (each 25 g / kg seed) and bio-fungicide Trichoderma @ 4 g per kg seed is advisable.
Chickpea	Sowing	Irrigated chickpea (Jaki 9218, PDKV Kanchan, Vijay, Vishal, ICCV-2, and ICCV-10) can normally be sown by October end or latest by 10 November. Wilt resistant varieties include JAKI 9218, Vishal, ICCV-2, ICCV-10 etc. Maintain sowing depth of 5 cm under irrigated condition. Seed treatment with Rhizobium + PSB (each 25 g / kg seed) and bio-fungicide Trichoderma @ 4 g per kg seed is advisable. Recommended fertilization for irrigated sole crop is @ 25:50:30 kg NPK/ha at sowing. Feasible intercropping system includes chickpea+ *rabi* sorghum (6:2).
Fruit crops	-	Make tree basins of fruit crops weed free followed by recommended manuring / fertilization. For management of hasta bahar in acid lime, undertake a spray of potassium nitrate 2% at release of moisture stress. Undertake recommended manuring / fertilization as per age of orchard trees.
Vegetable	-	§ Undertake nursery sowing of onion (white onion varieties: Akola safed, Phule safed, Yashoda, Bhima Shweta; Red onion varieties: Pusa Red, Niphad 53, Agrifound light red, N 2-4-1, Arka Pragati). Undertake nursery sowing of tomato, brinjal, cabbage, cauliflower and sowing of spinach, fenugreek, radish, and carrot, dolichos bean and ivy gourd.
Livestock	-	Screening of farm livestock, draught/milch animals for diseases be considered and they be vaccinated. for foot and mouth disease (FMD). Ensure the milking cow/buffalo has adequate constant access to clean drinking water and green fodder/feed daily.

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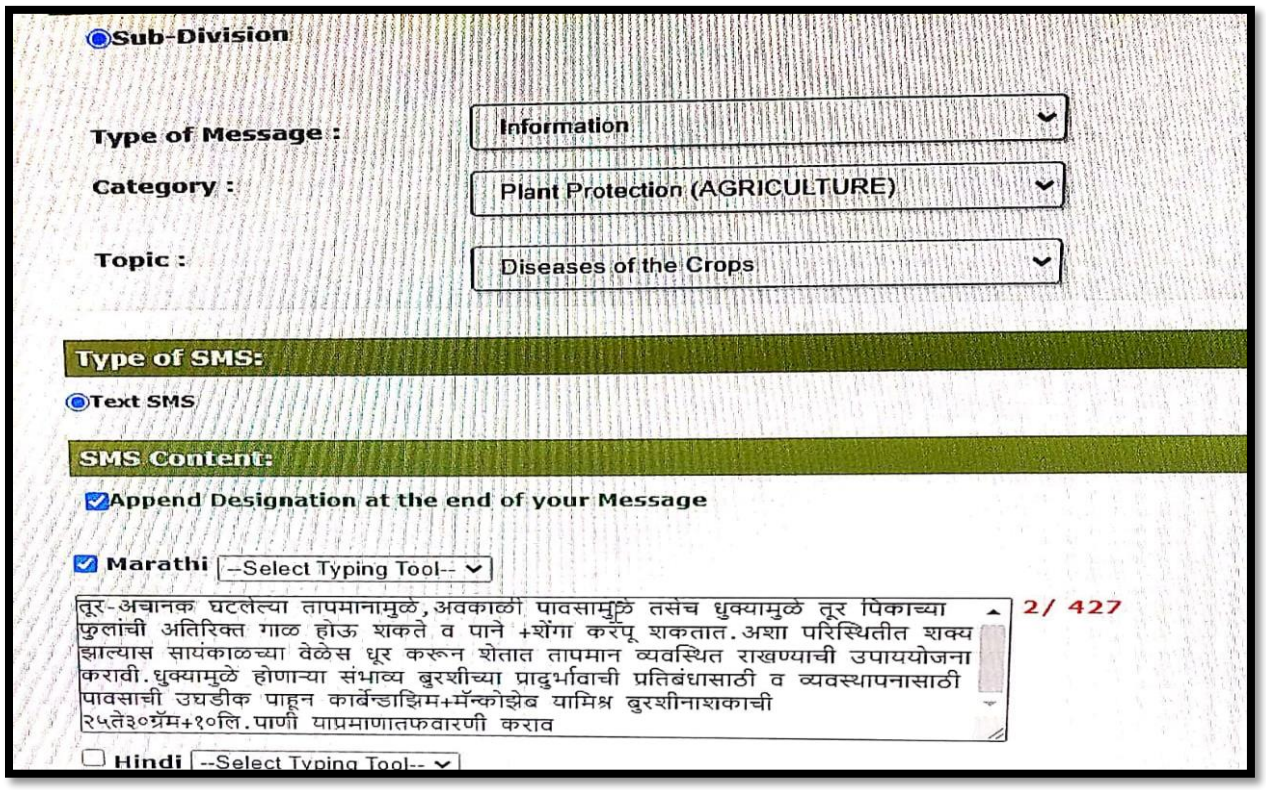
7) Advisory based on Pest surveillance activity.

7.1 Implementation Status of *CROPSAP*:

In Wardha district CROPSAP is a platform to take observations and provide advisory to farmers. The CROPSAP readings of Soybean, Cotton, Tur and Gram are collected by the Agriculture Assistant, Agriculture Supervisor, Circle Agriculture Officer, Taluka Agriculture Officer, Sub Divisional Agriculture Officer, DSAO at fixed plot and random plot on a weekly basis. as follows for a month.

Caders	No. of officers	CROPSAP readings target
District Superintending Agriculture Officer	1	22
Sub Divisional Agriculture Officer	3	78
Taluka Agriculture Officer	8	32
Circle Agriculture Officer	17	68
Agriculture Supervisor	33	66
Agriculture Assistant	168	672

Pink / American Bollworm, White Fly, Jassids, Stem Borer, Thrips these are the major pests and disease like Alternaria, leaf spot, fusarium wilt, leaf curl, bacterial blight of cotton, Yellow Vein Mosaic, Root Rot, Charcoal Rot etc. Based on the reading data sub divisional agriculture offices provide SMS to farmers as follow:



By date of 9.11.2023, 20384 farmers have received such SMS in Hinganghat subdivision. Similarly, 190667 farmers have received such SMS by all SDAO's of the district in November 2023.

7.2 Impact on Crop pests and diseases management:

a) Name of the Farmer: Anant Suresh Giri.
Village: Khairwada.
Taluka: Karanja (Gha.),
Crop Name: Soyabean

Sr. No.	Crop Stage	SMS Detail	Farmer Action	Economic Benefit
1	Before Sowing	To avoid impact of stem borer at initial stage do seed treatment.	Seed treatment done before sowing also uses biofertilizers.	Less impact occurs on stem borers. Increase germination.
2	At the time of Sowing	Showing should be done by BBF.	Sowing done by BBF method	Saves at least 3-4-kg seed

3	Vegetative Growth	For the control of sucking pest use Yellow sticky trap & pheromone trap and use 5% neemark.	Installation of Yellow sticky trap and pheromone trap.	Less impact of Yellow Mosaic Virus.
4	Pod Filling	Observation crop carefully spraying of 5% neemark.	used neemark	Reduce premature flower dropping & fruit shedding.

b) Name of the Farmer: Manoj Suresh Wagh.
Village: Rohana,
Taluka: Arvi, Crop Name: Cotton

Sr. No.	Crop Stage	SMS Detail	Farmer Action	Economic Benefit
1	Vegetative growth	Observe pest use of yellow sticky trap, use 5% neemark and pheromone trap.	Installation of yellow sticky trap and pheromone trap.	Less attack of sucking pests on cotton.
2	Vegetative growth	To prevent losses from sucking pests, use 5% neemark and Flonicamid 50WG 4gm/10 Lit. of water.	Used 5% neemark.	Reduce the cost of spraying healthy leaves throughout the season.
3	Vegetative growth	For the prevention of pink bollworm, use chioropyriphos 20%, EC 25ml or quinalphos 25% EC 25ml/10 lit of water.	Use of Chlorpyriphos 25% 25ml/10 lit. of water.	Minimized impact of pink bollworm.
4	Vegetative growth	For the prevention of pink bollworm if the losses occur 5%-10% use profenophos 15.8% 10 ml/10 lit. of water.	Used profenophos 50% 30ml/10 lit. of water.	Minimized impact of pink bollworm.

Chapter 9: Commodity wise status of Climate resilient Agriculture Value Chains

9.1 Existing marketing scenario

Agriculture in Wardha is diversified, and a wide range of crops are grown in the district. Major food grains are Wheat, Gram, Pigeon pea, among soybean, are major oilseeds while cotton is cash crop. Since the last few years Wardha district farmers are shifting to cropping patterns like Sugarcane sericulture, Strawberry, Dragon fruits etc. due to availability of market access and climate variability. Wardha district is becoming the second industrial hub in Vidarbha region.

Agriculture Produce Market Committees (APMCs)

In Wardha district there are 7 APMCs are working containing 18 sub yards.

Details of the APMCs and their arrivals are as given below.

Sr. No	APMC	Taluka	Avg. Annual Sales (00mt)	Major Commodities
1	Wardha	Wardha	348	Cotton, Gram, Wheat, Soybean
2	Sindhi	Seloo	379	Cotton, Gram, Wheat, Soybean
3	Pulgaon	Deoli	59	Bajra, Jowar, Cotton, Wheat
4	Arvi	Arvi	231	Cotton Soybean, Gram, Tur
5	Ashti	Ashti & Karanja	84	Cotton, Gram, Wheat, Soybean
6	Hinganghat	Hinganghat	1551	Cotton, Gram, Wheat, Soybean
7	Samudrapur	Samudrapur	128	Cotton Soybean, Gram, Tur

Among the APMCs in the district Wardha has the highest arrivals followed by Hinganghat and Sindi. Major Commodities marketed in the APMCs are wheat Cotton, gram, soybean and pigeon pea. Since all APMCs are at Taluka place, all are connected by reasonably good roads. Major commodities marketed in the district are Cotton, gram, Wheat, jowar, soybean and pigeon pea. Out of 7 APMCs, 4 APMCs will be developed through MACP; those are viz. Pulgaon, Sindhi, Hinganghat, and Ashti. These APMCs have been selected on predetermined criteria.

Rural Haats (RH)

Rural markets are where the action is for marketers, and haats are the best bet for companies to reach out to this burgeoning consumer segment. Haats are the nerve center of the economic, social and cultural life of villages. Producers and farmers depend on haats not only for the disposal of their produce, but also for purchase of their daily needs. Realizing the fact that marketing has a crucial role in development of rural non-farm sector and rural haats being an integral part of a rural market system, it is felt that strengthening of these haats will have a positive impact on marketing of rural non-farm products.

There are *51 rural haats* in Wardha district which are managed by gram panchayats.

Rural **Haats**	**Wardha**	**Deoli**	**Seloo**	**Hinganghat**	**Samudrapur**	**Arvi**	**Ashti**	**Karanja**	**Total**
	4	3	8	12	5	9	5	5	51

9.2 Marketable surplus of major crop:

Sr. No.	Commodity	Avg. Annual Production (00mt)	Quantity required for consumption (00mt)	Marketable Surplus (00mt)
1	Wheat	535	203	332
2	Soybean	2906	145	2761
3	Tur	639	236	403
4	Gram	1409	606	803
5	Cotton	2586	129	2457

Year wise price variation of major crops: (Prices in thousands per quintal)

Year	Wheat	Gram	Soybean	Cotton	Tur
2018-19	1692	4453	2823	4822	4020
2019-20	1828	3450	3252	5750	4228
2020-21	1879	4065	4165	5550	5313
2021-22	2070	4785	6377	8650	6550
2022-23	2145	4950	6200	8950	6780

(Source: APMC, Wardha)

9.2 Constraints in existing value chain

1. Farmers are not familiar with warehouses and e-wakhar receipts.
2. Lack of consumer-oriented value chain development.
3. Irregular production or supply in the market.

4. Lack of knowledge towards sustainability in the value chain.
5. Lack of awareness among farmers regarding banking services, rules, regulations.
6. Secondary approach towards group business activities.
7. APMC is unable to provide facilities like cleaning, grading and harvesting facilities.
8. The value chain documentation (FPC Registration, food license, export license etc.) process is complicated for rural farmers.
9. FPCs need support in every stage of the value chain.

9.3 Potential for strengthening of Commodity wise value chains

There are 86 FPCs at Wardha district out of 26 FPCs are currently inactive remaining 60 FPCs are working on livelihood activities like, Dal Mill, Cleaning & Grading, Tool-Bank, Processing Units, Vegetable Van, Godown, Vermicompost Units, etc.

9.4 FPCs contribution in Value Chain Development

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 analyzed *55 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. 9.4.1. 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 (Re Source quality)	21
Capacity Building (Re Source 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 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.

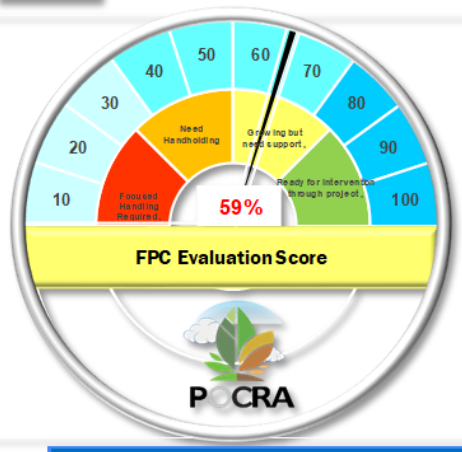
Customized FPC Evaluation Report

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

Waigaon Nipani Farmer Producer Company

Address

Waigaon Wardha ,Tq-Wardha, Dist-Wardha, Pincode- 442101

Score Report

Criteria	Max. Score	Score Obtained
Organization & Adminstration (Core Foundation Strength)	21	17
Governance (Control Systems in Place)	11	6
Management (Decision making processes)	8	8
Infrastructure (Assets and resources)	5	2
Finance (Financial base and health)	25	7
Business & Market Linkages (Resource quality)	21	16
Capacity Building (Resource quality)	5	1
Climate Resilience (Adaptability to climate risk)	4	2
Final Score	100	59

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.

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

Infrastructure

Better Financial Management can help in improving available infrastructure

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

9.5 Information about FPC Supported by SMART Project

Sr. No	Name of FPC	Type of Project
1	Kelzar Farmer Producer Company Ltd. Tq. Seloo District, Wardha	Productive Partnership for Cleaning Grading Unit
2	Krushonnati Farmer Producer Company Ltd. Waigaon Tq. Samudrapur Dist. Wardha	Productive Partnership for Waigaon Turmeric Processing Unit
3	Indrapuri Farmer Producer Company Ltd. Talegaon Tq. Ashti Dist. Wardha	Grading & Cleaning Unit Rural Warehouse
4	Damini Women Farmer Producer Company Ltd. Tq Deoli Dist. Wardha	Productive Partnership for Cleaning Grading Unit
5	Pragatshil Farmer Producer Company Ltd Arvi (Small) Tq Ashti Dist. Wardha	Productive Partnership for Dal Mill & Besan Unit
6	Wanashish Multicrop Farmer Producer Company Ltd. Kandhali Tq. Samudrapur Dist. Wardha	Productive Partnership for Dal Mill
7	Warda Shetkari Producer Company Ltd Tq Dist. Wardha	Silage / Murghas Production Unit
8	Wardha Banana Producer Company Ltd. Seloo Dist. Wardha	Oil Seeds Cleaning & Grading, Oil Milling & Cattle Feed Unit
9	Agrison Farmer Producer Company Ltd. Arvi (Small) Tq Hinganghat Dist. Wardha	Productive Partnership for Cleaning Grading Unit
10	Vidarbha Naisargik Shetmal Kisan Producer Company Ltd. Khairgaon Tq. Samudrapur Dist. Wardha	Productive Partnership for Waigaon Turmeric Processing Unit
11	Suryason Farmer Producer Company Ltd. Kandhali Tq Samudrapur Dist Wardha	Productive Partnership for Dal Mill

12	Hamadapur Tejaswi Women Farmer Producer Company Ltd. Hamadapur Tq Seloo Dist. Wardha	Productive Partnership for Cleaning Grading Unit
13	Hinganghat Cotton Agro Producer Company Ltd. Tq Hinganghat Dist. Wardha	Productive Partnership for Cleaning Grading Unit

(Source: SMART, DIU Unit, Wardha)

Nanaji Deshmukh Krushi Sanjivani Prakalp (NDKSP) Supported FPCs

Sr.No.	Taluka	Village	Name of Farmer Group	Activity
1	Samudrapur	Wagheda	Wagheda Farmer Producer Company Limited	Grain Processing Unit
2	Samudrapur	Wagheda	Wagheda Farmer Producer Company Limited	Custom Hiring Center (CHC)
3	Hinganghat	Daroda	Vartman Agro Producer Co. Ltd.	Custom Hiring Center (CHC)
4	Samudrapur	Kandhali	Wanashish Multicrop Farmer Producer Company Limited	Custom Hiring Center (CHC)
5	Wardha	Wardha	Warda Shetkri Utpadak Producer Company Ltd.	Custom Hiring Center (CHC)
6	Samudrapur	Waygaon Halda	Krishonnati Shetkari Producer Company Limited	Custom Hiring Center (CHC)
7	Samudrapur	Kora	Krushnapeth Farmer Producer Company Li.	Custom Hiring Center (CHC)
8	Arvi	Talegaon	Parnanetra Farmer Producer Company	Pulse Mill (Dal Mill).
9	Deoli	Sonoradhok	Annadata Shetkari Utpadak Producer Company Limited	Pulse Mill (Dal Mill).

(Source: NDKSP, DPIU unit, Wardha)

9.6 Details of Commodity Transacted or Facility Provided by Farmer Producer Companies at Wardha:

Sr. No.	Name of Farmer Producer Company	Taluka	Commodity Transacted	Services
1	Waifad Parisar Farmer Producer Company.	Wardha	Tur, Soybean, Gram.	Agriculture service & Input Center.
2	Wagheda Farmer Producer Company.	Samudrapur	Tur, Soybean, Gram.	
3	Krishonnati Farmer Producer Company.	Samudrapur	Turmeric.	
4	Vartaman Farmer Producer Company.	Hinganghat	Tur, Soybean, Gram.	
5	Wanashish Farmer Producer Company.	Samudrapur	Tur, Soybean, Gram.	
6	Kanhopatra Farmer Producer Company.	Samudrapur	Tur, Soybean, Gram.	
7	Madani Farmer Producer Company.	Wardha	Tur, Soybean, Gram.	Agriculture Input Center.
8	Annadata Farmer Producer Company.	Deoli	Tur, Soybean, Gram.	
9	Sant. Akaji Farmer Producer Company.	Arvi	Tur, Soybean, Gram.	
10	Samagra Farmer Producer Company.	Karanja	Tur, Soybean, Gram.	
11	Wardha Karanja Farmer Producer Company.	Karanja	Tur, Soybean, Gram.	
12	Kelzar Farmer Producer Company.	Seloo	Tur, Soybean, Gram.	
13	Parnnetr Farmer Producer Company.	Ashti	Tur, Soybean, Gram.	
14	Vidarbh Agro Farmer Producer Company.	Seloo	Turmeric.	-
15	Ranvara Farmer Producer Company.	Hinganghat	Turmeric.	-
16	Vidarbh Naisargik Farmer Producer Company.	Samudrapur	Turmeric.	-

(Source: ATMA Office, Wardha)

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 labor 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 government Programmes with extension Plan

A. ATMA (Agricultural Technology Management Agency) :

In the year 2022-23, 114 trainings with the 8360 farmers participation have been completed under the Atma in the district, including 2 trainings outside the state regarding silk industry and dairy business management, 7 trainings within the state regarding goat rearing and grain processing unit and 105 trainings within the district regarding fruit processing unit and hygiene, goat rearing and dairy business are completed. Total 68 farmers' exposure visits with the 1709 farmers participation have been organized in the Wardha district in 2022-23 including 32 within state and 36 within district.

B. *Ranbhaji Mahotsav*:

District Level Ranbhaji Mahotsav was organized on 14th August 2022 and 8 taluka levels *ranbhaji mohastav* were organized after 15 August 2023 on behalf of Maharashtra State, Department of Agriculture.

C. *Krishi Sanjivani Saptah*:

from 23st June to 1st July 2022, 40 meetings were organized in 8 talukas with the participation of 6368 farmers and guidance was given regarding preparation of Kharif season, importance of seed germination, seed treatment, soil testing, various schemes of agriculture department, precautions to be taken while handling/spraying chemical pesticides.

D. *Pradhan Mantri Pik Bima Yojana*:

Under this scheme Kharif 2022, 27095 applications enrolled including 14459 applications in Local Calamities (LC) and 27003 applications enrolled in Mid-Season Adversity (MSA). in Kharif 2022, 12908 farmers received amount 74626094/- in LC and 24737 farmers benefited by amount of 145562443/- in MSA.

E. *Vikel Te Pickel:*

In the year 2022-23, a total of 79 farmer groups / farmer producer companies are selling agricultural produce to bulk buyers / sellers / processors. In this, 15 farmer groups 162 Metric tons of their produce have been sold.

F. SMART:

16 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.

III. Monitoring mechanism for village adaptation progress.

1) Monthly review of Taluka Agriculture Officers and Circle Agriculture Officers.
2) Monthly meetings with field functionaries of all agriculture schemes.
3) Through the field farm school to give the proper guidance for farmers regarding climate resilient technologies to create sustainable livelihood opportunities.
4) 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.
5) To identify the needs and problems of farmers for effective implementation of various agriculture schemes.
6) To train extension workers, government officials, and agricultural experts to provide guidance and support to farmers in adopting mechanization.
7) Provide easy access to information about the latest trends in mechanization and government support programs through online platforms and local agricultural extension offices.
8) Encourage the formation of farmer cooperatives to jointly invest in and share machinery. This can help small farmers access modern equipment.
9) Promote the use of mechanization methods that are environmentally sustainable, such as precision agriculture and reduced chemical usage.
10) Monitor the adoption of modern agricultural technologies and machinery, such as tractors, harvesters, irrigation systems, and precision agriculture tools.

IV. Strategy for revisiting the village adaptation plan.

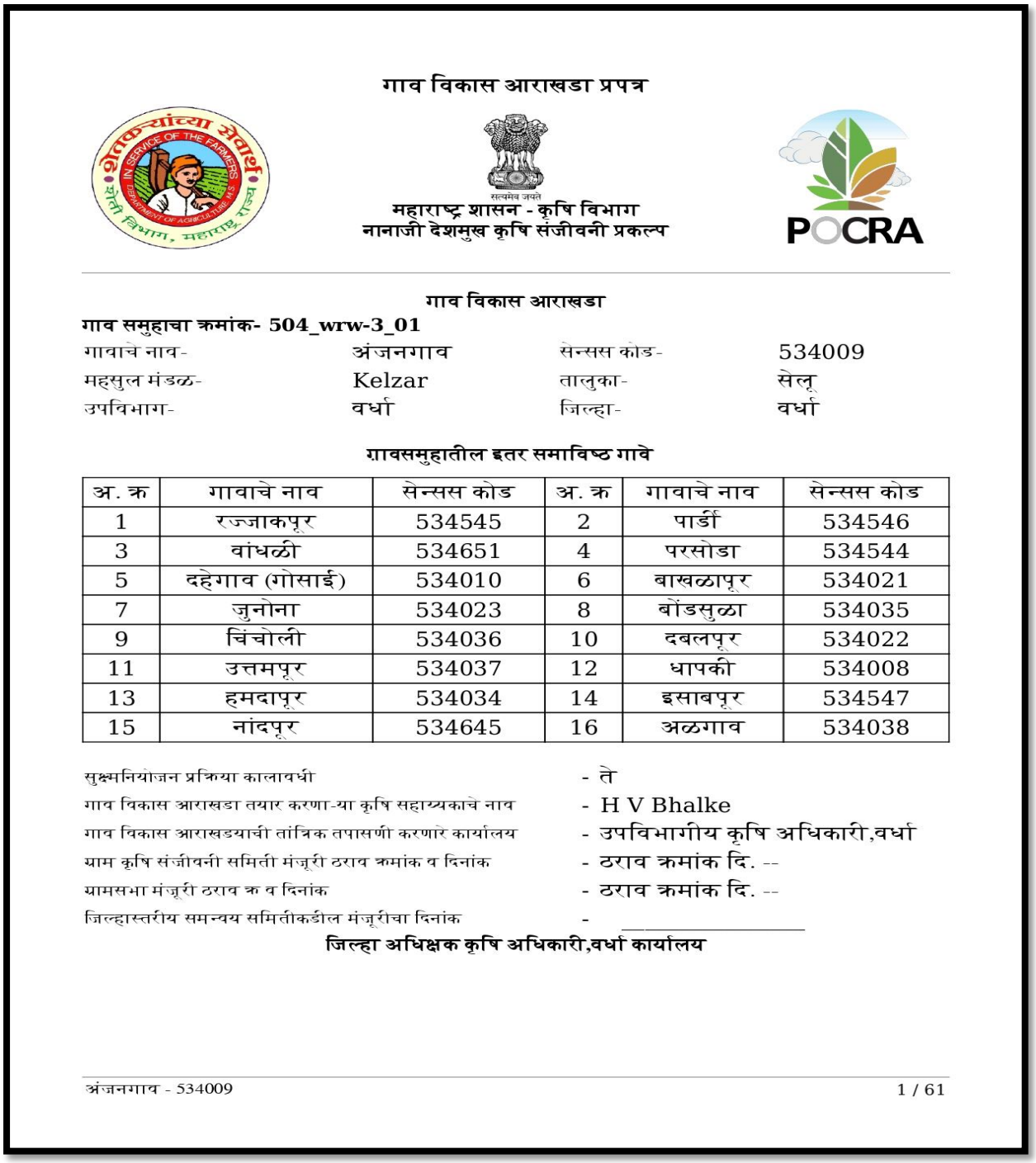
Revisiting a village adaptation plan is essential to ensure that it remains effective and relevant to the changing needs and circumstances of the communities it serves. Here's a strategy for revisiting and updating a village adaptation plan:

1. **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.

2. **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.
3. **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.
4. **Market and Value Chain Analysis**: Analyze the local and regional markets for agricultural produce. Identify opportunities to strengthen value chains, improve market access, and increase farmers' income.
5. **Resource Management**: Evaluate the sustainable management of natural resources, including water, soil, and forests. Consider strategies for resource conservation and sustainable practices.
6. **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.
7. **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.
8. **Community Participation**: Involve local communities in the planning and decision-making process. Encourage community-led initiatives and self-help groups.

ANNEXURES I (Sample Village Level Micro-Plan)

(http://mlpv2.mahapocra.gov.in/vdp.php?census_code=532132)



गाव विकास आराखडा प्रपत्र

सत्यमेव जयते

महाराष्ट्र शासन - कृषि विभाग
नानाजी देशमुख कृषि संजीवनी प्रकल्प

POCRA

गाव विकास आराखडा

गाव समुहाचा क्रमांक- 504_wrw-3_01

गावाचे नाव-	अंजनगाव	सेन्सस कोड-	534009
महसुल मंडळ-	Kelzar	तालुका-	सेलू
उपविभाग-	वर्धा	जिल्हा-	वर्धा

गावसमुहातील इतर समाविष्ठ गावे

अ. क्र	गावाचे नाव	सेन्सस कोड	अ. क्र	गावाचे नाव	सेन्सस कोड
1	रज्जाकपूर	534545	2	पार्डी	534546
3	वांधळी	534651	4	परसोडा	534544
5	दहेगाव (गोसाई)	534010	6	बाखळापूर	534021
7	जुनोना	534023	8	बोंडसुळा	534035
9	चिंचोली	534036	10	दबलपूर	534022
11	उत्तमपूर	534037	12	धापकी	534008
13	हमदापूर	534034	14	इसाबपूर	534547
15	नांदपूर	534645	16	अळगाव	534038

सुक्ष्मनियोजन प्रक्रिया कालावधी - ते
गाव विकास आराखडा तयार करणा-या कृषि सहाय्यकाचे नाव - H V Bhalke
गाव विकास आराखडयाची तांत्रिक तपासणी करणारे कार्यालय - उपविभागीय कृषि अधिकारी,वर्धा
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,वर्धा कार्यालय

अंजनगाव - 534009 1 / 61

अनुक्रमणिका

१) प्रस्तावना व पार्श्वभूमी, प्रकल्पाची गरज

नानाजी देशमुख कृषि संजीवनी प्रकल्पांतर्गत दि. च्या शासन निर्णयानुसार मौजे **अंजनगाव** ता. **सेलू** जि. **वर्धा** गावाची निवड झालेली आहे. मौजे **अंजनगाव** हे गाव जिल्हा ठिकाणापासून किमी अंतरावर दिशेला वसलेले आहे. गावाचे प्रक्षेत्र असलेल्या भागात येते. गावाचे भौगोलिक क्षेत्रफ़ळ हेक्टर आहे. गावाची सध्याची लोकसंख्या असून साक्षरतेचे प्रमाण आहे. हे गाव रीठ गाव .

मौजे **अंजनगाव** गावाचा प्रमुख व्यवसाय शेती यावर आधारीत आहे. गावात पिकाखालील क्षेत्र हे आहे. खरीप हंगामामध्ये ही पिके प्रामुख्याने घेण्यात येतात. रबी हंगामामध्ये ही पिके घेतली जातात. त्याव्यतिरिक्त ही फ़ळपिके आहेत. तर प्रामुख्याने भाजीपाला घेतला जातो. गावामध्ये उत्पादीत शेतीमालावर आधारीत **1** प्रक्रिया उद्योग आहेत. गावातील शेतीमाल विक्रीकरिता येथे बाजारपेठ उपलब्ध आहे. गावात शेती बरोबरच हे शेतीपुरक व्यवसाय आहेत. सद्यस्थितीत गावाच्या पाण्याच्या ताळेबंदानुसार **129 (कोटी लिटर)** इतका अपधाव शिल्लक आहे. गावात **शेततळे - इनलेट व आउटलेट्सह (३० x ३० x ३ मी. पर्यंत)** ही मृद व जलसंधारणाची कामे अस्तित्वात आहेत. गावात मृद व जलसंधारणाची कामे हाती घेण्यास वाव . गावात मृद व जलसंधारणाची कामे या कारणामुळे हाती घेता येणार नाहीत. गावाचे पर्जन्यमान सरासरी **2752** मि मी आहे. पडणारा पाऊस पिकांकरिता पुरेसा असतो. सर्वसाधारणपणे पावसातील घटकांमुळे शेतीचे नुकसान होते. भूजलाचे कमी प्रमाण व पाण्याची साठवण देखील कमी असल्यामुळे गावातील शेतीसाठी पाण्याचे नियोजन करणे क्रमप्राप्त आहे. लहान व मध्येम शेतक-यांची तसेच अनु. जाती/ जमातीतील आणि महिला शेतक-यांचे उत्पन्न वाढविण्याच्या उद्देशाने तसेच बदलत्या हवामानास तोंड देण्यासाठी शेतीमध्ये इ. बाबींना वाव आहे. गावाच्या या वैशिष्ठ्यामुळे गावातील शेती/ शेती पुरक व्यवसाय/ शेती आधारित व्यवसाय वृद्धींगत करता येणे शक्य आहे. गावामध्ये नानाजी देशमुख कृषि संजीवनी प्रकल्पातील बाबींचा लाभ शेतक-यांनी घेतलेला आहे.

2) गावाचा विकास आराखडा तयार करण्यासाठी राबविलेला कार्यक्रमाचा तपशील

2.1 सुक्ष्मनियोजन प्रक्रिया कालावधी

नानाजी देशमुख कृषि संजीवनी प्रकल्पांतर्गत गाव विकास आराखडा तयार करण्यासाठी लोकसहभागी पद्धतीने सुक्ष्मनियोजन प्रक्रिया दि. -- पासून दि. -- पर्यंत राबविण्यात आली. त्याचा तपशील पुढीलप्रमाणे आहे.

सुक्ष्मनियोजन दिवस	तारीख	कार्यक्रम (सुक्ष्मनियोजन तंत्र / उपक्रम)	उपस्थिती	
			महिला	पुरुष
1	--	प्रभात फ़ेरी	--	--
		संसाधन नकाशा	--	--
		संकलित सामाजिक व आर्थिक माहितीवर चर्चा	--	--
		गावातील शेती व निगडीत बाबींसंबंधी ऋतूचक्र, समयरेषा आणि परिस्थिती विश्लेषण विषयी चर्चा	--	--
		-शिवार फ़ेरी व विहीर निरिक्षण		
		-संसाधन नकाशा व अहवाल व त्यावर चर्चा	--	--
2	--	-शिवार फ़ेरी व विहीर निरिक्षण		
		लक्ष्य गट चर्चा - शेती मुल्यसाखळी, शेती परिस्थिती विश्लेषण, नैसर्गिक संसाधने व शेतीचे नियोजन ;	--	--
		शेतकरी गट/ कृषि आधारीत उद्योग/ प्रगतीशील शेतकरी माहिती	--	--
		- प्रस्तावित कामांचा मसुदा App द्वारे/ प्रिटद्वारे वाचून दाखविणे	--	--
		महिला सभा	--	--
3	--	- पाण्याचा ताळेबंद नुसार जलसंधारण कामे व पिक नियोजन आराखडा अंतिम करणे	--	--
		प्रस्तावित कामांचा मसुदा अंतिम करणे	--	--
		सामाजिक व पर्यावरणीय सुची	--	--
		ग्राम कृषि संजीवनी समिती सभा	--	--
4	--	- ग्रामसभा	--	--
		प्रस्तावित कामांच्या मसुद्यास व गाव विकास आराखड्यास मंजूरी देणे	--	--

Annexure II Sample Village Profile

(https://ffsauditlogs.blob.core.windows.net/mahapocra/scripts/pdf/pocra-village-profile-534174-2023-288.pdf)

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

अहवाल क्रमांक : **नादेकृसप्र/गामाप्र/534039/2023/354** दिनांक : 20/12/2023

ग्राम कृषी संजीवनी विकास दर्शिका

गावाचे नाव : शिवंणगांव	गावाचा सांकेतांक : 534039	ग्रामपंचायत: Aalgaon
गावाचा (प्रकल्प) टप्पा : 2	गाव खारपान मध्ये येते का ?: नाही	समूह कोड: 504_wrw-3_02
तालुका : सेलू	उपविभाग : वर्धा	जिल्हा : वर्धा

प्रकल्प कर्मचारी/अधिकारी

पदनाम	पूर्ण नाव	भ्रमणध्वनी क्रमांक
उपविभागीय कृषी अधिकारीं	DHUKE SARIKA	9960589795
तालुका कृषी अधिकारीं	RAUT RAVINDRA	8275392977
कृषी सहाय्यक	RUPNR AABASO	9403495184
समूह सहाय्यक	Walke Amol Gunwantrao	9673216276
शेतीशाळा प्रशिक्षक	Junghare Nilesh	9960109825
कृषीमित्र	Wankhede Khushal Sureshrao	9921634744
कृषीताई	Raifule Vaishali Gulabrao	9075065344

ग्राम कृषी संजीवनी समिती

पदनाम	पूर्ण नाव	भ्रमणध्वनी क्रमांक
सरपंच	Shelke Gajanan Vitthalrao	9284459860
उपसरपंच	Perkunde Madhuri Ganeshrao	7020457108
ग्रामपंचायत सदस्य	Moon Karuna Prakash	9657009130
ग्रामपंचायत सदस्य	Gedam Rajendra Manikrao	9763595148
प्रगतिशील शेतकरी	Mankar Mahadev Satwaji	8788718832
प्रगतिशील शेतकरी	Galande Pankaj Madhukarrao	8459761373
महिला शेतकरी	Gaikwad Jaishree Ravindra	9823924903
महिला शेतकरी	Naranje Ranjana Gunwanta	9011593456
महिला शेतकरी	Katlam Shalini Raibaji	8007588801
शेतकरी उत्पादक कंपनी प्रतिनिधी	Jumade Sachin Balwant	8308485482
बचत गट महिला प्रतिनिधी	Kolhe Sandhya Sureshrao	9075626067
कृषि पूरक व्यावसायिक शेतकरी	Keche Chandrashekhar Vilas	9356155643
कृषि पूरक व्यावसायिक शेतकरी	Mahabhude Sawati Vijayrao	9579836029

भौगोलिक तपशील

माहिती उपलब्ध नाही

हवामान अंदाज व पीक सल्ला

माहिती उपलब्ध नाही

वैयक्तिक लाभार्थी तपशील

नोंदणी केलेले शेतकरी - 77	अर्जांची एकूण संख्या - 136
पूर्वसंमती दिलेले अर्ज - 80	लाभ दिलेले अर्ज- 77
लाभार्थी संख्या - 29	लाभार्थी महिला शेतकरी - 6
अनुसूचित जाती लाभार्थी - 1	अनुसूचित जमाती लाभार्थी - 7
वितरीत अनुदान रक्कम - 1558634	बँकेसोबत आधार संलग्न नसलेले शेतकरी - 16

घटकनिहाय वितरित अनुदान

घटक/बाब	एकूण अर्ज	पूर्व समंती प्राप्त अर्ज	नाकारलेल्या अर्जांची संख्या	लाभार्थी शेतकरी	वितरीत केलेला निधी (रू)
Compost (Vermicompost / NADEP / Organic input production unit)	2	0	2	0	0
Drip Irrigation	4	0	4	0	0
Farm Mechanization	12	2	10	1	149500
FFS host farmer assistance / Promotion of BBF technology/ Zero Tillage Technology etc.	8	8	0	7	29200
Pipes	2	0	2	0	0
Recharge of open dug wells	9	2	7	2	23194
Seed Production	41	36	5	7	319869
Small ruminants	3	1	2	1	36938
Sprinkler Irrigation	31	23	8	22	413933
Water Pumps	10	6	4	6	86000
Well	14	2	8	2	500000
Total	136	80	52	48	1558634

कृषी व्यवसाय घटकाचा तपशील

नोंदणी केलेल्या FPC/SHG/Farmer Group ची संख्या - 1 एकूण अर्जांची संख्या - 1

पूर्वसंमती दिलेल्या अर्जांची संख्या - 1	कार्यारंभ आदेश दिलेल्या अर्जांची संख्या - 1
लाभ दिलेल्या FPC/SHG/Farmer Group ची संख्या - 1	अनुदान वितरीत रक्कम, रु. - 761394

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	1	1	1	1	761394

मृद व जलसंधारण तपशील

पावसाचे प्रमाण (मिमी) - 482.5	उपलब्ध अपधाव (TCM) - 142.36
अडवलेला अपधाव (TCM) - 2.2	शिल्लक अपधाव (TCM) - 140.16
प्रस्तावित क्षेत्र उपचार (हे.) - 225	प्रस्तावित नाला उपचार संख्या - 6
कामांची एकूण रक्कम - 61.81	तयार अंदाज पत्रकांची संख्या - 9
एकूण तांत्रिक मंजुरींची संख्या - 9	पूर्ण झालेल्या ई निविदा संख्या - 9
सुरु झालेल्या कामांची संख्या - 9	पूर्ण झालेल्या कामांची संख्या - 9
निधी वितरण केलेल्या कामांची संख्या - 8	खर्च झालेली एकूण रक्कम (रू) - 7318047

कामानुसार झालेला खर्च

उपचार प्रकार	एकूण तांत्रिक मान्यता	एकूण कार्यारंभ आदेश	एकूण पूर्ण झालेली कामे	निधी अदा केलेल्या कामांची संख्या	एकूण अदायगी (रू)
Compartment /graded bunding	3	3	3	3	894032
Construction of Cement Nala Bunds	3	3	3	3	5494581
Desilting of old water storage structure	3	3	3	2	929434
Total	9	9	9	8	7318047

पिक पद्धतींचा तपशील

माहिती उपलब्ध नाही

भूमी उपयोगिता वर्गीकरण

गावाचे एकूण भौगोलिक क्षेत्र 228.12 हे असून निव्वळ पिकाखाली त्यापैकी 89.58% क्षेत्र आहे. गावाचे भूरूप ढोबळमानाने उंचसखल/ डोंगराळ/ सपाट प्रकारचे आहे. गावातील निव्वळ पिकाखालील क्षेत्रापैकी 29.85% क्षेत्राकरिता सिंचनसुविधा उपलब्ध आहे.

अ.क्र.	तपशील		क्षेत्र (हेक्टर)
1	एकूण भौगोलिक क्षेत्र (Total Geographical Area)		228.12
2	पिकाखालील निव्वळ क्षेत्र (Net Cropped Area)		204.35
3	दुबार पिकाखालील क्षेत्र (Double Cropped Area)		90
4	एकूण लागवडीखालील क्षेत्र (Gross cropped Area)		204.35
5	एकुण सिंचित क्षेत्र (Irrigaterd Area)	हंगामी बागायत	61
		बारमाही बागायत	0
6	एकूण वन क्षेत्र (Total Forest Area)		4.97
7	कायम पड क्षेत्र (Permanent Fallow Area)		6.18
8	चालू पड क्षेत्र (Current Fallow Area)		8.41
9	गवत पड व चराऊ कुरणे (Pasture Land)		1
10	इतर पड क्षेत्र (Other Fallow Area)		6.18
11	बिगर कृषि क्षेत्र (Area put to non-Agricultural use)		1.21

पिकनिहाय क्षेत्र (क्षेत्र हेक्टर)

अ.क्र.	पिकाचा वर्ग	पिकाखालील क्षेत्र
1	तृणधान्य	0
2	कडधान्य	68
3	गळितधान्य	85
4	नगदी पिके (कापूस,ऊस)	0
5	भाजीपाला पिके	0
6	फळपिके	0
7	चारा पिके	0
8	इतर	0
एकूण		153

निरीक्षण विहिरींची पाण्याची पातळी

सूक्ष्म नियोजन आराखड्यानुसार गावतील सरासरी भुजल पातळी 10 (खोली मी मध्ये) निरीक्षण साठी निवडलेल्या विहिरीचा तपशील

अ.क्र.	पाणलोट क्रमांक	शेतकरी संख्या	भुजल पातळी स्थिती (मी)	दिनांक
1	504_wrw-3_02	107	6	--

शेतमाल निहाय घाऊक बाजारातील आवक व बाजार भाव बाबत माहीती

बाजार समिती - **सिंदी** शेतमाल - **सोयाबिन** जात/प्रत - **पिवळा**

दिनांक	परिमाण	आवक	कमीत कमी दर	जास्तीत जास्त दर	सर्वसाधारण दर
2023-12-18	क्विंटल	95	4050	4500	4400
2023-12-15	क्विंटल	117	3920	4500	4350

नजिकचे गोदाम / वखारकेंद्रा बाबत माहीती

एकूण क्षमता (MT)	उपलब्ध क्षमता (MT)	तारीख
4263	0	30/11/2023
गोदाम नाव	**ईमेल**	**दूरध्वनी**
BUTIBORI	butibori.wh@mswc.in	07104-202537

गोदामाचा पत्ता -MSWC, PLOT NO.26/4, MIDC AREA, INDORAMA ROAD, BUTIBORI - 441122

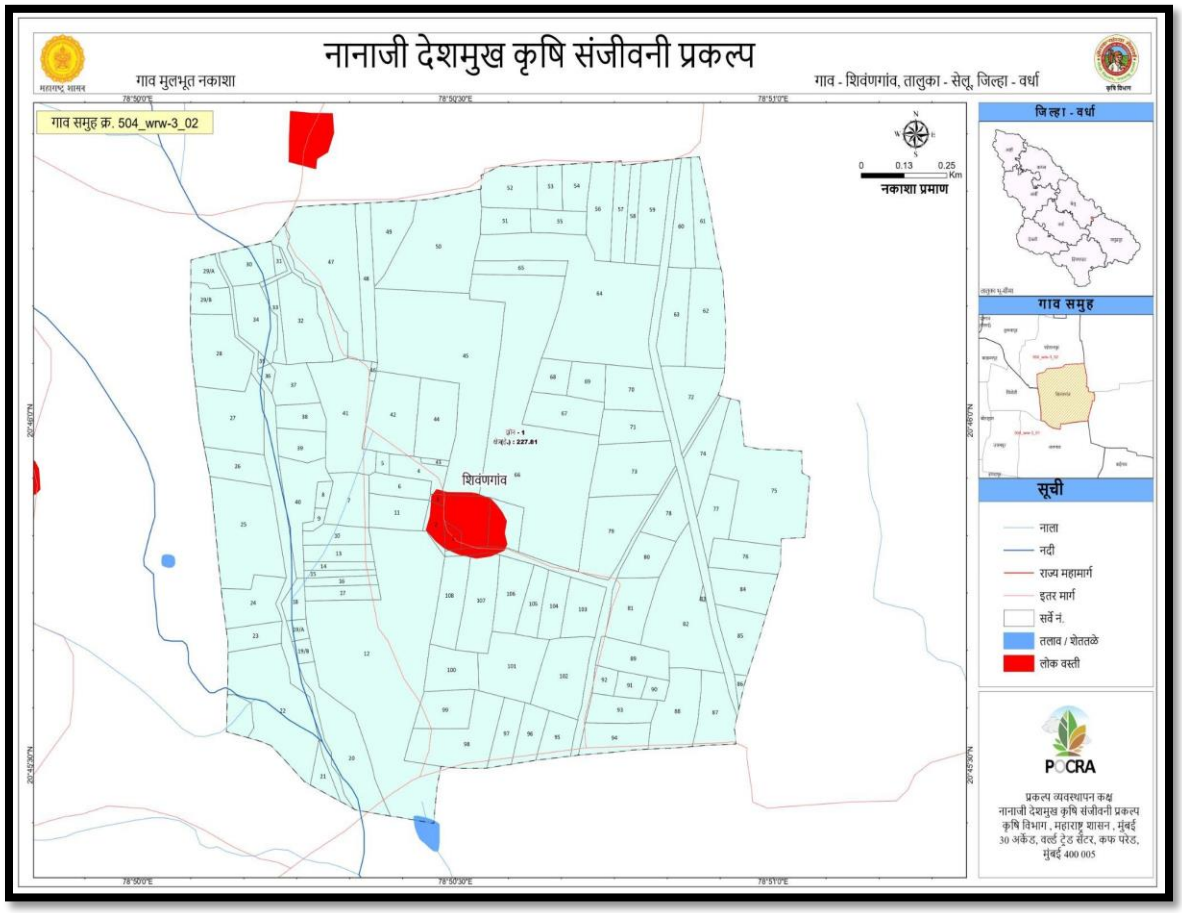
गावापासून अंतर(कि.मी.) - 20.20

Sources of Information:

1. General Census 2011
2. Agriculture Census 2010
3. PoCRA DBT Portal
4. PoCRA MLP Application
5. PoCRA FFS Application

Annexure III Sample Village Map: Tadborgaon Tq. Manwath

(https://mahapocra.gov.in/maps/BaseMap/534174.pdf)



Annexure IV (Sample Agromet Advisory)

(https://mahapocra.gov.in/home/taluka-advisories)

नानाजी देशमुख कृषि संजीवनी प्रकल्प
कृषी विभाग महाराष्ट्र शासन

Latest Updates!

0:00 / 1:00

जीआयएस डॅशबोर्ड

मार्गदर्शक सुचना मिळवण्याकरीता येथे क्लिक करा. ना.दे.कृ.सं. प्रकल्पांतर्गत गावनिहाय - गाव माहितीपत्रक, नकाशे, लाभ

कृषी हवामान सल्ला - जिल्हा: वर्धा, तालुका: सेलू

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

हा हवामान सल्ला डाउनलोड करण्यासाठी येथे क्लिक करा

			२४/१२/२०२३	२५/१२/२०२३	२६/१२/२०२३
पाऊस (मिमी)	०.०	०.०	०.०	०.०	०.०
कमाल तापमान (अं.से.)	२७.५	२८.४	२९.०	२९.७	२९.५
किमान तापमान (अं.से.)	१३.२	१३.१	१२.८	१३.१	१२.५
सकाळची सापेक्ष आर्द्रता (%)	३१	३४	३८	४०	४५
दुपारची सापेक्ष आर्द्रता (%)	१६	१८	१९	२२	२३
वा-याचा वेग (किमी / तास)	७	७	८	९	८
वा-याची दिशा	पूर्व - ईशान्य	ईशान्य	पूर्व - ईशान्य	ईशान्य	ईशान्य
ढग स्थिती (आकाश)	बहुतांश ढगाळ	बहुतांश ढगाळ	अंशतः स्वच्छ	अंशतः स्वच्छ	अंशतः स्वच्छ

मागील आठवड्यातील हवामान (महावेध कडून प्राप्त माहिती)

दिनांक	२०/१२/२०२३	१९/१२/२०२३	१८/१२/२०२३	१७/१२/२०२३	१६/१२/२०२३
पाऊस (मिमी)	०	०	०	०	०
कमाल तापमान (अं.से.)	०	०	०	०	०
किमान तापमान (अं.से.)	०	०	०	०	०
सकाळची सापेक्ष आर्द्रता (%)	०	०	०	०	०
दुपारची सापेक्ष आर्द्रता (%)	०	०	०	०	०
वा-याचा वेग (किमी / तास)	०	०	०	०	०

हवामान अंदाज

1/2

हवामान कोरडे राहण्याची शक्यता आहे. आकाश अंशतः स्वच्छ ते ढगाळ राहण्याची शक्यता. हळुवार वारा असण्याची शक्यता. तापमान १२.५ ते २९.७ अंश से. दरम्यान असण्याची शक्यता.

पीक सल्ला

गाव	पीक	पीक सल्ला
	तूर	प्रदुर्भावग्रस्त शेंगा जमा करून नष्ट करावे. शेंगापोखरणाऱ्या अळ्या वेचून नष्ट कराव्या.जाळीदार पाने जमा करून नष्ट करावे. क्विनॉलफॉस २५ % इ सी ३० मिली प्रति १० लिटर पाण्यात फवारणी करावी. - 2023-12-18
	हरभरा	कीटकांच्या प्रादुर्भावावर बारीक लक्ष ठेवा. प्रति हेक्टर ५ कामगंध सापळे उभारावे लावावेत. ५% निंबोळी अर्क फवारा - 2023-12-18
	कापूस	पिवळे चिकट सापळे लावावे आणि ५ टक्के निंबोळी अर्क फवारणी करावी किंवा फ्लोनिकामीड ५० डब्लू जि ४ ग्रॅम किंवा फिप्रोनिल ५% एससी @ ४० मिली । १०लिटर पाण्यामध्ये फवारणी करावी. हेक्टरी ५ कामगंध सापळे लावुन गुलाबी

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

हा हवामान सल्ला डाउनलोड करण्यासाठी 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.

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कृषी विभाग
महाराष्ट्र शासन

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