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

Prepared by

Agricultural Technology Management Agency(ATMA), Dharashiv

and

Project Management Unit

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INTRODUCTION

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

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

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Chapter 1: General Profile of the District

1.1 Geographical area and location of the district

Dharashiv district lies between 17° 35’ and 18° 40’N latitude to 75° 16’ and 76° 40 E longitudes. It has a geographical area of 7484.8 Sq. Kms. Dharashiv district is the southwestern part of the Marathwada Region of Maharashtra State. It is surrounded on the South by part of Solapur district and part of Gulbarga district of Karnataka State, on the North by Beed and Latur district on the east, on the west by part of Ahmednagar and Solapur districts. The average altitude of this district is 600 metres above mean sea level (MSL).

1.2 Tehsil details the number of villages

Sr. No.	Division	Tehsil Name	No. of Villages
1	Dharashiv	Dharashiv	128
2		Tuljapur	123
3	Umarga	Umarga	96
4		Lohara	48
5	Kalamb	Kalamb	98
6		Washi	54
7	Bhoom	Bhoom	96
8		Paranda	91
Total	**Total No. of villages**		**734**

There are 4 divisions in which, 8 Blocks and 734 Villages in Dharashiv district. Dharashiv tehsil has 128 villages and Lohara tehsil has 48 villages.

1.3 Demographic information of Dharashiv

Population of district is 16.58 Lacks as per 2011 census. Out of which 8.64 Lacks are Male & 7.96 Lacks are Females. Population of SC and ST is 2.74 Lacks (16.53%) and 0.31 Lacks (1.87%) respectively as per 2011 census. The growth rate of population is 2.39% per annum. Out of the total population 13.79 Lack lives in rural areas and 2.81 Lacks in urban areas. The literacy rate of the district is 76.33%. *(Source: As per 2011 census)*

Total Population of Dharashiv district

Sr. No.	Division name	Tehsil Name	Population
1	Dharashiv	Dharashiv	405736
2		Tuljapur	278879
3	Umarga	Umarga	269519
4		Lohara	116712
5	Kalamb	Kalamb	217687
6		Washi	92150
7	Bhoom	Bhoom	136745
8		Paranda	140148
Total	**4**	**8**	**1657576**

(Source: As per 2011 census)

Working and Non-working population of the Dharashiv district

District	Taluka	Total worker	Male worker	Female worker	Total non-worker	Male non worker	Female non worker
Dharashiv	Bhoom	**65535**	37981	27554	**64227**	30687	33540
	Kalamb	**99442**	60616	38826	**110477**	50093	60384
	Lohara	**47126**	30352	16774	**62473**	27184	35289
	Dharashiv	**166785**	106374	60411	**225494**	97740	127754
	Paranda	**67445**	40141	27304	**67032**	31323	35709
	Tuljapur	**111655**	72683	38972	**152591**	65372	87219
	Umarga	**95846**	66344	29502	**160146**	65772	94374
	Washi	**36404**	27301	48060	**27166**	20894	41220
	Total	**690238**	441792	287403	**869606**	3,89,065	515489

(Source: As per 2011 census)

The table presents male and female working populations, total non-working, males and females. The "Total" row aggregates the figures for the entire district. For example, in the district, there are a total of 16,57,576 residents. The total main workers in the district are 6,90,238 with

4,41,792 males and 2,87,403 females. The data provides a comprehensive overview of the population, workforce, and non-working individuals across different talukas and the entire district.

Scheduled Caste (SC) and Scheduled Tribe (ST) populations of the district

District	Taluka	Total SC population	Total ST Population
Dharashiv	Bhoom	18234	1827
	Kalamb	40327	5660
	Lohara	18278	1323
	Dharashiv	67996	13496
	Paranda	16817	1376
	Tuljapur	45386	3378
	Umarga	43869	5665
	Washi	14277	3314
Total		**2,65,184**	**36,039**

(Source: As per 2011 census)

The table provides data on the Scheduled Caste (SC) and Scheduled Tribe (ST) populations in different talukas within a district. Each line corresponds to a taluka, showing the total SC and ST populations. The last line provides the aggregated totals for the entire district, indicating a total SC population of 2,65,184 and a total ST population is 36,039.

1.4 Annual Average rainfall of the district with segregation of tehsils receiving highest and lowest rainfall

Sr. No.	Taluka	2020			2021			2022		
		Normal Rainfall	Actual Rainfall	Actual as % to Normal	Normal Rainfall	Actual Rainfall	Actual as % to Normal	Normal Rainfall	Actual Rainfall	Actual as % to Normal
1	Dharashiv	636.6	647	101.6	636.6	786.9	123.6	636.6	534.6	84
2	Tuljapur	652.9	571.6	87.6	652.9	847.8	129.9	652.9	794	121.6
3	Paranda	472.5	498.5	105.5	472.5	760.1	160.9	472.5	633.8	134.1
4	Bhum	580.6	564.6	97.2	580.6	971.3	167.3	580.6	663.5	114.3
5	Kalamb	630	657.4	104.4	630	767.9	121.9	630	577.4	91.7
6	Umarga	565.5	725.9	128.4	565.5	873	154.4	565.5	797.4	141
7	Lohara	544.1	715.1	131.4	544.1	726.3	133.5	544.1	725.8	133.4
8	Washi	641.2	632.7	98.7	641.2	939.5	146.5	641.2	639.7	99.8
Total Dharashiv		**590.42**	**626.6**		**590.42**	**834.1**		**590.42**	**670.77**	

(Source: District Superintendent Agriculture Office)

The table depicts rainfall data for different tehsils of the years 2020, 2021, and 2022. Talukas include Dharashiv, Tuljapur, Paranda, Bhum, Kalamb, Umarga, Lohara, and Washi. The data consists of normal and actual rainfall, along with the percentage deviation from normal for each year. The last row aggregates total values for Dharashiv. Positive percentages in the "% To Normal" column indicate above-average rainfall, while negative values suggest below-average rainfall. For instance, in 2022, Dharashiv received 84.0% of its normal rainfall, indicating a below-average year.

1.5 Max. and Min. temperature of the district

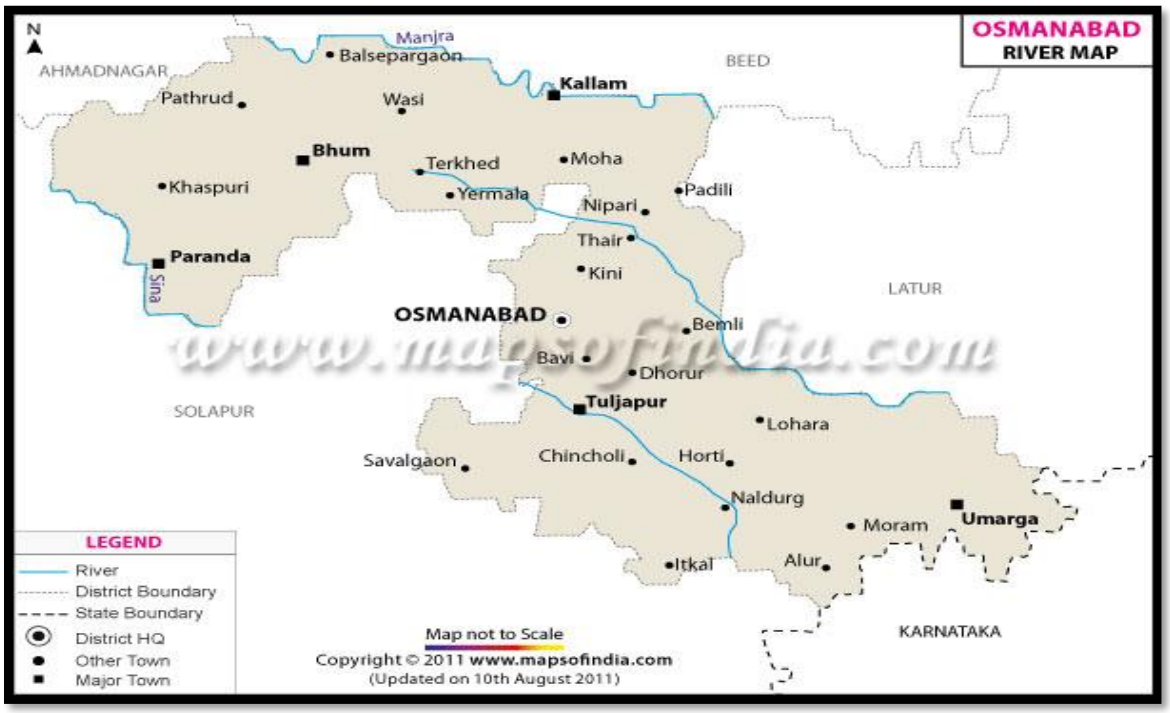
Sr. No	Name of Taluka	Temperature	
		Min ºC	Max ºC
1	Dharashiv	10.5	43.0
2	Tuljapur	11.0	42.0
3	Umarga	10.5	43.2
4	Lohara	11.0	42.0
5	Bhoom	12.0	41.0
6	Paranda	11.0	43.0
7	Kallam	10.5	42.0
8	Washi	11.0	42.0
District- Dharashiv		**10.7**	**41.5**

(Source: Agriculture Commissioner Website http://maharaub.gov.in/ Metrology Dept)

The table provides meteorological data for various talukas in the Dharashiv district. The average of minimum and maximum temperature of the district ranges from 10.7ºC to 41.5 ºC.

1.6 River network in the district

All rivers in Dharashiv District are tributaries, Manjara is tributary of Godavari and Terna is tributary of Manjra in Dharashiv district. Bhogavati, Benetura, Sina, Bori, Chandani rivers are tributaries of Krishna. *(Source - www.mapsofindia.com)*



1.7 Irrigation potential of the district

In Dharashiv Agriculture Economy can be achieved by supply of water for different purposes. Most part of the district is draught prone, so along with the implementation irrigation schemes, need to conserve existing water and recharge it. To increase the water availability, ground water table and irrigation capability, only the Dug well is the most viable option for the ground water development. As the area is facing acute rainfall since many years, Micro Irrigation Methods like Drip irrigation, Sprinkler irrigation, Subsurface irrigation etc. techniques need to be adopted. In Deccan Basaltic areas, structures like check dams, gully plugs, percolation tanks, nala bunds etc. are most favourable structures for the artificial recharge. The existing ponds, old wells and water bodies need to be rejuvenated which can act as water conservation structures. *(Source- International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056)*

1.8 Different types of soils of the districts

The various types of soils found in the Dharashiv district. Soils of the district are classified into four groups, on the basis of depthness and spread, are as follow

I) Shallow Soils - These soils are located mostly in the north-east part of the district. These soils are light brown to dark grey brown in colour, loamy to clay loam in texture with granular to sub angular blocky in structure. It has been seen that the soils are deficient in nitrogen and organic matter contents and will give better yields on the application of the same with provisions of adequate water-supply.

II) Medium Soils - These soils are found near Washi, Bhoom and eastern part of Paranda, southern part of Tuljapur, Umarga and Dharashiv Tehsil. The soil is clay loam to clayey in texture with subangular blocky to blocky in structure with dark brown to dark grey brown in colour.

III) Medium Deep Soils - These types of soils are scattered in the northwest and northern areas and also eastern parts of the north central zone in the district. The soils are clay loam to clayey in texture and granular to sub angular blocky in texture and the lower zones of the profile show angular blocky to massive structure also. The soil colour varies from dark grey brown to very dark brown. The organic matter contents are fair to moderate ranging round

IV) Deep Soils - These soils are generally seen in the south-central zone in the district and in the river valleys of Terna and Manjra. However local deep soils are also seen in south-west, north-central and south-central portions and in some other local patches also. The soils are clayey in texture and subangular blocky to blocky in texture. The lower zones of the profile show compact to massive structure. The colour varies from dark grey brown to very dark.
(Source: ATMA, SREP 2019, Dharashiv District)

Table No.1.8. a - Information on Soils of Dharashiv District (Ha)

Sr. No	Name of the block	Black Soil		Red Soil		Sandy Soil		Sandy Loams		Other Soil		Total (Ha.)
		Area (Ha.)	%	Area (Ha.)	%	Area (Ha.)	%	Area (Ha.)	%	Area (Ha.)	%	
1	Dharashiv	45809	34	66539	50	711	0.5	13514	10	6042	4	132615
2	Tuljapur	16270	11	111019	77	190	0.1	15270	10	851	0.5	143600
3	Umarga	78907	84	4527	4	145	0.1	7635	8	2411	2	93625
4	Lohara	40945	77	7669	14	340	0.6	2350	4	1566	2	52870
5	Bhoom	17810	20	64626	72	817	0.9	4839	5	566	0.6	88658
6	Paranda	65270	80	8261	10	610	0.7	6810	8	49	0.06	81000
7	Washi	22890	33	30635	44	771	1	7600	11	6762	9	68658
8	Kalamb	76288	87	4823	5	635	0.7	5015	5	701	0.8	87462
Total		364189	53.25	298099	34.5	4219	0.5	63033	8	18948	2.37	748488

(Source: District Superintending Agriculture Office)

Maximum about 53.25 % of black type soils followed by red soils about 34.5% and then sandy loams 8%, sandy soils are about 0.5 % and other types of soils are about 2.37 %, total 748478 hectares of area covered by different types of soils in the district.

1.9 Different zones according to prevailing agro-ecological situations

Dharashiv district is divided into six prominent agro-ecological situations on the basis of the soil types, rainfall, topography and irrigation. The description of each agro ecological situation, its coverage in different blocks are given below. The characteristic features of the agro-ecological situations are described below

AES I – Excellent resources with irrigation

The average rainfall in this situation is between 750 to 700 mm and the soils are heavy with very good water retention capacity. The important food grain crops grown are Kharif Jowar, Rabbi Jowar, Wheat. Sugarcane is the main cash crop in this AES. Soyabean, Tur, Udid, Cotton Gram are other major cash crops.

AES II – Moderate resources with irrigation

The soil in this situation is black, laterite and alluvial. The average rainfall in this situation is 650 mm. The important crops grown in this situation are Kharif Jowar, Rabbi Jowar. Other crops grown are Soyabean, Tur, Udid, and maize.

AES III – Poor resources with irrigation

This agro ecological situation is found in the eastern part of the district and extends to Umarga, Dharashiv, Tuljapur, Washi & Kalamb.

The average rainfall in this situation is 700 mm. Wide range of crops are grown in Kharif and Rabbi. The major crops are Soybean, Tur, Jowar, Wheat, Sugarcane, Udid and Gram.

AES IV Excellent resources without irrigation

This agro ecological situation is identified in Tuljapur, Dharashiv, Umarga, and Lohara Tahsils. The soil in this situation is fertile. Irrigation facilities were found very inadequate in this situation. This situation is under a rainfed area. Major crops grown in this situation are Soyabean, jowar, bajra, Udit and Gram

AES V – Moderate resources without irrigation

This situation was found in Bhoom, Tuljapur, Dharashiv, Washi Paranda and Kalamb. The representative village identified to study this situation was village Dharur in Dharashiv. The average annual rainfall here is 650 mm. The major crops grown in this area are Kharif Jowar, Tur, Soybean Udid and Bajra.

AES VI – Poor resources without irrigation

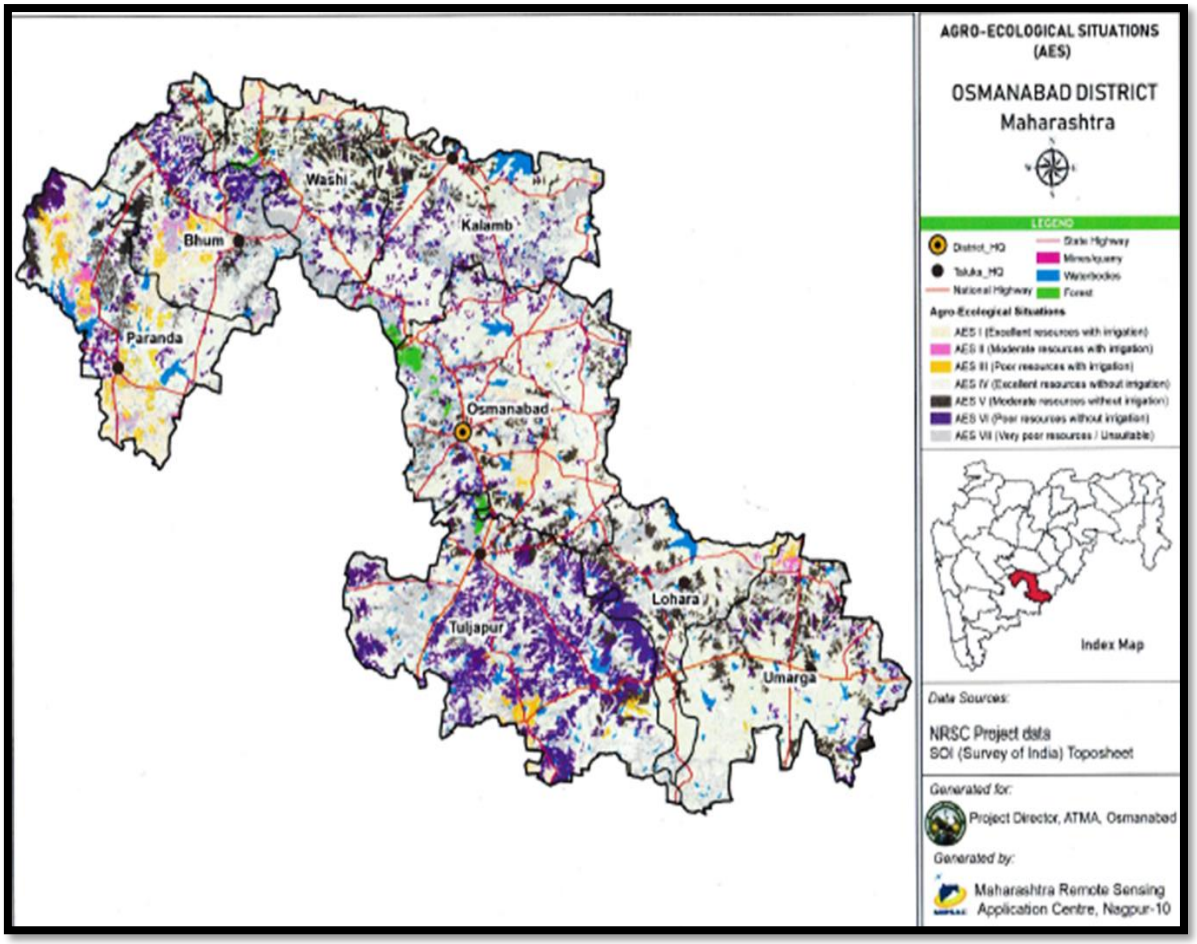
This is a very prominent agro-ecological situation which is extended in Tuljapur, Paranda, Bhoom, Dharashiv, Umarga, Lohara, Kalamb Washi Tehsils. The average annual rainfall in this situation is 700 mm. Wide ranges of crops are grown in Kharif and Rabbi season. An irrigation facility is inadequate.

AES VII– Very Poor resources without/ Unsuitable

The average rainfall in this situation is 650 mm. This type of situation is found in Lohara, Bhoom, washi and Tuljapur block. Soil in this situation is not fertile. Irrigation facilities are inadequate. Crops grown in this type of situation are jowar, Tur, and Udid.

(Source:ATMA SREP,2019, Dharashiv)

Map of different prevailing Agro-ecological situations of Dharashiv district



Chapter 2. Agriculture Profile of the District

2.1 Land use classification of the district

2.1. a Forest land, barren and uncultivable, cultivable waste land etc.

Sr. No.	Block	Total Geographical Area (Ha.)	Cultivable Area (Ha.)	Cultivable Waste Area (Ha.)	Current fallow Area (Ha.)	Forest Area (Ha.)	Pasture Area (Ha.)	Land put to non-Agriculture Area (Ha.)	Land under misc. Plantation Area (Ha.)	Barren & unculturable land (waste land) Area (Ha.)
1	Dharashiv	132615	123005	1260	2016	2000	0	2700	0	1354
2	Tuljapur	143600	126147	5025	4459	1708	0	2215	0	3846
3	Umarga	93625	79646	4851	3769	1074	0	715	0	2670
4	Lohara	52870	45950	1936	2058	226	0	500	0	1420
5	Bhoom	88668	77275	1480	1758	783	0	2300	0	1610
6	Paranda	81000	63393	2419	5896	0	0	3990	0	4902
7	Kalamb	87452	80339	1087	2856	498	0	1325	0	1035
8	Washi	68658	51414	5840	5760	411	0	350	0	4783
	Total	748488	647169	23898	28572	6700	0	14095	0	21620

(Source: District Superintending Agriculture Officer, Dharashiv)

Out of total geographical area of the district about 647169 Ha. area is cultivable area available for different cultivations, out of which 23898 Ha. is cultivable waste land, current fallows are 28572 Ha. area under forest is 6700 hectares, non-agriculture land area is 14095 hectares. The area do not found under pastures land and miscellaneous plantation category.

2.2 Agriculture land holdings- its distribution according to land sizes

Sr. No	Block	Marginal Below 1.00 ha		Small 1.00 to 2.00 ha		Other/above 2.00 ha		Total		Average size/holding(ha)
		No. of holding	Area (Ha.)	No. of holding	Area (Ha.)	No. of holding	Area (Ha.)	No. of holding	Area (Ha.)	
1	Dharashiv	22752	12149.2	26580	34614.8	18270	68112 41	67602	114876	1.70
2	Tuljapur	23193	11217.7	24490	35496.7	20710	79787	68393	126501	1.85
3	Umarga	22042	10036.5	21176	29476.1	14090	50303.3	57317	89816.2	1.57
4	Lohara	8704	4484.96	10263	14049 47	9025	31837 21	27992	50371.6	1.80
5	Bhoom	17932	8649.41	13267	19195.5	12140	47287 78	43339	75132.7	1.73
6	Paranda	23988	12789 93	16115	22455.9	14196	43730 02	54299	18975.8	1.45
7	Kalamb	2571 3	12794	20394	2550963	12847	17375.4	5895 4	85679.4	1 45
8	Washi	13937	5500.09	9108	11419.8	9054	35919.3	32099	52839.2	1.65
	Total	132548	64831	141393	2703621	110332	103385	351041	614192	1.67

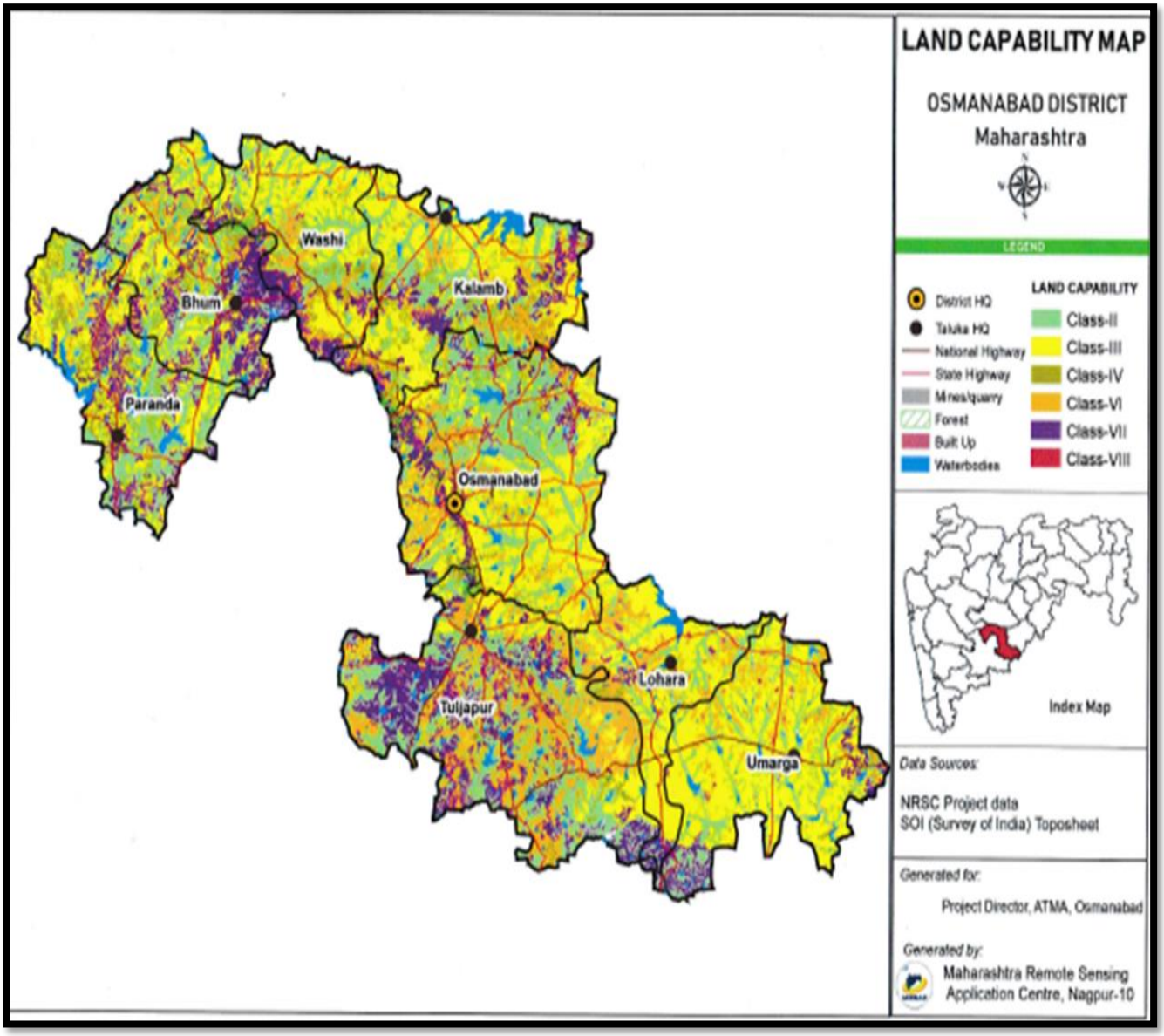
(Source: District Superintending Agriculture Officer, Dharashiv)

The distribution of agricultural land holdings plays a pivotal role in understanding the agrarian landscape, providing valuable insights into the demographics of farmers and the overall health of rural economies. In the presented data, the land holdings are categorised into three main segments: Marginal (below 1.00 ha), Small (1.00 to 2.00 ha), and Other/Above 2.00 ha.

Analysing the data across various blocks in the region reveals a nuanced picture. In the Dharashiv block, for instance, the majority of holdings fall into the 'Other/Above 2.00 ha' category, showcasing a concentration of larger land parcels. This pattern is mirrored in Tuljapur, Lohara, Bhoom, and Kalamb blocks, emphasising the prevalence of larger landholdings in these areas. Conversely, Umarga and Paranda blocks exhibit a more diverse distribution, with significant proportions of both marginal and small land holdings. This diversity suggests a varied agricultural landscape, potentially accommodating a mix of crop types and farming practices. The average size/holding across blocks ranges from 1.45 Ha to 1.85 Ha, indicating a relatively balanced distribution of land sizes in the region.

The cumulative district total paints a comprehensive picture of the agricultural scenario, with the largest number of holdings falling in the 'Other/Above 2.00 Ha category. Despite this, the average size/holding across the district remains relatively low at 1.67 Ha., reflecting a landscape where both small and large landholders coexist.

Land use and land capability map



(Source: SREP, 2019 ATMA, Dharashiv)

2.3. Table Irrigation and Water lifting facility in Dharashiv District

Sr. No	Block	Irrigation Facilities (Nos.)									Agril Pumps (Nos.)	
		Large Project	Medium Project	Micro Irrigation		Percolation tank/Village Ponds	Kolhapuri Bandharas	Storage Dams	Lift Irrigation Schemes	Open Dug Wells	Diesel Pumps	Electric Pumps
				State level	Local Level							
1	Paranda	1	4	4	3	112	7	67	0	17670	66	18291
2	Bhoom	0	3	9	3	68	0	90	0	2911	28	13222
3	Vashi	0	0	9	1	19	0	27	0	2411	60	9971
4	Kalamb	0	1	10	1	56	10	92	0	7588	80	23759
5	Dharashiv	0	3	32	7	75	17	98	0	3175	1580	35034
6	Tuljapur	0	4	63	11	111	16	101	0	-	-	21134
7	Lahara	1	0	11	0	24	2	54	0	1955	-	11316
8	Umarga	0	3	30	2	36	1	155	0	7620	75	14237
District Total		2	18	168	28	501	53	684	0	43330	1889	146964

(Source: ATMA SREP,2019 Dharashiv)

In the district there are 2 large projects and 18 medium irrigation projects and 168 state level and 28 of local level projects, 501 percolation tanks, 53 Kolhapuri type Bandharas, 684 storage dams, 43330 open dug wells and 1814 diesel pumps and 146964 are electric pumps in the district, no lift irrigation scheme found in the district. In Tuljapur tehsil no open dug and diesel pumps found and in Lohara tehsils no diesel pumps found.

2.4 Type of crops grown, cropping pattern, cropping intensity and farming systems.

Cropping Pattern of Dharashiv district:

The main crops in the district are Soybean, Tur, Maize, Rabbi Jowar, Wheat, and Groundnut. Cash crops like Sugarcane, Cotton, and Fruits such as grapes, mango, pomegranate and fig are also grown in some parts of Dharashiv, Umarga, Kalamb, Bhoom and Tuljapur blocks. The major cropping season in the district is Kharif and Rabbi.

Earlier the district was leading in groundnut production. Black gram, hybrid Jowar, sunflower, Tur and Rabbi Jowar were the other important crops in the district. In recent years this has been changed, the area under new crops such as soybean, cotton, fruits, vegetables, onion and sugarcane has been increased. Cropping intensity of Dharashiv district is 129 %. Different types of farming systems found in the district like agriculture + Livestock rearing (Cows, Buffalos raising, Goatery, Poultry etc.); Field Crops + Horticulture + Silviculture; Agriculture + Silvi-Pastoral etc.

Crop Rotations

Historically (Early seventies) the district was leading in groundnut production. The Kharif groundnut followed by Rabbi Jowar in the next year was the common pattern. Due to the population pressure and introduction of newer techniques the traditional pattern has changed. Area under Paddy (rice) has also reduced during the last twenty years; traditionally Kharif paddy followed by Chana (Gram) in Rabbi was a common practice.

In recent years this has been changed to sugarcane because of availability of irrigation facilities, setting up of sugar co-operatives and comparatively good economic returns from sugarcane. In light soils Kharif is the main season. Tur, Jowar, Niger, Minor millets and moth beans are the main crops.

In heavy soils double cropping is followed, Black gram (Urad), or Soyabean in Kharif followed by Rabbi Jowar, Gram or Wheat is a common practice. In Paranda and Umarga block Safflower cultivation was predominant which is now diminishing due to fewer returns to the farmers. Similarly, Rabbi Jowar and Gram or Safflower is practised in deep soils. In recent years the sole crop of soybean in Kharif followed by Rabbi Jowar or gram is being extensively practised across all the blocks. Cotton is cultivated in parts of Bhoom, Paranda, Washi and Kalamb blocks. This is mainly due to better returns per acre compared to cultivation of food crops such as Kharif Jowar, Urad and Tur.

Details on Crops and Cropping System in Dharashiv District Area in 00' Ha. *(Year 2022)*

Block	Tuljapur		Dharashiv		Paranda		Bhoom		Washi		Kalamb		Umarga		Lohara	
Season	**kharif**	**Rabbi**	**kharif**	**Rabbi**	**kharif**	**Rabbi**	**kharif**	**Rabbi**	**kharif**	**Rabbi**	**kharif**	**Rabbi**	**kharif**	**Rabbi**	**kharif**	**Rabbi**
Crop	Soybean	Jowar	Soybean	Jowar	Tur	Jowar	Cotton	Jowar	Soybean	Jowar	Soybean	Jowar	Tur	Jowar	Soybean	Jowar
Area (Ha)	248	499	500	368	73	268	83	245	124	70	372	189	154	240	86	62
Crop	Tur	Gram	Jowar	Gram	S. Cane	Gram	Soybean	Wheat	Cotton	Gram	Cotton	Gram	Soybean	Gram	Tur	Gram
Area (Ha)	225	117	84	222	38	37	73	38	82	73	71	274	134	165	88	60
Crop	Maize	Wheat	Tur	Wheat	Cotton	Wheat	Tur	Gram	Tur	Wheat	Tur	Wheat	Udid	Safflower	Udid	Wheat
Area (Ha)	120	86	113	74	29	38	58	37	31	26	76	150	131	63	57	22
Crop	S. Cane	Safflower	S. Cane	Safflower	Maize	Maize	Udid	Maize	Maize	Maize	Udid	--	Jowar	Safflower	Jowar	--
Area (Ha)	59	73	48	32	27	17	41	17	23	15	45	---	98	54	38	--
Cropping Systems	1.Jowar -Tur - Soybean; 2.Tur- Soybean and Jowar; 3.Tur and wheat		1.Soybean and Jowar; 2.Tur and wheat; 3. Soybean -Tur		1.Soybean and Jowar; 2.Tur and wheat; 3. Soybean -Tur		1.Tur and Gram; 2. Maize and Gram; 3.Tur and wheat.		1.Udid and Jowar; 2.Cotton and Gram; 3. Soybean and Jowar; 4. Maize and Gram.		1.Udid and Jowar; 2. Cotton and Gram; 3. Soybean and Jowar; 4.Maize and Gram;		1.Jowar and Gram; 2. Soybean and Jowar; 3.Udid and Jowar.		1.Jowar and Gram; 2. Soybean and Jowar; 3.Udid and Jowar.	

(Source: District Superintending Agriculture Officer, Dharashiv)

Table shows cropping systems present in the kharif and rabbi seasons in the district, crops grown and its area of 8 tehsils, in Tuljapur cropping pattern is Jowar-Tur-Soybean grown or tur- soybean and Jowar is grown, Tur and Wheat is grown after Tur in rabbi. In Tuljapur, Dharashiv and Paranda tehsils cropping pattern is more or less same, in Bhum, Washi, Kalamb and Umarga tehsils Udid, Maize and Grams crops are taken along with Jowar, Cotton and Soybean. In Lohara Jowar- gram or Soybean-jowar or Udid-Jowar are taken in rabbi.

2.5 Year wise area, production and productivity of major crops for the last 5 years.

(Area in hectare, productivity in kg/hectare, production: 00' Metric ton)

Sr No	Crop	2018-19			2019-20			2020-21			2021-22			2022-23			Average		
		Area	Production	Productivity	Area	Production	Productivity	Area	Production	Productivity	Area	Production	Productivity	Area	Production	Productivity	Area	Production	Productivity

6	Mung	279	88	314	424	111	261	251	178	709	199	149	750	103	69	666	251	119	540
7	Udid	572	205	358	168	56	333	556	411	740	564	443	786	389	254	652	450	274	574
8	Groundnut	65	25	388	23	14	589	30	20	669	20	17	843	12	10	850	30	17	668
9	Sunflower	29	4	130	18	4	216	10	4	409	3	1	322	1	0	372	12	3	290
10	Sesamum	26	1	47	12	1	85	8	1	95	4	1	159	2	0	0	10	1	77
11	Soyabean	2890	1624	562	3388	3600	1063	3746	6282	1677	3841	4071	1060	4469	5050	1130	3667	4126	1098
12	Khurasani (Niger)	8	0	52	5	0	100	2	0	180	1	0	190	1	0	0	3	0	104
13	Cotton	203	16	81	115	10	87	92	26	284	32	5	167	20	5	240	92	13	172
14	Sugarcane	572	29172	51	218	11772	54	293	14650	50	542	29.268	54	743	40	54	474	11133	53
Total Kharif		**5824**			**5404**			**6015**			**6022**			**6240**			**5881**		

Crop		2018-19			2019-20			2020-21			2021-22			2022-23			Average		
		Area	Production	Productivity	Area	Production	Productivity	Area	Production	Productivity	Area	Production	Productivity	Area	Production	Productivity	Area	Production	Productivity
Rabbi																			
1	Jowar (R)	1145	894	781	1789	1635	914	1683	2609	1550	1488	1951	1311	1461	1979	1354	1513	1814	1182
2	Wheat	196	180	920	308	295	956	339	521	1536	301	395	1311	323	507	1567	293	379	1258
3	Maize	81	62	773	81	105	1293	83	135	1625	72	83	1156	63	81	1289	76	93	1227
4	Gramh	869	428	493	1968	1625	825	2058	2221	1079	2341	2170	927	2519	2364	938	1951	1761	852
5	Safflower	78	46	592	55	29	523	52	30	569	40	30	743	49	38	772	55	34	640

2.6 Other Facilities

Sr. No.	Type of facility	No/Area	Capacity
1	Seed Farms	6	600 Quintals
2	Agro Processing	57	
	i) Sugar Factory	12	3.8 Million tones
	ii) Seed Processing	1	12000 Quintals
	iii) Dal Mill	9	50000 Quintals
	iv) Oil Extraction	12	12000 Quintals
	v) All Other	21	22000 Quintals
3	Nurseries	10	5,00,000 Saplings
4	Warehouses	30	19860 MT
5	Cold Storage	2	50 MT
6	Pre-Cooling	1	25 MT
7	Veterinary Dispensary	40	1,20,000 Animals per year.
8	Agricultural Polyclinics	5	2000 Animals per year
9	Soil Water Testing Lab	2	2400 samples per year
10	Research stations	1	Research and extension
11	Training Institutes	6	50 Programs
12	PACCs	469	3 lakh members
13	Krishi Vigyan Kendra	1	Research and extension
14	Agricultural college	1	Education
15	Agro service centres	514	Selling of Agri inputs
	Total	**686**	

(Source-District Superintending Agriculture officer, Dharashiv)

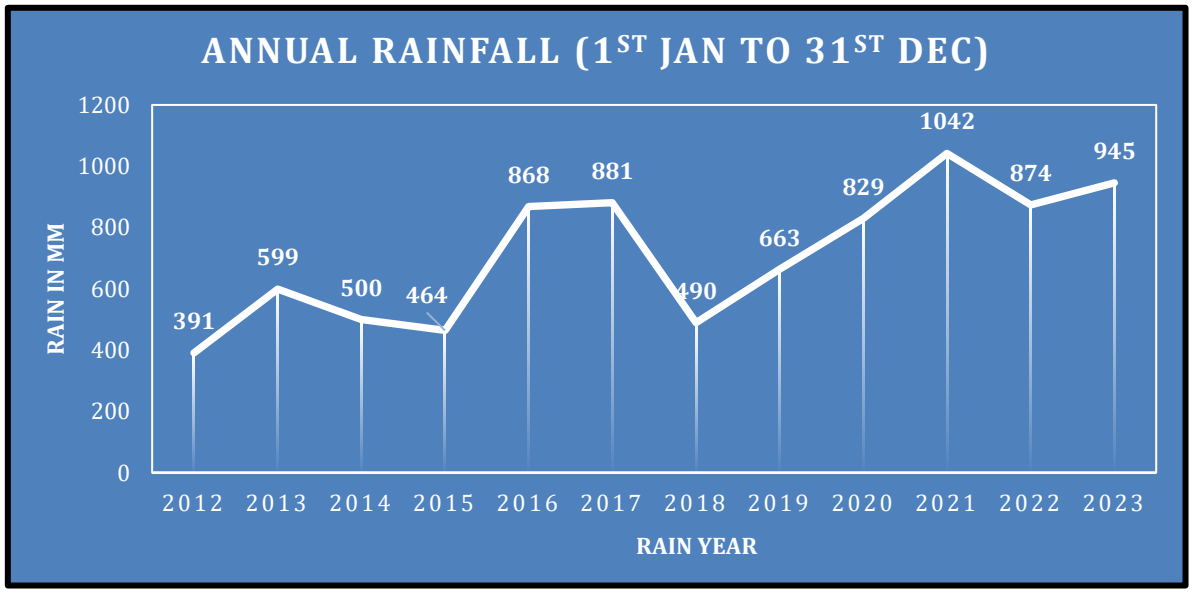
Chapter 3: Weather trend of district

Mahavedh project is operationalised by the Government of Maharashtra (GoM) through Public Private Partnership with M/S Skymet Weather Services. 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 PWD and R & D 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:

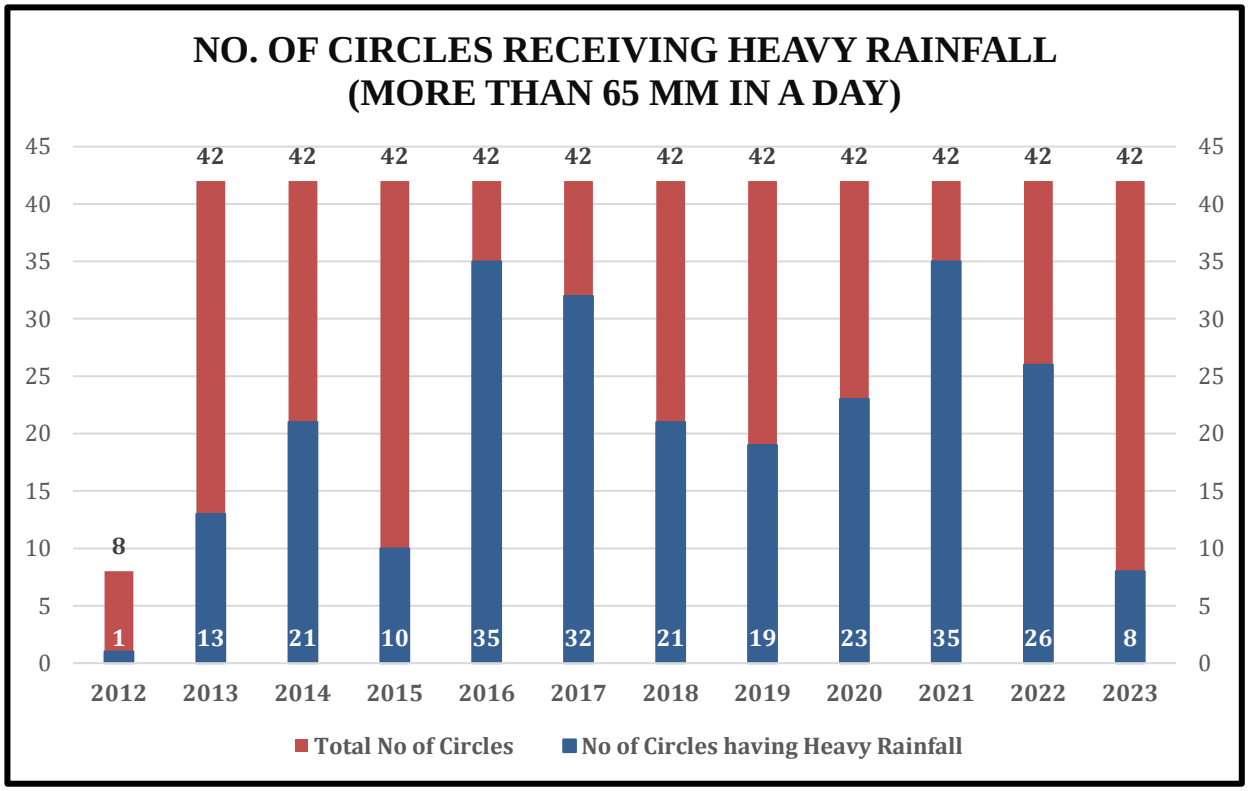
Normal or average rainfall is the amount of precipitation that we expect per year (in a given area). It is obtained and set by calculating the average (mean) of precipitation recorded in an area. Annual rainfall or precipitation is the sum of daily rainfall in a year.



The graph 3.1 presents annual rainfall data of Dharashiv district from year 2012 to 2023, highlighting fluctuations in precipitation. Notably, the lowest recorded rainfall was in year 2012 at 391 mm, while the highest occurred in year 2021 with a total of 1042 mm annual rainfall.

3.2 Heavy rainfall.

Heavy rainfall is rainfall more than 65 mm in a day. There are complex pattern of rainfall trends in Maharashtra, trend of extreme rainfall events is essential for understanding local-scale manifestations of climate change and to design context specific adaptation interventions.



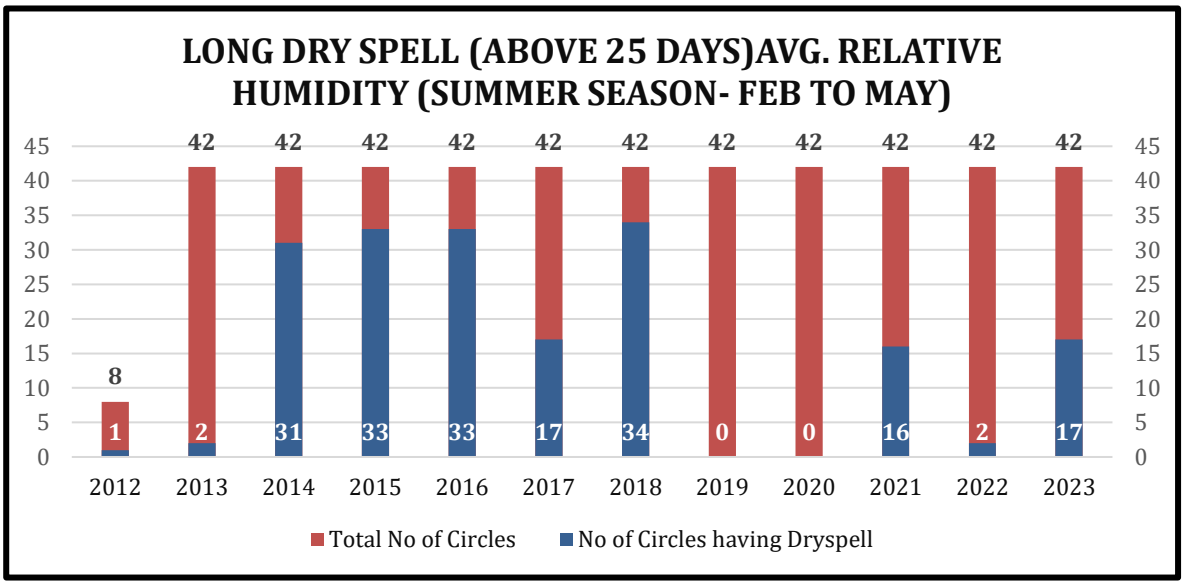
The provided graph 3.2 illustrates occurrences of heavy rainfall in circles within the Dharashiv district from year 2012 to 2023. Notably, in year 2016 & 2021, heavy rainfall affected the maximum number of circles, with 35 circles out of the 42 circles experiencing such conditions. Conversely, the year 2023 recorded a lower incidence of heavy rainfall, with only 8 circles being affected. Normally, it observes that days of heavy rainfall is increased in recent years, previously such events were very rare, as compared to the last four to five years.

3.3 Dry spells

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

3.3.1 Long Dry spell

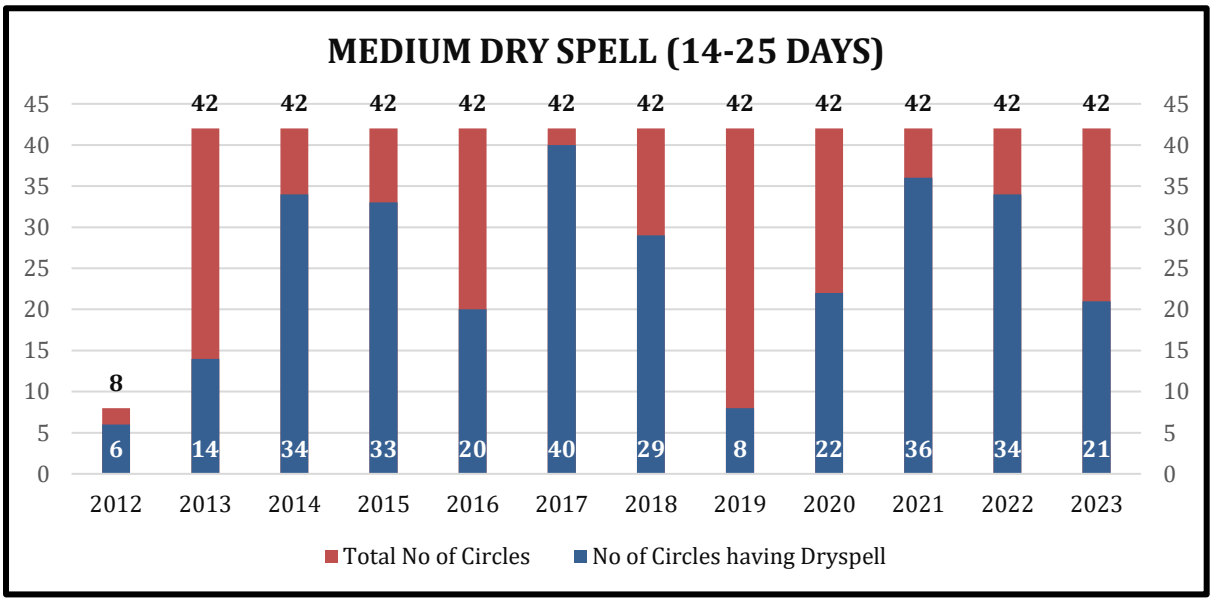
Long Dry spell is a prolonged period above 25 days of dry days in monsoon period



The graph (Graph 3.3.1) that shows the trend of long dry spells observed in a Dharashiv 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, 34 circles out of the 42 circles in the district experienced severe long dry spells. Conversely, in year 2019 and 2020, there was no long dry spell, across all 42 circles in the district.

3.3.2 Medium Dry spell

Medium Dry spell is a period of 14-25 dry days in monsoon period

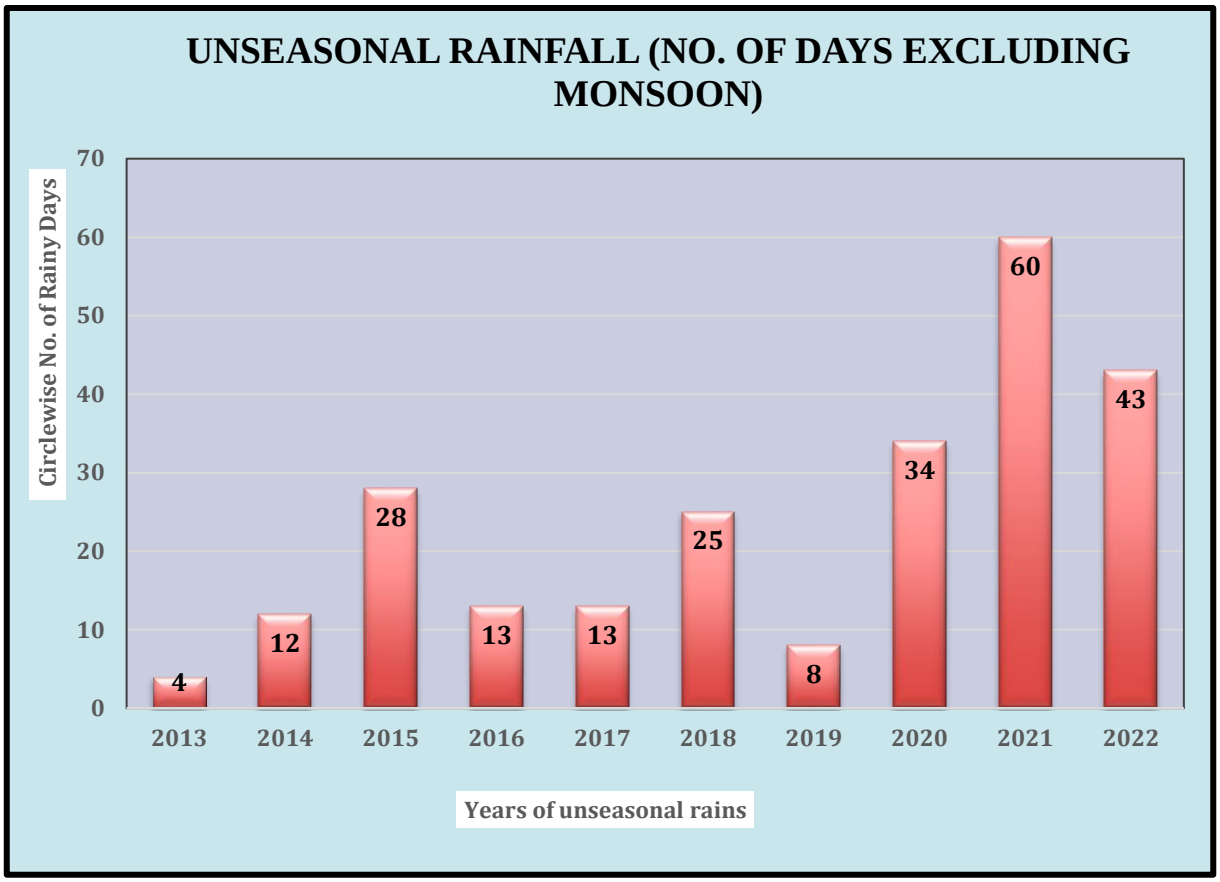


The graph 3.3.2 shows the trend of medium dry spells observed in a Dharashiv district. The data covers the total number of circles and the circles that affected medium dry spell (14 to 25 days) from the year 2012 to 2023. The graph shows that in year 2017, 40 circles out of the 42

circles in the district experienced medium dry spells. Conversely, in year 2019, there was only 8 circles out of 42 circles experienced medium dry spell in the district

3.4 Unseasonal rainfall.

Rainfall received during nonmosoon periodis treated as unseasonal rainfall. Unseasonal rains occur when there is a sudden change in atmospheric pressure. such conditions can result in precipitation, even during non-monsoon season.



The graph 3.4 Illustrates the circle wise annual occurrences of unseasonal rainfall in rainy days in the district from year 2013 to year 2022. The data reveals a variation ranging from 4 days to 60 days of unseasonal rainfall. Generally, we can say that days of unseasonal rains are increasing year by year in increasing manner, previously events were very rare as compared to previous 4 to 5 years and by seeing this trend, it can be predicted that trend of unseasonal rainfall events will be increasing.

3.5 Monsoon Onset Delay

The onset of the south-west 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 11th June for Dharashiv district.

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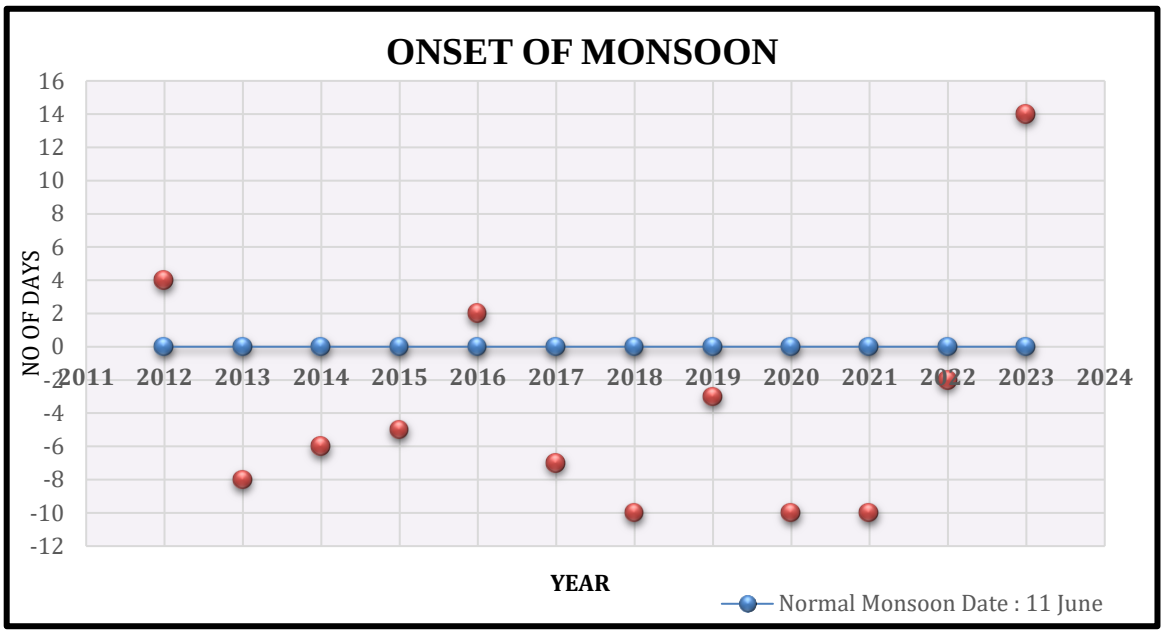
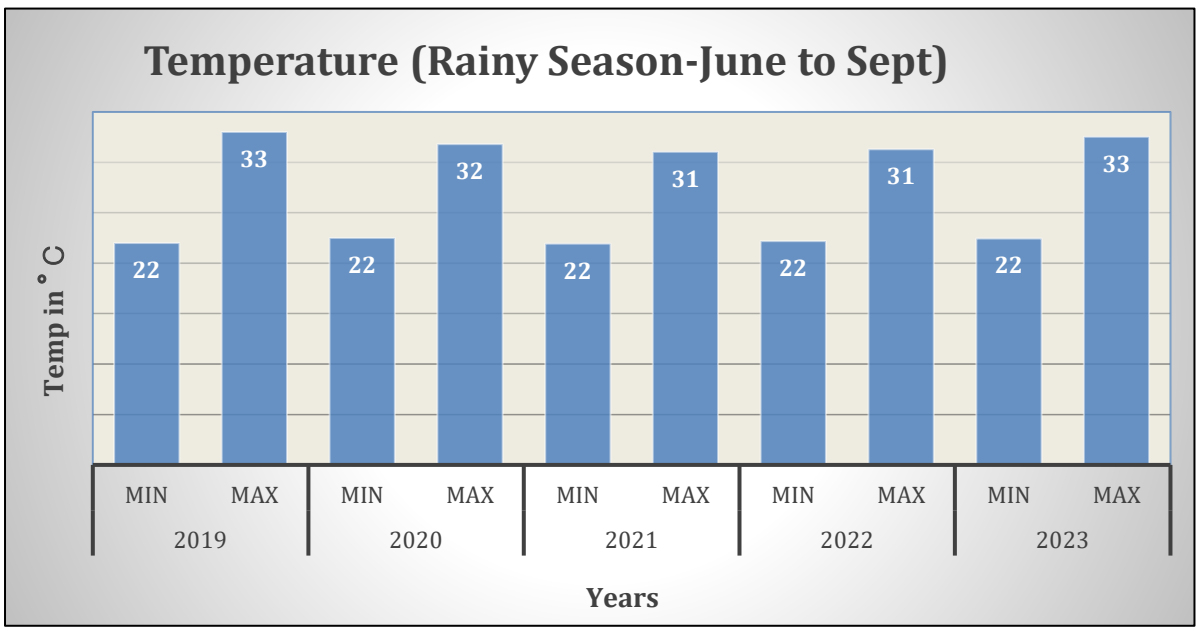


The graph 3.5 depicts the annual onset of the monsoon for Dharashiv. The blue line represents the normal day of onset of monsoon i.e. 11th June. The onset days show variations ranging from -10 to 14 days. Notably, in year 2012, 2016 and 2023 the monsoon arrived delayed than the normal onset date. However, in remaining years the monsoon was notably arrived earlier.

Temperature

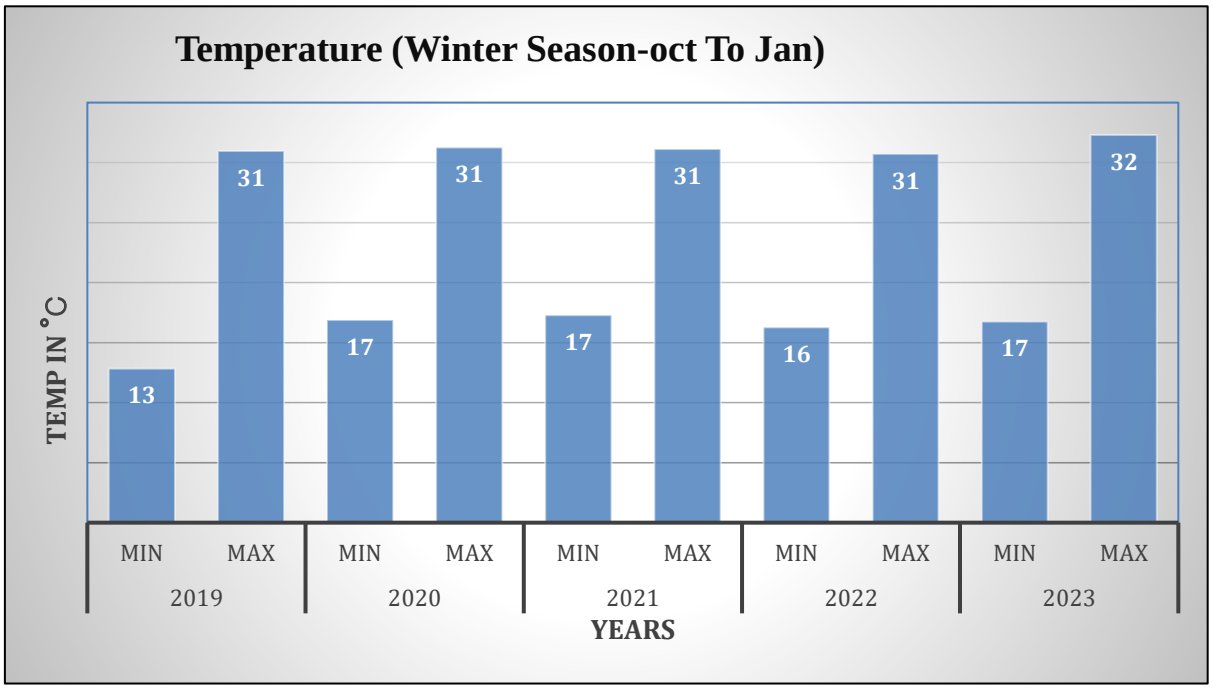
Temperature is a physical quantity that quantitatively expresses the attribute of hotness or coldness. The average temperature is 28 °C (82.4 °F), with a minimum of 19°C (66.2 °F) and a maximum of 37°C (98.6 °F). On the coldest nights, the temperature usually drops to around 13°C (55.4 °F). On the warmest days, the temperature usually reaches around 39°C (102.2 °F).

3.6.1 Temperature (Rainy Season-June to Sept.)



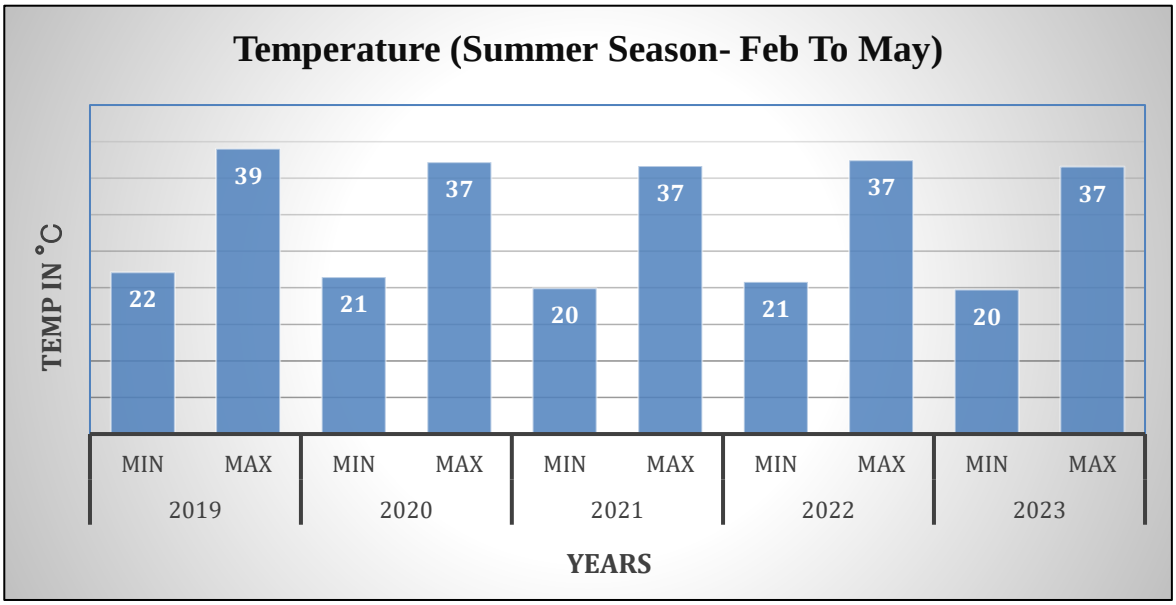
The graph 3.6.1 presents the temperature in the Dharashiv district during the rainy season from year 2019 to year 2023 exhibited a consistent range, with minimum temperatures 22 °C and maximum temperatures ranging from 31-33 °C.

3.6.2 Temperature (Winter Season-Oct to Jan)



The graph 3.6.2 presents the temperature in the Dharashiv district during the winter season from year 2019 to year 2023 exhibited a consistent range, with minimum temperatures fluctuating between 13-17 ºC and maximum temperatures ranging from 31-32 ºC.

3.6.3 Temperature (Summer Season- Feb to May)

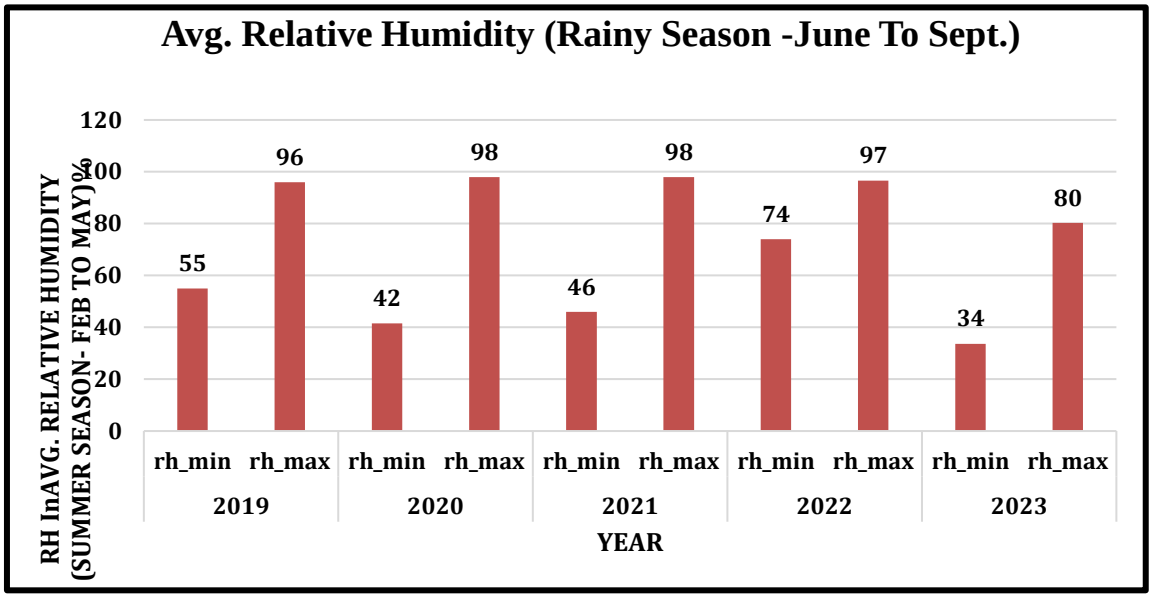


The graph 3.6.3 represents temperature in the Dharashiv district during the summer season from year 2019 to year 2023 exhibited a consistent range, with minimum temperatures fluctuating between 20°C and 22 ºC and maximum temperatures ranging from 37°C to 39 ºC.

3.6 Relative Humidity

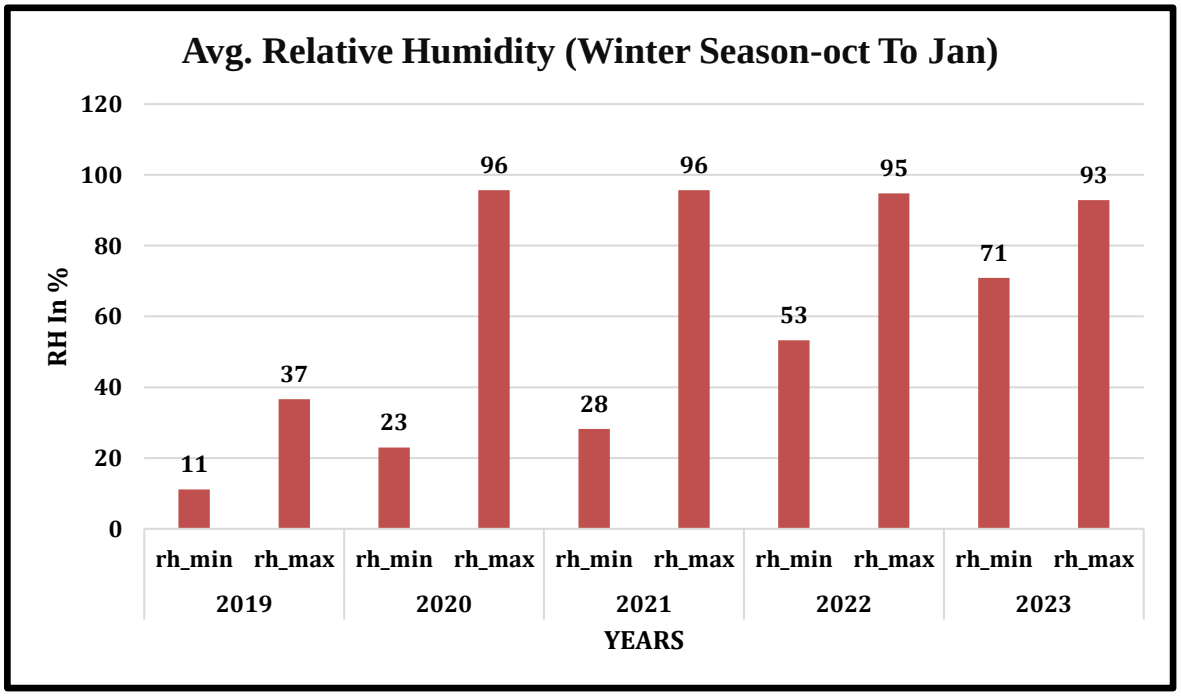
Relative Humidity is the ratio of the actual quantity of moisture at a certain temperature and pressure to the maximum it can hold at the same temperature and pressure. It is usually multiplied by 100 and expressed in percent.

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



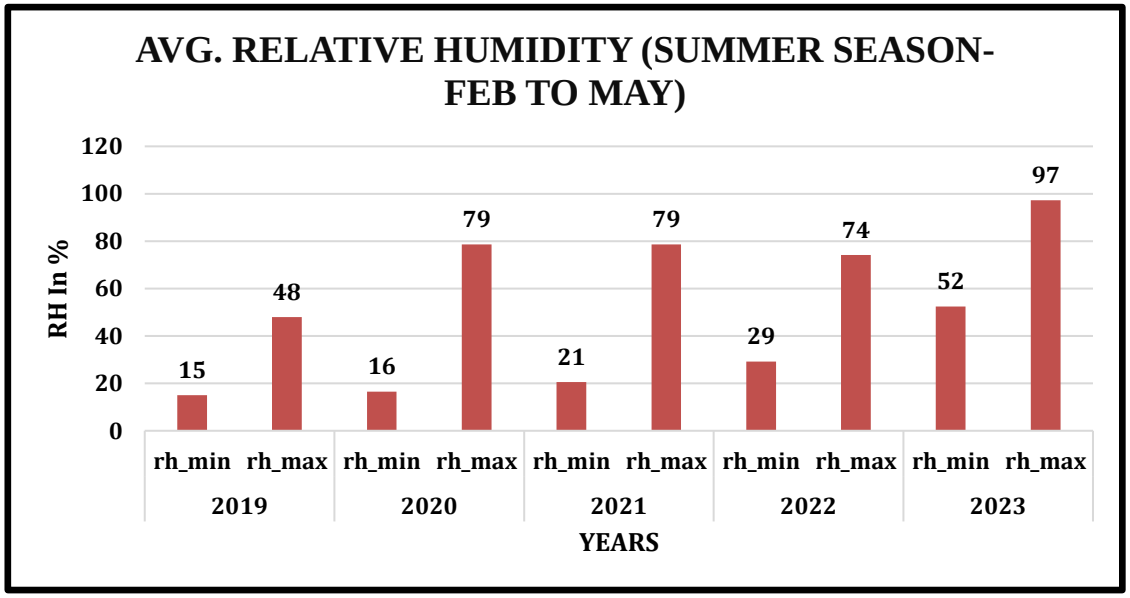
The graph 3.7.1 illustrates humidity levels during the rainy season in the Dharashiv district, revealing a variation in minimum humidity from 34% to 74% and maximum humidity ranging between 80% and 98%.

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



The graph 3.7.2 illustrates humidity levels during the winter season in the Dharashiv district, revealing a variation in minimum average relative humidity is from 11% to 71% and maximum avg. relative humidity from 37% and 96%.

3.6.2Avg. Relative Humidity (Summer Season-Feb to May)



The relative humidity during the summer season, typically averaged from Feb to May. The graph 3.7.3, illustrates humidity levels during the summer season of the Dharashiv district, revealing a variation in minimum average relative humidity from 15% to 52% and maximum average relative humidity ranging between 37% and 97%.

Chapter 4. Impact of climate variability on agriculture production

The climate of the district is characterised by a hot summer and general dryness throughout the year, except during the south-west monsoon season, i.e., June to September. The mean minimum temperatures are 8.5°C and mean maximum temperature is 42.5°C. The normal annual rainfall over the district varies from 600 mm to about 850 mm. The rainy season starts from mid-June and continues till the end of September.

Temperature rise affects crop physiology, crop water balance, pest population, and soil biology and chemistry. A rise in temperature leads to faster crop development, and a shorter growing period, which means less robust growth. Higher daytime temperatures decrease photosynthesis rates in crops and higher night time temperatures increase respiration requirements, leading to overall lower carbon fixation. Extremely high temperature cause direct damage to plant cells. Heat stress during the reproductive phase may lead to sterility, reduced fruiting, impacted grain filling, and sometimes even total crop failure. Warming of air leads to an increased vapour pressure deficit between leaf and air, causing more transpiration and more chances of stomatal closure during the day, which stops photosynthesis in most crop plants. Rising temperature can favour increased survival of pests and diseases and their spread. Pests will be able to survive warmer winters in higher numbers, and pests, vectors of plant diseases, and weeds and weed hosts for pests will all be able to radiate towards the poles. Increasing atmospheric temperature is closely linked to increasing soil temperature, which causes changes in the soil community. Increased soil temperatures affect plant-microbe interactions and lead to reduced or impaired nodule formation, which is harmful to leguminous crops. Higher soil temperatures lead to increased volatilization of compounds, reducing soil fertility through dissipation of assimilated soil carbon and trace minerals and gases. Rising soil temperatures also lead to increased mobility of metals in soil and possibly increased bio-accumulation in crop tissues, which is harmful to human health and soil microorganisms.

Most of the crop plants grow best at 15 ^{o}C to 30 ^{o}C Many plants die at temperatures of 45 ^{o}C -55 ^{o}C. The warm season crops are Mai ze, sorghum, sugarcane, red gram, cowpea etc. These crops are called tropical crops. These are generally grown in the monsoon season. The maximum temperature for these crops is 45 to 50 ^{o}C. Minimum temperature is 15 ^{o}C to 20^{o}C. and optimum temperature is 30 ^{o}C to 38^{o}C. Chickpea, Sorghum and wheat are the widely grown crops in Rabbi season. The temperature required for its growth is 25 ^{o}C to 30 ^{o}C.

1. Soybean: The optimal climatic conditions for soybean are temperatures ranging between 22 °C and 32 °C. High rainfall during June, July and August causes an increasing incidence of fungal diseases. A wet and warm environment is favourable to pests – the white fly, Spodoptera and the soybean semilooper. Degraded soil structure combined with heavy rainfall leads to flooding, which promotes root rot and fungal diseases, as well as impedes crucial processes like weeding and supplemental fertilisation. Studies show that the late onset of monsoon, prolonged dry spell during growth stages, early cessation of monsoon, and damage to the crop during maturity period are particularly harmful. An increase in extreme rain events is detrimental to the crop as soybean is intolerant of flooding. The predicted changes in rainfall will exacerbate existing challenges. Inadequate rain during the vegetative period leads to weak vegetative growth, then excess rain during flowering will lead to an increase in diseases, root rot and pests until August, and then the sudden drop in rainfall during the important stage of pod filling led to reduced pod filling and inferior quality soybean.

2. Wheat: It requires at least 5-6 irrigations for optimal growth, and it is not possible for a rainfed farmer to conventionally grow wheat. This means that the farmers growing wheat are a part of a small section of landholders with access to irrigation water and are able to adapt to water scarcity well. Unlike the Kharif cropping season, rainfall is not the primary form of climate challenges that wheat faces. With minimal inputs other than fertilizer, it is an inexpensive crop to grow in Maharashtra, and is a good choice for farmers in the Rabbi season. Since fewer farmers plant during the Rabbi season, there is lower competition for harvest labour and low pest and weed pressure. However, rising temperatures are the main challenge to wheat yields, and it is difficult for the farmer at an individual scale to find ways to adapt to this. Many studies have been carried out to test the effect of rising temperatures on winter wheat. Temperatures over 25 °C during grain filling depress yields, and both historical and projected temperatures during grain filling are well over this. One study found a 5% grain yield loss for every 1°C rise between 17.7 °C and 32.7 °C, affecting both grain growth rate and duration. Both day and night temperatures have an effect on wheat yield, and so increasing maximum and minimum temperatures pose a threat to yield. The carbohydrates stored in the grain are produced almost entirely by the flag leaf – a single topmost leaf on a stalk. Any stress to this leaf, such as water stress or heat stress, causing stomatal closure or wilting will have a marked effect on grain filling. Additionally, under heat stress situations, the usage of nitrogen changes in the plant, and impacts protein deposition in the grain. Since temperature cannot be controlled or supplemented by farmers, the main adaptation is the breeding of plants with higher heat tolerance. Being a winter crop, wheat experiences the effects of ozone, which is higher in concentration over the environment during the winter months. An estimated 17% of wheat yield may be lost due to crop damage from ozone exposure. The source of irrigation water for farmers is usually groundwater, and essentially all winter wheat contributes to usage of valuable groundwater resources. We also know that soil quality is linked to water percolation, and low fertility and eroded soils cannot hold water long enough for it to percolate. With projected rainfall in the winter months falling to almost zero, and soils already depleted of nutrients and organic matter, groundwater recharge will be doubly affected. The pressure of winter wheat on the water table in the already semi-arid regions of our study will be significant. Agriculture is not the only use of groundwater, and we need it urgently for drinking, domestic and ecological needs for our ever increasing population. Developing plans to manage groundwater and ensuring its recharge are crucial to ensure long term sustainability of groundwater resources. From interactions with farmers, we see that the effects of heat on yield are clear to them, but heavy winds during grain filling and sudden rainfall during harvesting are connected more directly to yield loss. Rain during the harvest season is a cause of loss in the Kharif season as well, and adaptations to safely dry and store harvested crops become essential. Shorter height wheat varieties address the risk posed by strong winds. However, since future climate estimates predict increasing temperatures through the Rabbi season, it is important to begin work on adaptations for upcoming yield loss due to increased heat, and increased weed, pest and disease pressure indirectly caused by the heat.

3 Gram: Gram is tolerant of higher temperatures and hence does not have as negative a relationship with projected temperatures. Gram is both sown and harvested before wheat, and escapes some of the extremely high temperatures of March. Many farmers that grow wheat also grow gram, and find gram to also be an inexpensive crop with low inputs. There is an increase in the pesticides used recently, to combat the pod borer and chickpea wilt, but other than that it is a low input crop and requires one time fertiliser application. An important point

to highlight here is the relationship of gram cultivation to soil. Like soybean, gram is a legume, and through a symbiotic relationship with bacteria in its roots, it can fix 80% of its own nitrogen requirement from atmospheric nitrogen. The bacteria it associates with are in structures on the roots called nodules, and nodule formation is an important part of early vegetative growth. If the soil temperature during this time is high, it affects nodule formation, leading to crop damage. Soil structure also plays a role in the cultivation of gram. If soils are black and deep, as they are in some places in Maharashtra, they can potentially hold sufficient moisture to grow gram without irrigation. Since most soils in our study region have been degraded and have low soil moisture holding capacity, the reduction of Rabbi rainfall has necessitated irrigation to grow gram. Additionally, sensitive plant stages like flowering are affected negatively by both excess and insufficient soil moisture, and these states are exacerbated in degraded soils. A serious effort to improve soil fertility across the three regions must be undertaken, and will benefit all crops grown, especially gram. As mentioned above, gram is a comparatively heat-tolerant cold season crop, but is still negatively affected by high temperatures. Gram flowers self-pollinate before opening, and high temperatures during flowering lead to abscission of flowers, buds and pods. High temperatures after flower opening cause low pod weight, and most cultivars of gram do not set pod over 35 °C. Both historical and future temperatures remain below this in the early weeks of the pod formation stage. Towards the end of pod filling, however, temperatures are projected to reach 37-38 °C, and breeding varieties that can perform well in such conditions is important to adapt to the future climate.

Drought conditions account for 50% of global yield reduction in gram, and in most places, despite irrigation, gram is grown in low nutrient and low soil moisture conditions. Often, cultivars grown are adapted to these conditions, and do not respond well to high input conditions. Finding cultivars that respond well to increased soil moisture is key for the future. In addition, methods to irrigate gram crops adequately must not endanger the already strained groundwater supply. With decreasing winter rain, and less water percolation through soil, gram poses the same challenge to groundwater that wheat does. With rising temperatures, gram is facing increasing pressure from weeds, pests and disease. These are usually suppressed by cold weather, but with warming winter temperatures, there is an increasing incidence of pod borers, chickpea wilt and weeds. Gram is a poor competitor of weeds, and these must be vigilantly removed. If not addressed, chickpea wilt can affect all plants in a field and lead to crop destruction even before flowering. The rising temperatures are leading to an increase in labour and chemical use by farmers. Seed treatments have become necessary. Overall, rising temperatures and decreasing rainfall pose the main climate related threats to gram. Cloudy conditions, excess rainfall at the time of harvesting and excess soil moisture during the early vegetative stage are the other challenges gram faces. However, it remains a relatively low input crop for the Rabbi season, and looks like it can handle most of the challenges the future climate will bring, as long as pests are controlled.

Late-onset of monsoon and intermittent dry and wet spells have impacted the germination of soybean and cotton. The excess rainfall during the mid-kharif season will lead to an increase in fungal diseases, weeds, and pests. This is likely to impact the production of pods in soybean and boll formation in cotton. Waterlogged soils and humid conditions will promote rot, leading to a loss of soil nutrients and fertilisers from the soil. The overall impact of excessive rainfall during the fruit formation and maturity stage for both the kharif crops studied - soybean and cotton will be on the yield and quality of the produce.

Impact of Climate Variability on Agricultural Production

A. IMPACT OF TEMPERATURE:

Sr. No	Crop	Crop Growth	Water Availability	Pests and Diseases Infestation
1	Soybean	Optimum temperature for the growth of Soybean crop is 26.5 to 30^0C for most varieties. The optimum temperature for soybean germination is around 21^0C. In Kharif 2023, it is observed that there is an increase in temperature in the months of August and September causing decrease in average yield of Soybean crop.	Temperature variation affects hydrological cycles. In Kharif 2023 only 66% rainfall was causing a 30% reduction in average yield of Soybean crop.	Due to prolonged dry spell in August and September month infestation of whitefly on soybean acts virus vector and results in spread of yellow wen mosaic virus
2	Tur	Requires 26to 30^0 C in Kharif or monsoon season and 17 to 22^0 C Rabbi or post monsoon season. Tur is stunted at a lower temperature. It is extremely Susceptible to low radiation at the time of pod development.	Water availability during flowering and pod formation increases yield. Post Monsoon rain is beneficial to the yield of tur but the crop is very sensitive to water logging conditions which leads to wilting of plants.	Cloudy weather in October causes an infestation of leaf miner and lepidopterous insects like pod borer and plume moth.
3	Wheat	The critical minimum temperature for wheat crops is from 3.5 to 5.5^0 C, optimum 20 to 25^0 C. The maximum is around 35^0 C. If temperature is more than 30^0 C at the time of maturity, it leads to forced maturity and yield losses.	In order for wheat to reach physiological maturity and its potential yield it needs on average 350-600 mm of water. Wheat grows faster when irrigated and it needs 4-5 irrigations for higher yield. In rainfed conditions or inadequate rainfall situations results in reduced growth and lower yield.	No measures for insects and pests found on wheat crops since the last 5 years.
4	Gram	Gram crops grow best in temperature between 24-30^0 C. It is frost tolerant, but grows best in daytime temperature between 21-26^0 C and night temperature above 18^0C. Gram crop requires a cool climate for growth and development, but need higher temperature for maturity. Severe cold and frost at the time of flowering can cause flower drop.	Gram is mostly sown as a rainfed crop. However, where irrigation facilities are available, give a pre-sowing irrigation. It will ensure proper germination. In no case first irrigation should be given at flowering time of the gram crop. A light irrigation should be given because heavy irrigation is always harmful to gram crops. Excess of irrigation enhances vegetative growth and depresses chickpea yield.	The major pest of Gram is pod borer and cutworm while most common and harmful diseases are wilt and Sclerotinia blight.

B. IMPACT OF RAINFALL:

Sr. No	Crop	Crop Growth	Irrigation Supply	Pests and Diseases Infestation	Soil Erosion and Nutrient loss
1	Soybean	Insufficient rainfall can lead to drought conditions and negatively impact crop growth and yields. Drought conditions can lead to moisture stress, causing stunted plant growth, wilting and reducing crop yields. This condition occurred in Kharif 2023. Rainfall has a significant impact on crops as it provides the necessary moisture for plant growth and development. Excessive rains can causes soil erosion, waterlogging, and increase the risk of soil borne diseases	Soybean water use will fluctuate throughout the season depending on weather conditions and crop growth stages. The mid- to late-reproductive growth stages are the most sensitive to water stress. When the soybean does not receive enough water to meet evapotranspiration (ET) demands during the reproductive growth stages, significant reductions in yield can occur. Soybean is very sensitive to excess moisture and the crop is affected, if water stagnates in the fields. The crop should not suffer due to water stress from flowering to maturity.	1. Unpredictable rains might disrupt the parasitoids' ability to track their caterpillar hosts. 2. Too much water will be devastating for some pests, especially soil dwelling insects. 3. Rain drops can physically dislodge insects from their host plants and behaviour patterns can be disrupted in small insects such as thrips.	1. Rainfall intensity and slope gradient affect runoff and sediment, ultimately leading to soil nutrient loss. It shows a positive correlation between rainfall intensity and nutrient loss. 2. There are two main ways in which soil nutrients are lost. At low rainfall intensities, soluble nutrients migrate with runoff, while at high rainfall intensities, soil nutrients migrate with runoff in sediment form. 3. Soil nutrient loss rises with the increase in the slope gradient, but when the slope gradient reaches the threshold value, nutrient loss declines with the rise of the slope gradient, indicating that there is a critical slope gradient for nutrient loss.
2	Tur	Rainfall in October damaged standing tur crop which is likely to reduce yield by 20%	Irrigation supply during initiation of flower buds, flowering and pod formation will result in higher yield and vice versa.	1.Unpredictable rains might disrupt the parasitoids' ability to track their caterpillar hosts. 2. Too much water will be devastating for some pests, especially soil dwelling insects. 3. Rain drops can physically dislodge insects from their host plants and behaviour patterns can be disrupted in small insects such as thrips.	1. Rainfall intensity and slope gradient affect runoff and sediment, ultimately leading to soil nutrient loss. It shows a positive correlation between rainfall intensity and nutrient loss. 2. There are two main ways in which soil nutrients are lost. At low rainfall intensities, soluble nutrients migrate with runoff, while at high rainfall

				4. Some pest species are suppressed by periods of rainfall by outbreak of fungal diseases.	intensities, soil nutrients migrate with runoff in sediment form. 3. Soil nutrient loss rises with the increase in the slope gradient, but when the slope gradient reaches the threshold value, nutrient loss declines with the rise of the slope gradient, indicating that there is a critical slope gradient for nutrient loss.
3	**Wheat**	If rainfall in harvesting stage of wheat deteriorate quality of wheat	Irrigation during period of high wheat demand has significant effects on wheat growth, grain yield and. The soil water status and different growth stages have different effects on photosynthetic physiological characteristics and grain yield	1. Unpredictable rains might disrupt the parasitoids' ability to track their caterpillar hosts. 2. Too much water will be devastating for some pests, especially soil dwelling insects. 3. Rain drops can physically dislodge insects from their host plants and behaviour patterns can be disrupted in small insects such as thrips. 4. Some pest species are suppressed by periods of rainfall by outbreak of fungal diseases.	1. Rainfall intensity and slope gradient affect runoff and sediment, ultimately leading to soil nutrient loss. It shows a positive correlation between rainfall intensity and nutrient loss. 2. There are two main ways in which soil nutrients are lost. At low rainfall intensities, soluble nutrients migrate with runoff, while at high rainfall intensities, soil nutrients migrate with runoff in sediment form. 3. Soil nutrient loss rises with the increase in the slope gradient, but when the slope gradient reaches the threshold value, nutrient loss declines with the rise of the slope gradient, indicating that there is a critical slope gradient for nutrient loss.

4	**Gram**	Being a crop in determinate growth habit, drought conditions will attain maturity by stopping growth, while late season rains will cause increased crop duration.	Irrigation effect on Parameter like number of primary and secondary branches for plant height, No. of nodules biomass per plant, days to maturity and yield component increases in gram.	1. Unpredictable rains might disrupt the parasitoids' ability to track their hosts. 2. Too much water will be devastating for some pests, especially soil dwelling insects. 3. Rain drops can physically dislodge insects from their host plants and behaviour patterns can be disrupted in small insects such as thrips. 4. Some pest species are suppressed by periods of rainfall by outbreak of fungal diseases.	1. Rainfall intensity and slope gradient affect runoff and sediment, ultimately leading to soil nutrient loss. It shows a positive correlation between rainfall intensity and nutrient loss. 2. There are two main ways in which soil nutrients are lost. At low rainfall intensities, soluble nutrients migrate with runoff, while at high rainfall intensities, soil nutrients migrate with runoff in sediment form. 3. Soil nutrient loss rises with the increase in the slope gradient, but when the slope gradient reaches the threshold value, nutrient loss declines with the rise of the slope gradient, indicating that there is a critical slope gradient for nutrient loss.

(Source: Krushi Vigyan Kendra (KVK), Tuljapur)

Chapter 5: Measures to cope with climatic variability

A. Measures for different climatic parameters

A) Rainfall conditions	1. Heavy rainfall	• Soil and water conservation structures like graded bunding, compartment bunding, *Mati Nala Bandh*, may help to reduce water runoff and soil erosion. • Use BBF technology for sowing, crops, soybean, tur etc. which helps for easy drainage of excess water and also helps in moisture stress conditions. • BBF technology is also useful for crop growth i.e. development of roots, development of branches and more pod formation which leads to higher production of crops. • To avoid losses due to heavy rainfall, drain the water through an accurate drainage system. • Dibbling of soybean recommended by university Vasantrao Naik Marathwada University, Parbhani also helpful for cultivation of soybean crop. • Use of green manuring crops like Dhaincha, application of gypsum helpful in soil, water moisture conservation.
	2. Low rainfall	• Weeding and foliar spray of water-soluble fertiliser such as 0:52:34, 0:0:50. helpful in reducing moisture stress to the crop. • Intercropping helps in conservation of soil moisture e.g. Tur + Soybean; Tur + Udid; Tur + Moong in heavy soil. Tur+ jowar in medium soil. • Inter-cultivation operation (breaking the soil into small fragments) can prevent the loss of land moisture by evaporation. • In horticulture crops we can maintain moisture of the soil by pruning mulching and water-soluble fertiliser such as 0:52:34, 0:0:50. • Use Of micro –irrigation and construction of a farm pond. • Use of Short Duration variety. • Cultivate crops and variety as per type of land.
	3.Dry Spells / Water Stress-	• Drought tolerant crops with low water requirements reduce evapotranspiration losses during photosynthesis by rapidly closing their stomata and maintaining leaf water potential and photosynthetic rate. • Promote protective irrigation for each crop. • Increase water availability to counteract the impacts of drought shocks through small water reservoirs (Farm ponds)

	4.Terminal Drought-	• Cultivate short duration varieties of soybean, udid, mung etc. which are helpful in terminal drought conditions. • Use Farm Yard Manure, Green manuring crops helpful in enhancing carbon percentages in soil. • Use individual farm ponds for storage of water, preserving excess water in the rainy season which may be used during terminal drought conditions.
	5. Late onset of monsoon	• Sowing is done only after 70mm to 100 mm rainfall. • Promote intercropping • Late onset of monsoon conditions farmers must cultivate short duration varieties of the different crops in future it will be easy for Rabbi crop cultivation.
B)Temperature conditions	1. High Temperature-	• Wind breaks redistribute sensible heat that is already present in the air. • Promote Protected cultivation. • Use of shade net and polyhouse.
	2. Cold waves/Low Temperature	• Irrigation helps to reduce the effect of low temperature. • Smoking during night time can help to increase temperature to some extent
C) Hailstorms		• Hail protection nets reduce crop damage and loss by buffering the impact of hails on crops. • Promote Protected cultivation. • Hail protection nets reduce crop damage e.g. in grape we can reduce loss by hail storms using hail protection nets.
D) Soil degradation		• To avoid soil degradation, we can implement NRM structures like, Compartment bunding, Graded binding, Loose boulders, *Mati Nala Bandh*s etc. • Preparatory tillage like deep ploughing, clod crushing, harrowing help in minimises soil degradation. • Plantation of agroforestry trees on banks of Nala River is also helpful. • Integrated Nutrient Management and Organic Manuring. • Reclamation of Acid and Salt Affected Soils, through the drainage management (Desalinization), green manuring etc. • Change Cropping pattern also avoids soil degradation, continuous sowing of arial crops can cause soil erosion, degrades soil causing less growth and yield.

B. Best practices developed by farmers in district:

1. Use of Non-woven white pomegranate tree cover

1	Farmer Name	Shri. Shivaji Bajirao Kamble, Village: Andur, Tehsil, Tuljapur
A	Title	Use of non-woven white pomegranate tree cover.
B	Objectives	1. To Protect crop from insect, wind, rain and sunburn. 2. To provide physical protection from mechanical injuries (scars and scratches)
C	Problem identified & its intensity	1. Low yield problem 2. Poor fruit quality 3. Black spots on fruits
D	Interventions planned	Use of non-woven white pomegranate tree cover
E	Result	Keeps pests, birds, insects away Saves the crop from hail, wind and frost Better Fruit quality

2. Use of waste decomposer for rapid Composting of farm residues under Organic farming.

2	Farmer Name	Shri. Sudhir Shivaji Supnar, Village Name: Barul and Tehsil Tuljapur
i	Title	Use of a waste decomposer for rapid Composting of farm residues.
ii	Objectives	1. To convert farm waste residues into organic manure. 2. To make organic manure from farm residues in less duration.
iii	Problem identified & its intensity	1. Many times farm waste is burned due to it requiring more time for decomposition. 2. Due to no use of microbial inoculants, decomposition requires 2-3 years.
iv	Interventions planned	Use of various technologies for rapid decomposition of farm residues.
v	Result	Use of waste decomposer reduces fertiliser dose, application of micronutrients which leads towards organic farming also production cost of farmers reduced up to 10 percent due to organic input, it helps in maintaining soil health.
vi	Percentage of adaptation	35% of organic farmers use.
vii	Source of technology	NCOF, Ghaziabad

Different types of waste decomposers are Biofertilizers, Rhizobium Biofertilizers, Azospirillum Biofertilizers, Liquid Bio Fertilizers, Phosphate Solubilizing Bacterias, Potash Mobilizing Bacteria's, Vesicular Arbuscular Mycorrhiza, Soil Probiotics. etc.

3. Introduction of *Grampriya* breed in backyard poultry

Sr. No.	Farmer Name	**Mrs. Surekha Tanaji Pawar, Village, Sarola, Taluka, Tuljapur**
i	Title	Introduction of *Grampriya* breed in backyard poultry photo
ii	Objectives	1. To get 160-180 eggs per bird per year in backyard poultry 2.To increase the body weight of the birds in backyard poultry. 3. To lower the mortality rate.
iii	Problem identified & its intensity	Low egg laying capacity of local breeds. Low body weight of local breeds in backyard poultry.
iv	Interventions planned	T_1-Farmers practice- Local poultry breeds used by farmers. T_2- Technology assessed – *Gramapriya breed* in backyard poultry.
v	Result	Egg Production: 190 eggs per bird per year
vi	Percentage of adaptation	55
vii	Source of technology	Directorate of Poultry Research, Rajendranagar, Hyderabad

4. BBF (Broad bed furrow):

Farmer Name: Shivaji Keshav Navgire, Village: Barul, Tehsil, Tuljapur

In the heart of Barul village, situated in the Tehsil of Tuljapur, farmer shri. Shivaji Keshav Navgire has revolutionised soybean cultivation under rainfed conditions. Embracing the Broad Bed Furrow (BBF) sowing method, Shivaji maximises rainwater usage, mitigates damage from heavy rainfall, and achieves an impressive 14 percent increase in soybean yield. Facing the challenge of erratic rainfall, he turned to the BBF method, creating raised beds with furrows that effectively harness rainwater. This innovative approach not only conserves water but also shields crops from the harmful effects of heavy downpours, ensuring a more stable and resilient harvest.

The BBF technique provides ample space for intercultural operations, simplifying weed management and nutrient application. Shivaji found the method remarkably efficient, enabling him to maintain his soybean fields with ease. The tangible success of Shivaji's venture lies in the 14 percent boost in soybean yield compared to traditional methods. His dedication to sustainable farming practices not only secures his own livelihood but serves as a beacon of inspiration for fellow farmers facing similar challenges. **Shivaji Keshav Navgire's** short success story exemplifies the transformative power of the BBF method, showcasing its ability to maximise rainwater utilisation, protect crops, and significantly enhance agricultural yields in rainfed conditions.

5. Dibbling of soybean seeds:

Farmer Name: Arvind Sudhakar Shinde, Village Name: Hinglaj Wadi, Tehsil, Dharashiv

Shri. Arvind Sudhakar Shinde, a forward-thinking farmer from Hinglaj Wadi in Dharashiv Tehsil, has redefined soybean cultivation through the innovative practice of dibbling. By strategically placing soybean seeds on ridges and creating furrows for convenience, Arvind has achieved extraordinary results. Arvind's dibbling technique has not only halved the seed rate but has also led to a significant increase in the number of pods per plant. This sustainable approach optimises resources while maximising yield, showcasing Arvind's commitment to efficiency and productivity in agriculture. In the fields of Hinglajwadi, where Arvind's soybean crop flourishes, the success of dibbling is evident. Arvind's story serves as an inspiration for fellow farmers, highlighting the transformative impact that thoughtful and strategic farming practices can have on both resource utilisation and crop productivity.

Chapter 6: Climate Resilient Technology (CRT) Interventions and Its Impact on Yield of Crops

6.1 CRT Interventions followed by the farmers in the districts

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 to 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

6.2 Impact of BBF on Yield of crops

Abstract: There is a need for in-situ soil and water conservation and proper drainage technology in deep black soils. Broad bed and furrow (BBF) system involves preparation of a broad bed of 90 cm, furrow of 45 cm and sowing of crop at a row spacing of 30 cm. The cost of BBF implementation is Rs. 45,000. The BBF technology has many advantages including in-situ conservation of rainwater in furrows, better drainage of excess water and proper aeration in the seedbed and root zone. More than 500 farmers in many villages of Dharashiv district adopted this technology. Similarly, Furrow irrigated raised bed FIRB planting was promoted for cultivation of different crops in our district. Planting of soybean, tur, crop on raise bed also helps in enhancing the crop yield and saving of seed rate which help the farmers for decreasing cost of cultivation.

Objective: For in situ soil and water conservation and for better crop growth.

Benefits:

1 Saving of seed rate per acer, per hector
2. Minimising cost of cultivation.
3. Minimising paste and diseases infestation easy for better spraying schedule
4. And finally increasing crop production per acer / per hectare
5. Increase in water use efficiency
6. Increase in crop productivity (5-10%)
7. Less moisture stress during non- rainy days
8. Time saving (25-30%) in irrigation
9. Requires 20-25% lower seed rate
10. Water saving up to 25-30%
11. Better weed management
12. Reduces crop lodging

Adoption of BBF technology in Dharashiv District

Sr. No	Taluka	Area (Ha)	No. of Farmers
1	Dharashiv	2180	1835
2	Tuljapur	1885	1976
3	Umarga	1020	842
4	Lohara	745	428
5	Bhoom	475	193
6	Paranda	1340	927
7	Kalamb	1910	1020
8	Washi	785	178
Total District		10340	7399

(Source: District superintending agriculture office, Dharashiv)

Four Rows BBF Plantation

6.3 Impact of Zero tillage on yield crops in the Dharashiv District.

Abstract: In project *Zero tillage* is an innovative activity adapted by farmers in our district, especially in Kharif tur, soybean, vegetable followed by Rabbi Gram, Jawar 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 distance, after growth of weed we can use herbicides for control of weed. Due to this we can add organic carbon in soil which helps in better productivity and fertility of the soil. Zero tillage technology increases the microbial count in soil structure which results in better soil health card. This directly affects the maximum crop growth the result of humus in such types of soil control moisture balance in the soil.

Objective:

Introduction of new technology to farmers

1. To maintain soil health
2. To increase organic material with microorganism
3. To minimise use of chemical fertilizers, pesticides for crop growth

Impact: Shri. Chandrakant Lendave, Village Kunhali Tq. Umarga Dist. Dharashiv has adopting Zero tillage activity (SRT) from last three years. He applied this technology to 1.00 Acre for the crops Tur, Jowar, Soybean, Onion and saved the cost of production by 20% and this increased the production of the tur and soybean crop up to 10%.

Shri. Lendave, from Kanhali village, Umarga tehsil of Dharashiv showing Tur and Onion Crops grown on SRT beds.

6.4 Impact of Neem based extracts on yield of crops.

a. Abstract: For Neem Seed Kernel Extract (Nim Ark) preparation collect neem seeds easily from Neem trees which are already available in the field. Neem extract (Nim Ark) is the main component of the integrated pest management of Tur, Soybean, Udid, Moong crop. After 30 days of spraying of neem extract (ark) in soybean, udid, mung crop and flowering stage in tur crop prevents or repels females to lay eggs or hatching of eggs, larvae cause minimum damage to crop plant leads to better growth of the crop.

b. Objective:

1. To minimise cost of spraying schedule
2. To maintain environmental balance
3. To protect friendly insects

c. Impact: Shri. Nagesh Devidas Shinde, Village- Jewali, Taluka-Lohara and District, Dharashiv crop soybean + tur adopted technology of nim extract from the last two year which saved amount of 2240 Rs. per acer during spray schedule.

6.5 Impact of On- farm Biofertilizers on Crop Yield

Abstract: To prevent extra use of chemical fertilizers farmers adopting bio-fertilizers like Phosphorus Solubilizing Bacteria, Rhizobium, Azotobacter, Vermicompost, Vermi-wash, Jeevamrut, Beejamrut in farm production. This bacteria's help in fixing phosphorus, nitrogen in the soil. Vermicompost, Vermi-wash, Jeevamrut, Beejamrut help in increasing organic material in soil.

Impact: Shri. Shivram Vilas Gaikwad, from Village-Rudarwadi, Taluka-Lohara District-Dharashiv was used Tricoderma, Phosphorus Solubilizing Bacteria, Rhizobium as biofertilizers for seed treatment. They also used jeevamrut, Vermiwash, Vermicompost etc. due to the use of above biofertilizers, organic carbon, microorganism ratio in the soil increased, this results in better fertility of the soil. This saved the extra expenditure of chemical fertilizers.

6.6 Impact of CRT on crop yield based on FFS data of Dharashiv District.

FFS (Farmers' Field School) sessions have been implemented in the project village since 2018, focusing on Soybean, Pigeon pea and Gram crops in the Dharashiv district. FFS aims to promote sustainable and efficient farming. It does by introducing effective practices for selected crops, improving farmers' knowledge with concepts like IPM and INM etc., empowering them to make right decisions and in 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 technologies (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

Year	Soybean		Pigeon Pea		Gram	
	FFS Plot yield (Kg/ha)	Control Plot yield (Kg/ha)	FFS Plot yield (Kg/ha)	Control Plot yield (Kg/ha)	FFS Plot yield (Kg/ha)	Control Plot yield (Kg/ha)
2019	1050	975	2375	2120	740	650
2020	1335	1179	1098	970	1450	1266
2021	1333	1188	1035	904	1189	1052
2022	1662	1459	1337	1166	1561	1450
Average	**1345**	**1200.25**	**1461.25**	**1290**	**1235**	**1104.5**

The FFS plot for **Soybean crops** benefited from various CRT interventions, including seed treatment with fungicide and Biofertilizer, sowing by 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 12.05% as compared to the control plots, plots in the years 2019 to 2022

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 13.27% as compared to the control plots, plots during the years 2019 to 2022

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 11.82% as compared to the control plots during the years 2019 to 2022.

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

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

7.1 Drought

7.1.1 Rainfed situation

7.1.1.1. Early season drought (delayed onset)

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farmingsituation**	**Normal Crop / Cropping system including variety**	**Change in Crop /Cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2weeks **4th week ofJune**	Medium deep to deep black soils with assured rainfall	Pigeon pea	No Change	Normal package of practices recommended by VNMK, Parbhani	Linkage with VNMKV, Parbhani, MSSC, NSC for supply of seed
		Sorghum	-do-	-do-	
		Black gram	-do-	-do-	
		Soybean	-do-	-do-	
		Sunflower	-do-	-do-	
	Shallow soils with assured rainfall	Pigeon Pea	-do-	-do-	
		Sorghum	-do-	-do-	
		Black gram	-do-	-do-	
		Soybean	-do-	-do-	
		Pearl millet	-do-	-do-	
	Medium deep to deep black soils with low rainfall (Bhoom and Paranda tehsils)	Pigeon Pea	-do-	-do-	
		Sorghum	-do-	-do-	
		Black gram	-do-	-do-	
		Soybean	-do-	-do-	
	Shallow soils with low rainfall (Bhoom and Paranda Tehsils)	Pigeon Pea	-do-	-do-	
		Sorghum	-do-	-do-	
		Black gram	-do-	-do-	
		Pearl millet	-do-	-do-	

Condition			Suggested Contingency measures		
Early season drought (delayedonset)	**Major Farming situation**	**Normal Crop / Cropping systemincluding variety**	**Change in Crop/Croppingsystem**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 weeks2nd week of July	Medium deep todeep black soils with assured rainfall	Pigeon Pea	No change. Prefer varieties likeBSMR 736, 853 BDN 708, 711	Normal package of practices recommended by VNMKV, Parbhani Normal package of practices recommended by VNMKV, Parbhani	Linkage with VNMKV,Parbhani, MSSC, NSC for supply of foundation / certified / truthful seed Supply of seed cum fertilizer drill under RKVY, ZILLA PARISHAD, MAIDC
		Sorghum	Cotton / Maize/ Pigeon Pea (BSMR 736, 853, BDN 708, BDN 711) / Pearl millet (Shradha, Saburi, AIMP-92901) / Sunflower (Morden, SS-56, LSFH-35, BSH-1)		
		Black gram	Soybean (JS 335, VNMKVS-71) + Pigeon Pea (BSMR 736, 853, BDN 708, BDN 711) intercropping in 4:2 or 6:3 row proportion		
		Soybean	-do-		
		Sunflower	No change. Prefer varieties like Morden, SS-56, LSFH-35, BSH-1		
	Shallow soils with assuredrainfall	Pigeon Pea	No change. Prefer varieties like BSMR 736, 853 BDN 708, 711	- do-	
		Sorghum	Cotton / Maize/ Pigeon Pea (BSMR 736, 853, BDN 708, 711) / Pearl millet (Shradha, Saburi,AIMP-92901) / Sunflower (Morden, SS-56,LSFH-35, BSH-1)	- do-	
		Black gram	Soybean (JS 335, VNMKVS-71) + Pigeon Pea (BSMR 736, 853, BDN 708, BDN 711) intercropping in 4:2 or 6:3 rowproportion	- do-	
		Soybean	-do-	- do-	
		Pearl millet	No change. Prefer varieties like Shradha, Saburi, AIMP-92901	- do-	
	Medium deep to	Pigeon Pea	No change. Prefer varieties like BSMR 736, 853 BDN 708, 711	- do-	

	deep black soils with Low rainfall(Bhoom and Paranda tehsils)	Sorghum	Sorghum (CSH-9, 11, 16, PBK-401, 809) + Pigeon Pea (BSMR 736, 853 BDN 708, 711) in 4:2 row proportion	- do-	
		Black gram Soybean	Soybean (JS 335, VNMKVS-71, 81) + Pigeon pea (BSMR 736, 853, BDN 708, 711) in 4:2 row proportion or cotton (Bt. cottonhybrids like Bunny, Mahyco, Ankur, Ajit-51) + Pigeon Pea in 6:2 ratio	- do-	
	Shallow soils with low rainfall (Bhoom and Paranda tehsils)	Pigeon Pea	No change	- do-	
		Sorghum	Pearl millet (Shradha, Saburi, Shanti, ABPC 4-3) + Pigeon Pea (BSMR 736, 853, BDN 708, 711) in 4:2 row proportion	- do-	
		Black gram	Soybean (JS 335, VNMKVS-71, 81) + Pigeon pea (BSMR 736, 853, BDN 708, 711) in 4:2 row proportion	- do-	
		Pearl millet	No change. Prefer varieties like Shradha, Saburi, AIMP-92901	- do-	

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop / Cropping systemincluding variety**	**Normal Crop / Croppingsystem including variety**	**Agronomic measures**	**Remarks on Implementation**
Delay by 6weeks **4th week ofJuly**	Medium deep to deepblack soils with assured rainfall	Pigeon Pea	No change	• Open furrows after every 6-8 rows withBalram plough. Intercultivation with hoe. • Foliar spray with 2% urea and DAP	• Linkage with VNMKV, Parbhani, MSSC, NSC for supply of foundation / certified / truthful seed • Supply of seed cum
		Sorghum Black gram	Pearl millet (Shradha, Saburi,AIMP-92901) + Pigeon pea (BDN-708, 711) in 4:2 or 3:3 row proportion	• Give protective irrigation • Foliar spray with 2% urea and DAP	
		Soybean	Soybean (VNMKVS-47, 71) + Pigeon Pea (BDN-708, 711) in4:2 row proportion		
		Sunflower	Sunflower (Morden, SS-56, LSH-36, Mahyco-17, BSH-1) + Sesamum (JLT-7, 26)	• Interculture with hoe • Protective irrigation	

	Shallow soils with assured rainfall	Pigeon Pea	Pearl millet (Shradha, Saburi,AIMP-92901) + Pigeon pea (BDN-708, 711) in 4:2 or 3:3 row proportion	• Open furrows after every 6-8 rows withBalaram plough • Intercultivation with hoe	fertilizer drill under RKVY, ZILLA PARISHAD, MAIDC
		Sorghum		• Interculture with hoe. Protective irrigation	
		Black gram	Fodder maize (African Tall), Fodder sorghum (Pusa Chaari) / Keep fallow, plan for rabbi crops like sorghum	Plan for land preparation to take up rabbi crops	
		Soybean	Soybean (VNMKVS-47, 71) + Pigeon Pea (BDN-708, 711) in4:2 or 3:3 row proportion	• Give protective irrigation • Foliar spray with 2% urea and DAP	
		Pearl millet	No change. Prefer varieties likeShradha, Saburi, AIMP-92901	Give protective irrigation	
	Medium deep to deep black soils with low rainfall (Bhoom and Paranda tehsils)	Pigeon Pea	No change / Pearl millet + Pigeon Pea in 4:2 or 3:3 or sesamum (No.-85, JLT-7), Fodder sorghum (*Nilwa*)	• Open furrows after every 6-8 rows with Balaram plough • Intercultivation with hoe • Foliar spray with 2% urea and DAP	
		Sorghum	Castor (VI-9, Aruna, DCS-9 (Jyothi), GGH-4, 5, 6 and DCH-117 / 32)		
		Black gram	Keep fallow, plan for rabbi crops like sorghum	• Plan for land preparation to take up rabbi crops • Foliar spray with 2% urea and DAP	
		Soybean	Soybean + Pigeon pea 4:2 (VNMKVS-47, 71 + BSMR 853, BDN-708, 711)		
	Shallow soils with low rainfall (Bhoom andParanda tehsils)	Pigeon Pea	Pearl millet (Shradha, Saburi, AIMP-92901) + Pigeon pea (BDN-708, 711) in 4:2 or 3:3 row proportion	• Open furrows after every 6-8 rows with Balaram plough • Intercultivation with hoe • Foliar spray with 2% urea and DAP	
		Sorghum			
		Black gram	Fodder maize (African Tall), Fodder sorghum (Pusa Chaari) / Keep fallow, plan for rabbi cropslike sorghum	Plan for land preparation to take up rabbi crops	
		Pearl millet	No change. Prefer varieties like Shradha, Saburi, AIMP-92901	Give protective irrigation	

Condition			Suggested Contingency measures		
Early season drought (Delayed Onset)	**Major Farming situation**	**Normal Crop / Cropping systemincluding variety**	**Change in Crop/Cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 8weeks 2nd week ofAug	Medium deep to deep black soils withassured rainfall	Pigeon Pea	Pearl millet + Pigeon Pea in 3:3 or 4:2 row proportion. Prefer early maturing varieties like BDN-708 / 711	• Open conservation furrow after every 6-8 rows withBalram plough. • Adopt closer spacing of 60 X30 cm for Pigeon Pea. • Seed hardening i.e. 18 hrs soaking in water followed by24 hrs. shade drying.	• Supply of seed cum fertilizer drill underRKVY, ZILLA PARISHAD, MAIDC • Supply of seed through MSSC, NFSM, University, Village seed production programme.
		Sorghum		• Open conservation furrow after every 6-8 rows withBalram plough. • Seed hardening i.e. 18 hrs soaking in water followed by24 hrs shade drying.	
		Black gram	Niger **(**Local) / fodder sorghum / fallow for Rabbi crops	Prepare land for early sowing of rabbi crops	
		Soybean	*Kharif* fallow followed by *rabbi* crops	-do-	
		Sunflower	Sunflower (Morden, SS-56, LSH-36, Mahyco-17, BSH-1) + Pigeon Pea (BSMR 853, BDN-708,711	*In situ* moisture conservation like conservation furrows with Balramplough and protective irrigation	
	Shallow soils with assured rainfall	Pigeon Pea	Pearl millet + Pigeon Pea in 3:3 or4:2 row proportion. Prefer early maturing varieties like BDN-708 / 711	Intercultivation with hoe or conservation furrows with Balramplough and protective irrigation at critical stages	
		Sorghum	-do-		
		Black gram	Niger **(**Local) / fodder sorghum / fallow for Rabbi crops	Prepare land for early sowing of rabbi crops	
		Soybean	*Kharif* fallow followed by *rabbi* crops	-do-	
		Pearl millet	No change. Prefer varieties like Shradha, Saburi, AIMP-92901	Interculture with hoe, protective irrigation	

	Medium deep to deep black soils with low rainfall (Bhoom and Paranda Tehsils)	Pigeon Pea	Pearl millet + Pigeon Pea in 3:3 or4:2 row proportion. Prefer early maturing varieties like BDN-708 / 711	Intercultivation with hoe or conservation furrows with Balramplough and protective irrigation at critical stages	
		Sorghum	-do-		
		Black gram	Niger (Local) / fodder sorghum / fallow for Rabbi crops	Prepare land for early sowing of rabbi crops	
		Soybean	*Kharif* fallow followed by *rabbi* crops	-do-	
	Shallow soils with low rainfall (Bhoom and Paranda tehsils)	Pigeon Pea	Pearl millet + Pigeon Pea in 3:3 or 4:2 row proportion. Prefer early maturing varieties like BDN-708 / 711	Interculture with hoe, protective irrigation, if feasible	
		Sorghum	Sunflower / Castor	-do-	
		Black gram	Niger (Local) / fodder sorghum / fallow for Rabbi crops	Prepare land for early sowing of rabbi crops	
		Pearl millet	No change. Prefer varieties like Shradha, Saburi, AIMP-92901	Interculture with hoe, protective irrigation, if feasible	

7.1.1.2. Early season drought (Normal onset)

Condition			**Suggested Contingency measures**		
Early seasondrough (Normal onset)	**Major Farming situation**	**Normal Crop / Cropping system**	**Crop management**	**Soil nutrient & moisture Conservation measures**	**Remarks on Implementation**
Normal onset followed by 15-20 days dry spell after sowing germination / crop stand etc.	Medium deep to deepblack soils with assured rainfall	Pigeon Pea	• Gap filling within the rows with same or short duration cultivar to maintain at least 75% plant population	Interculture with hoe	Supply of interculturalimplements (Harrow, hoe) through MAIDC,Zilla Parishad
		Sorghum	Gap filling with pearl millet / Pigeon Pea	-do-	
		Black gram	• Gap filling within the rows with the same variety • If the plant population is less than 50% of optimum, go for resowingof the alternate crops like pearl millet / sunflower / Pigeon Pea • If possible, give protective irrigation with sprinkler.	-do-	

		Soybean	• Gap filling within the rows with same or short duration cultivar to maintain at least 75% of optimumplant population • If the plant population is less than50% resow the crop	-do-	
		Sunflower	• Gap filling within the rows with same or short duration cultivar tomaintain at least 75% plant Population	-do	
	Shallow soils with assured rainfall	Pigeon Pea	Gap filling within the rows with same or short duration cultivar to maintain atleast 75% plant population	-do-	
		Sorghum	Gap filling with pearl millet /Pigeon Pea	-do-	
		Black gram	• Gap filling within the rows with the same variety • If the plant population is less than50% of optimum, go for resowingof the alternate crops like pearl millet / sunflower / Pigeon Pea • If possible, give protectiveirrigation with sprinkler.	-do-	
		Soybean	• Gap filling within the rows with same or short duration cultivar to maintain at least 75% of optimumplant population • If the plant population is less than50% resow the crop	-do-	
		Pearl millet	Gap filling or transplanting of seedlings either from the same field or from nursery or gap filling withPigeon Pea	Interculture with hoe.	
	Medium deep to deep black soils with low	Pigeon Pea	Gap filling within the rows with same or short duration cultivar to maintain atleast 75% plant population	-do-	
		Sorghum	Gap filling with pearl millet / Pigeon Pea	-do-	

	rainfall (Bhoom and Paranda tehsils)	Black gram	• Gap filling within the rows with the same variety • If the plant population is less than50% of optimum, go for resowingof the alternate crops like pearl millet / sunflower / Pigeon Pea • If possible, give protectiveirrigation with sprinkler.	-do-	
		Soybean	• Gap filling within the rows with same or short duration cultivar to maintain at least 75% of optimum	-do-	
			plant population • If the plant population is less than50% resow the crop		
	Shallow soils with low rainfall (Bhoom andParanda tehsils)	Pigeon Pea	Gap filling within the rows with same or short duration cultivar to maintain atleast 75% plant population	do	
		Sorghum	Gap filling with pearl millet / Pigeon Pea	-do-	
		Black gram	• Gap filling within the rows with the same variety • If the plant population is less than50% of optimum, go for resowingof the alternate crops like pearl millet / sunflower / Pigeon Pea • If possible, give protective irrigation with sprinkler.	-do-	
		Pearl millet	Gap filling or transplanting of seedlings either from the same field orfrom nursery or gap filling with Pigeon Pea	do-	

7.1.1.3. Mid-season drought(Long Dry Spell)

Condition			Suggested Contingency measures		
Mid-season drought (long dry spell, consecutive 2weeks rainless (>2.5 mm) period)	**Major Farming situation**	**Normal Crop / Cropping system**	**Crop management**	**Soil nutrient & moistureconservation measures**	**Remarks on Implementation**
At vegetative Stage	Medium deepto deep black soils with assured rainfall	Pigeon Pea	• Interculture with harrow for weedingand to create soil mulch. • Protective irrigation if possible,through farm pond water	• Avoid top dressing of fertilizers till sufficient soilmoisture is available. • Opening of alternate furrowsafter every 6-8 rows with Balaram plough. • Mulching with crop residue @3-5 t / ha within the rows • Spraying of 2% urea or DAP	• Supply of intercultural implements (Harrow, hoe) through MAIDC, Zilla Parishad. • Link farm ponds technology through watershed programme / NREGS implemented by Agriculture Department.
		Sorghum	• Protective irrigation if possible,through farm pond water • Intra row thinning • Intercultivation with harrow forweeding	Avoid top dressing of fertilizers till sufficient soil moisture is available. • Opening of alternate furrows • after every 6-8 rows with Balaram plough.	
		Black gram	• Interculture for weeding and to createsoil mulch. • Protective irrigation if possible, give through farm pond water	• Spraying of 2% urea or DAP • Interculture with hoe	
		Soybean	Interculture for weeding and to create soil mulch.	• Opening of alternate furrows with Balaram plough. • Mulching with crop residue @3-5 t / ha within the rows • Spraying of 2% urea or DAP	
		Sunflower	-do-	-do-	

	Shallow soils with assured rainfall	Pigeon Pea	• Interculture for weeding and to create soil mulch • Protective irrigation	• Spraying of 2% urea or DAP • Opening of alternate furrows	
		Sorghum	• Protective irrigation if possible through farm pond water • Intra row thinning • Intercultivation with harrow for weeding	• Avoid top dressing of fertilizers till sufficient soilmoisture is available. • Opening of alternate furrows with Balaram plough	
		Black gram	• Interculture for weeding and to create soil mulch. • Protective irrigation if possiblethrough farm pond water	Spraying of 2% urea or DAP	
		Soybean	Prepare shallow furrow while hoeing by tying ropes to prongs, which will providesoil support to crop plant and conserve soil moisture	Land leveling and bunding in caseof regular dry spells	
		Pearl millet	• Avoid top dressing of fertilizers till sufficient soil moisture is available • Interculture with harrow for weedingand to create soil mulch. • Protective irrigation if possible, give through farm pond water	Opening of alternate furrows	
	Medium deep to deep black soils with low rainfall.	Pigeon Pea	• Interculture with harrow for weeding and to create soil mulch. • Protective irrigation if possible, give through farm pond water.	• Avoid top dressing of fertilizers till sufficient soil moisture are available Opening of alternate furrows with Baliram plough. • Mulching with crop residue • Spraying of 2% urea or DAP	

		Sorghum	• Protective irrigation if possiblethrough farm pond water • Intra row thinning • Interculture with harrow for weedingand to create soil mulch to conserve moisture.	• Avoid top dressing of fertilizers till sufficient soil moisture is available. • Opening of alternate furrows with Balaram plough	
		Black gram	• Interculture with harrow for weeding and to create soil mulch. • Protective irrigation if possiblethrough farm pond water	Spraying of 2% urea or DAP	
		Soybean	Interculture with harrow for weeding and to create soil mulch.	• Spraying of 2% urea or DAP • Opening of alternate furrows	
	Shallow soils with low rainfall (Bhoom andParanda tehsils)	Pigeon Pea	• Interculture with harrow for weeding and to create soil mulch. • Protective irrigation if possiblethrough farm pond water	• Avoid top dressing of fertilizers till sufficient soilmoisture is available. • Opening of alternate furrows with Balaram plough. • Mulching with crop residue • Spraying of 2% urea or DAP	
		Sorghum	• Protective irrigation if possible through farm pond water • Intra row thinning	• Avoid top dressing of fertilizers till sufficient soilmoisture is available • Interculture for weeding andto create soil mulch to conserve moisture. • Opening of alternate	

				furrows	
		Black gram	• Interculture for weeding and to create soil mulch. • Protective irrigation if possible through farm pond water	Spraying of 2% urea or DAP	
		Pearl millet	• Interculture with harrow for weeding and to create soil mulch. • Protective irrigation if possible,through farm pond water	• Avoid top dressing of fertilizers till sufficient soilmoisture is available. • Opening of alternate furrows with Baliram plough. • Mulching with crop residue • Spraying of 2% urea or DAP	

Condition			**Suggested Contingency measures**		
Mid-seasondrought (long dry spell)	**Major Farming situation**	**Normal Crop / Cropping system**	**Crop management**	**Soil nutrient & moistureconservation measures**	**Remarks on Implementation**
At flowering /fruiting stage	Medium deep todeep black soils with assured rainfall	Pigeon Pea	Life saving irrigation if possible throughfarm pond water	Foliar spray of 2% KNO_3,urea and DAP	• Farm ponds through watershed development • Supply of seed through MSSC, NFSM, VNMKV, Villageseed production programme • Implements through MAIDC, Zilla Parishad
		Sorghum	• Life saving irrigation if possible,through farm pond water • In case of severe stress, harvest asgreen fodder	If feasible spray anti- transparent 6% kaolin	
		Black gram	Life saving irrigation if possible, through farm pond water	Spraying of 2% urea and DAP	

		Soybean	-do-	Foliar spray of 2% urea and DAP	
		Sunflower	-do-	-do-	
	Shallow soils withassured rainfall	Pigeon Pea	Life saving irrigation if possible, through farm pond water	Foliar spray of 2% urea and DAP	
		Sorghum	Life saving irrigation if possible, throughfarm pond water.	• If feasible spray anti- transparent 6% kaolin • In case of severe stress,harvest as green fodder	
		Black gram	• Life saving irrigation, if possible,through farm pond water • In case of severe stress harvest as greenfodder	Spraying of 2% urea andDAP	
		Soybean	Life saving irrigation if possible through farm pond water	Foliar spray of 2% urea and DAP	
		Pearl millet	-do-	-do-	
	Medium deep todeep black soils with low rainfall(Bhoom and Paranda tehsils)	Pigeon Pea	Life saving irrigation if possible through farm pond water	Foliar spray of 2% KNO_3, urea and DAP	
		Sorghum	-do-	-do-	
		Black gram	-do-	Spraying of 2% urea and DAP	
		Soybean	-do-	-do-	
	Shallow soils with low rainfall (Bhoom and Paranda tehsils)	Pigeon Pea	Life saving irrigation if possible, give through farm pond water	Foliar spray of 2% urea and DAP	
		Sorghum	• Life saving irrigation if possible through farm pond water If feasiblespray anti-transparent 6% kaolin. • In case of severe stress harvest as greenfodder	-do-	
		Black gram	Life saving irrigation if possible through farm pond water	Spraying of 2% urea and DAP	
		Pearl millet	-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**	**Rabbi Crop planning**	**Remarks on Implementation**
	Medium deep to deepblack soils with assured rainfall	Pigeon Pea	Life saving irrigation	-	• Farm ponds through watershed development • Supply of seed through MSSC, NFSM, VNMKV, Village seed production programme • Implements through MAIDC, Zilla Parishad
		Sorghum	Life saving irrigation or harvest at physiological maturity	Plan for rabbi crops chickpea / safflower	
		Black gram	Harvest at physiological maturity	Plan for rabbi crops chickpea / safflower / rabbi sorghum / sunflower	
		Soybean	Life saving irrigation	-do-	
		Sunflower	-do-	-do-	
	Shallow soils withassured rainfall	Pigeon Pea	Life saving irrigation	-	
		Sorghum	Life saving irrigation or harvest at physiological maturity	Plan for rabbi crops chickpea / Safflower	
		Black gram	Harvest at physiological maturity	Plan for rabbi crops chickpea / Safflower / rabbi Sorghum / Sunflower	
		Soybean	Life saving irrigation	-do-	
		Pearl millet	Life saving irrigation or harvest at physiological maturity	-do-	
	Medium deep to deepblack soils with low rainfall (Bhoom and Paranda tehsils)	Pigeon Pea	Life saving irrigation	-	
		Sorghum	Life saving irrigation or harvest at physiological maturity	-do-	
		Black gram	Harvest at physiological maturity	Plan for rabbi crops chickpea / safflower / rabbi sorghum / sunflower	
		Soybean	Life saving irrigation	Plan for rabbi crops Chickpea / Safflower	
	Shallow soils with low rainfall (Bhoom and Paranda tehsils)	Pigeon Pea	Life saving irrigation	Foliar spray of 2% KNO_3, urea and DAP	
		Sorghum	• Life saving irrigation In case of severe stress harvestas green fodder	Plan for rabbi crops chickpea / Safflower	
		Black gram	Harvest at physiological maturity	Plan for rabbi crops chickpea / Safflower / rabbi Sorghum /	

				sunflower	
		Pearl millet	Life saving irrigation or harvest at physiological maturity	Plan for rabbi crops chickpea / Safflower after harvest ofsole pearl millet	

7.1.2 Irrigated situation

Condition			Suggested Contingency measures		
	Major Farmingsituation	Normal Crop/Cropping system	Change in crop / cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due tolow rainfall	Medium deep to deep black cotton soil with assured rainfall	Sugarcane	No change or irrigatedcotton	Raising of nurseries with single budded setts to save the time andwater for pre-seasonal planting. Drip system for enhancing the waterproductivity. Mulching with sugarcane trashbetween rows and frequent interculture to conserve moisture	Linkage with DSAO for micro-irrigation
		Turmeric	No change	Use drip irrigation	
		Vegetable crops	Cotton / Maize	-do-	
		Mango	No change	• Drip irrigation • Basin mulch	
	Shallow soils withassured rainfall	Grape			
		Kagzi lime			
	Medium deep to deepblack cotton soil with low rainfall (Bhoom and Paranda)	Wheat / Onion		• Drip irrigation • Irrigation at critical crop growthstages	
	Shallow soils with low rainfall (Bhoom and Paranda tehsils)	Wheat	Rabi sorghum / chickpea	Irrigation at critical crop growth stages	

Condition			Suggested Contingency measures		
	Major Farmingsituation	Normal Crop/Cropping system	Change in crop / cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals dueto low rainfall	Medium deep to deep black cotton soil with assured rainfall	Sugarcane	No change or irrigated cotton	• Raising of nurseries with single budded setts to save the timeand water for pre- seasonal planting • Drip system for enhancing the waterproductivity • Mulching with sugarcane trash between rows and frequent interculture to conserve moisture	Linkage with DSAO for micro-irrigation
		Turmeric	No change	Use drip irrigation	
		Vegetable crops	Cotton / Maize	-do-	
		Mango	No change	• Drip irrigation • Basin mulch	
	Shallow soils with assured rainfall	Grape	No change	-do-	
		Kagzi lime	No change	-do-	
	Medium deep to deep black cotton soil with low rainfall (Bhoom and Paranda tehsils)	Wheat / Onion	No change	• Drip irrigation • Irrigation at critical crop growth stages	
	Shallow soils with low rainfall (Bhoom and Paranda tehsils)	Wheat	Rabi sorghum / chickpea	Irrigation at critical crop growth stages	

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/Cropping system	Change in crop / cropping system	Agronomic measures	Remarks on Implementation
Non release of waterin canals under delayed onset of monsoon in catchment	Medium deep to deep black cotton soil with assured rainfall	Sugarcane	Cotton	• Mulching • Interculture	Linkage with MAU, Parbhani, MSSC, NSC for seed
		Turmeric	Rabi sorghum, Chickpea and safflower	-do-	
		Vegetable crops	Pigeon Pea	-do-	
		Mango	No change	-do-	
	Shallow soils with assuredrainfall	Grape	No change	Arrange for waterfrom some other source	
		Kagzilime	No change	-do-	
	Medium deep to deep black cotton soil with low rainfall (Bhoomand Paranda tehsils)	Sugarcane	Cotton	• Mulching • Interculture	
		Turmeric	Rabi sorghum, Chickpeaand safflower	-do-	
		Vegetable crops	Pigeon Pea	-do-	
		Mango	No change	-do-	
	Shallow soils with lowrainfall (Bhoom and Paranda tehsils	Not applicable			

Condition			Suggested Contingency measures		
	Major Farming situation	Normal Crop/Cropping system	Change in crop / cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater	Medium deep to deep black cotton soil with	Sugarcane	Cotton	• Mulching • Interculture	Linkage with MAU, Parbhani, MSSC, NSC for seed
recharge due to lowrainfall	assured rainfall	Turmeric	Rabi sorghum, Chickpea and safflower		
		Vegetable crops	Pigeon Pea		
		Mango	No change		
	Shallow soils with assured rainfall	Grape	No change	Arrange for water from some other source	
		Kagzilime	No change		
	Medium deep to deep black cotton soil with low rainfall (Bhoomand Paranda tehsils)	Sugarcane	Cotton	• Mulching • Interculture	
		Turmeric	Rabi sorghum, Chickpea and safflower		
		Vegetable crops	Pigeon Pea		
		Mango	No change		
	Shallow soils with low rainfall (Bhoom andParanda tehsils)	Not applicable			

Grape	Soil drenching with COC 3g/litre to avoid rhizome rot	Spray Dithane M-45 3g/liter or propiconazole 1 ml/liter 2-3 timesagainst *Cercospora* leaf spot		
Pomegranate	a) Insect pest - Shot hole borer - Use Geru paste withinsecticides - Soil application of 10 g phorate @ 10g/plant in basin b) Disease - i) Bacterial blight – Spraying of bactinashak 250ppm (2.5g/10 lit.) and captaf 0.25 % alternatively ii) Fungal fruit and leaf spot- Spraying of mancozeb 75 WP 0.25 % or carbendazim 50 WP 0.1 %Wilt	i) Shot hole borer - Use Geru paste with insecticides - Soil application of 10 g phorate @ 10g/plant in basin ii) Anar caterpillar - Spraying of Emamectin benzoate 5SG @ 5g/10 lit. water. i) Bacterial spot – Spraying of bactinashak 250 ppm(2.5 g / 10 lit.) and captaf 0.25 % alternatively ii) Fungal fruit and leaf spot- Spraying of mancozeb 75 WP 0.25 % or carbendazium 50 WP 0.1 %	i) Fruit sucking moth - Protect the fruits either by bagging orby using repellents i) Bacterial spot – Spraying of bactinashak 250 ppm (2.5 g / 10 lit.) and captaf 0.25 % alternatively	

Chapter 8: Agro meteorological Advisory

8.1 Importance / Need of Agro-met advisory

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

8.2 Forecasts or advisories generated at district level

Weather forecasts are short range, medium range and long range. Long range weather forecasts provide guidelines for selection of crops best suited to the anticipated climatic conditions. The short and medium range weather forecasts help to advise the farmers on the actual and expected weather to make decisions on day-to-day farming operations such as sowing, weeding, time of pesticides spray, irrigation scheduling, fertiliser application etc., in crop management.

8.3 Agro-met Advisory Bulletin

It is generated by using medium range weather forecasts. This advisory issued by Gramin Krishi Mousam Seva, Dharashiv. It collaborated with ICAR (Indian council of agriculture research) and IMD (Indian meteorological department) https://mausam.imd.gov.in/imd_latest/contents/agromet/advisory/blocalmain.php.The IMD's Agrometeorological Advisory Service (AAS) collects and organizes climate/weather, soil, and crop information. The IMD's Agricultural Meteorology Division also supports and participates in multi-disciplinary activities in this field. Weather-based crop advisory services can provide farmers with real-time information about weather patterns, crop health, and appropriate measures. This information can help farmers make informed decisions about various crop management practices. For example, farmers can use weather-based services to help with, Sowing/transplanting of crops, Pesticide and fertilizer application, Scheduling irrigation, Timely harvesting of the crops, Vaccination of animals etc. and district level weather forecast is also provided by Indian Meteorological Department
https://mausam.imd.gov.in/imd_latest/contents/agromet/advisory/indiadistrictforecast.php

8.4 DAMU information

DAMU are being established in KVKs under the ICAR network in a phased manner for rendering block level Agro-met advisory Services. District Agro-met Unit (DAMU), a project of Indian Meteorological Department is operational in 200 KVKs All over India. They provide block level AAB Based on medium range weather forecast, block-wise Agro-Met advisory

bulletins are transmitted weekly twice to farmers, state department, IMD, NGOs and mass media. District Agro-Met Units (DAMU) is the flagship programme of Govt. of India for weather-related services to the farmers aiding in decision making on day-to-day agricultural operations. The scheme is downscaled at block level with great concern to address weather needs of farmers at micro level. This is a joint effort of IMD and ICAR with multi-organizational collaboration to implement various components. While the scheme is in existence since long, following service requirements from the district Agro-met Units (DAMUs) located in the Krishi Vigyan Kendra's (KVKs) are deciphered to implement block level Agro-met advisory Service (AAS) under grant-in-aid programme of IMD. SMS (Agro-met) has the pivotal role in association with the Nodal Officer and other experts in the KVK to implement the service

8.5 Other Sources of Agro-Meteorogical / Weather Advisories

8.5.1 Meghdoot: Its joint initiative of India Meteorological Department (IMD), Indian Institute of Tropical Meteorology (IITM) and Indian Council OF Agricultural Research (ICAR) aims to deliver critical information to farmers through a simple and easy to use mobile application. The mobile application was developed by the Digital Agriculture research theme at International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad in collaboration with IITM, Pune and IMD, Delhi. The app seamlessly aggregates contextualised district and crop wise advisories issued by Agro-met Field Units (AMFU) & District Agro-Met Unit (DAMU) every Tuesday and Friday with the forecast and historic weather information to the fingertips of the farmers. ***https://play.google.com/store/apps/details?id=com.aas.meghdoot***

8.5.2 VNMKV, Parbhani: AAB is also available on Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani website.
https://university.vnmkv.ac.in/WeatherBulletinpdf/_AAB_Parbhani.pdf

8.5.3 VNMKV, Parbhani: AAB is also available on Blogger.
https://www.blogger.com/blog/posts/5278960244914681835?bpli=1&pli=1

8.5.4 YouTube Channel of VNMKV, Parbhani (An agriculture university of the region)

8.5.5 YouTube Channel of Agriculture Dept. Govt. Maharashtra "हवामानाचा अंदाज आणि कृषि तज्ञांचा सल्ला 2023"

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

8.6 Utilisation of Agro-Met Advisory by farmers in changing climatic conditions.

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

This advisory includes rainfed as well as irrigated crop which help the farmers for accurate timing of sowing for control of pest diseases, protective irrigation and animal care. This results in proper time of sowing, better management of spraying schedule to avoid stress of moisture on crop condition, better management of sheep, goat, buffalo, cow and bullock. This helps the farmers by increasing his crop production, financial condition and his good living standard.

8.6 Advisory based on Pest surveillance activity

Agriculture Department of Maharashtra State is entrusted with the responsibility of sustainable Agriculture Development. For increasing crop production and productivity various activities like promoting use of improved / hybrid seeds, balance use of fertilizers, Integrated Pest Management, land development, micro-irrigation, mechanizations, technology transfer through extension services are carried out by the Agriculture Department.

In Maharashtra Soybean, cotton, rice, tur, sorghum and bajra are major Kharif crops while, sorghum, wheat gram are the major crops grown in the Rabi season. soybean-cotton-tur-Gram is the major crop system observed in the State. Due to good average per hectare yield and fetching of good market prices, farmers are shifting towards cotton and soybean crops in last few years. Pest disease management is the crucial factor in crop production. In general, there is 20-30% losses in yield occurred due to pest and diseases. Vulnerability of rainfall and changes in weather thereof leads to create congenial conditions for pest and disease development. There is a heavy economic loss to farmer, if pest and disease problem do not managed in time.

During Sept-Oct, 2008 there was sudden outbreak defoliators on Soybean crop particularly in Marathwada and Vidarbha regions of the State. Within a short while the pest spread in such a rapid proportion that 48% of sown area under Soybean crop was infested and out of that on 70% area crop losses were more than 50%. To avoid the crop losses due to pest and diseases recurrence and as a long-term strategy, Department of Agriculture has taken initiative and formulated and implemented “Awareness-cum surveillance programme for management of major pests in cotton-soybean based cropping system in Maharashtra” in 2009-10 under technical guidance of National Integrated Pest Management Centre (NCIPM), New Delhi and again continued as “Crop Pest Surveillance and Advisory Project” (CROPSAP) from 2010-11.

8.6.1. Implementation status of CROPSAP

AGRICULTURE ASSISTANT 2022-2023					
Division	District	No of Agriculture Assistant	Target no of field	Achieved (Based on Data Upload)	% of work done
Latur	Dharashiv	265	34980	22340	63.87

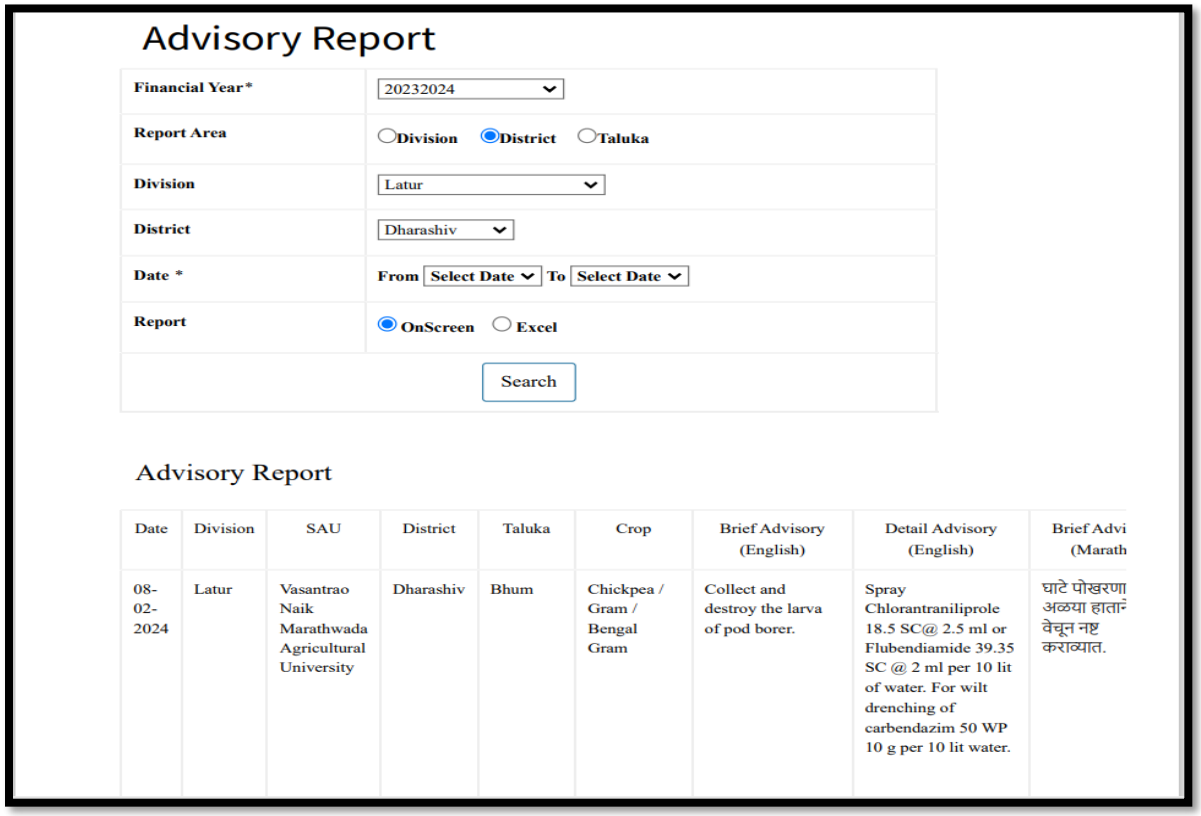
AGRICULTURE SUPERVISOR					
Division	District	No of Agriculture Supervisor	Target no of field	Achieved (Based	% of work done

				on Data Upload)	
Latur	Dharashiv	44	5808	4167	71.75

CIRCLE AGRI OFFICER					
Division	District	No of Circle Agri Officer	Target no of field	Achieved (Based on Data Upload)	% of work done
Latur	Dharashiv	22	2904	1360	46.83

TALUKA AGRI OFFICER					
Division	District	No of Taluka Agri Officer	Target no of field	Achieved (Based on Data Upload)	% of work done
Latur	Dharashiv	8	1008	512	50.79

8.6.1.1 Advisory Report



8.6.1.2 Pests and surveillance:

Crop	Quantitative	Qualitative surveillance
Soybean	*Spodoptera*, Semilooper (*Chrysodeixis acuta*), *Helicoverpa armigera*, Girdle beetle (*Obereopsis brevis*)	Hairy caterpillar, Stem fly *(Melanogromyza sojae)*, Whitefly *(Bemisia tabaci)* , Yellow mosaic virus, Rust *(Phakopsora pachyrhizi)* and Pod blight *(Colletorictum truncatum)*
Cotton	*Spodoptera*, Jassids (*Amrasca devestans*), Whiteflies (*Bemisia tabaci*), Thrips (*Thrips tabaci*), Mealybug (*Phenacoccus solenopsis*) and Leaf reddening	Aphids *(Aphis gossypii)*, *H. armigera*, *Earias* spp., Pink bollworm *(Pectinophora gossipiella)*, Grey mildew *(Ramularia areola)* and Parawilt
Rice	Yellow stem borer (*Scirpophaga incertulas*), Gall midge (*Orseolia oryzae*), Swarming caterpillar (*Spodoptera mauritia*), Leaf folder (*Cnaphalocrosis medinalis*), Plant hoppers – White blacked plant hopper (*Sogatella furcifera*) & Brown plant hopper (*Nilaparvata lugens*), Blue beetle (*Leptisma pygmaea*), Bacterial leaf blight (*Xanthomonas campestris pv oryzae*), Sheath blight (*Rhizoctonia solani*) and Blast – (*Pyricularia oryzae*)	Caseworm *(Nymphula depunctalis)*, Brown spot *(Helminthosporium oryzae)*, *Hispa*
Pigeonpea	Pod borer (*Helicoverpa armigera*), Pod fly *(Melanagromyza obtusa)*	Mealybug, Cowbug, Pod bugs, Termites, Stem weevil, Blister beetle and Sterility mosaic
Chickpea	*Helicoverpa armigera*, Wilt disease (*Fusarium*)	-

8.6.1.3 Schedule of pest surveillance and management advisories:

Data collection	Data entry and uploads	Data analysis & issue of advisories (SAUs)	Dissemination of advisories by DA
Monday & Tuesday	Wednesday	Thursday	Thursday
Thursday & Friday	Saturday	Monday	Monday

The regular monitoring and dissemination of advisory helped in reducing the number of chemical pesticide sprays in fields of IPM trained farmers as compared to farmer practices. The seed cotton yield recorded was also higher in IPM as compared to FPs. Implementation of this application not only helped in identifying the hot spots but also geared up the staff to manage the crisis situations through creation of popularity and awareness, in the district.

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

9.1 Existing marketing scenario in the district

Market Structure

Dharashiv has a total of 8 APMCs out of which the major APMCs are Kalamb, Murum and Umarga. Dharashiv district is located in between two major agricultural markets of Solapur and Latur, and both these districts heavily influence the APMC volumes in the district. Typically, in talukas/blocks close to Latur or Solapur, farmers tend to sell their produce directly into these districts, instead of bringing them to markets within Dharashiv. This was further corroborated by discussions with the APMC secretaries of Dharashiv and Tuljapur, who were of the opinion that only 5% and 30% of the total production respectively in their talukas was getting traded through their APMC. The major reason quoted by them was the presence of large traders and processors either directly purchasing from the district or the farmers going there to sell their produce for a better price.

APMCs

An analysis of the total APMC volumes in the district indicate that 87% of the total APMC arrivals (all the commodities put together) are traded through Kalamb and Murum together, though the share of these two APMC areas might actually be much lower when comparing the total volumes from Dharashiv, across all commodities and market channels.

Overall, discussions indicate that a bulk of the produce grown in Dharashiv district is traded outside the district, with a major chunk of that being sold in either Solapur or Latur.

Grading

Grading in the district's APMCs is almost always a semi-manual process. Weighing is done electronically but grading after that is done through visual inspection. There can be significant price variation between grades, for instance there are four grades of soybean available with a price swing of about 20-25% between the lowest and highest grades.

While manual grading is not based on a new set of grades, the method of grade assessment is based on a set of established thumb rules and estimates developed by the traders and commission agents over long years of experience. There are certain agents that also use moisture metres for the grading of the produce brought in by the farmers, but not all. Some examples of manual grade assessment are as follow:

- In cereals and pulses, the size of the grain, uniformity of the grain size across the sample as well as boldness of the colour is also an important factor. For instance, in Red Gram large and bold red coloured grains are rated above smaller and lighter coloured grains.
- Damage to grains is another factor that is important. Often crops which are harvested using machine harvesting have scratches on the grain and hence command a relatively lower price than those harvested by hand.
- Amount of thrash, foreign matter and other edible grain (for instance soya grains in a red gram sample) is another determinant of grade of the produce. While certain foreign matter such as twigs, leaf’s etc - to a manageable extent - is tolerable, edible grains and large amounts of rocks, soil etc is graded low.

The above are largely assessment methods and not setting up new grades altogether. Albeit, owing to non-accurate measures of testing, produce is likely to be classified in a lesser number of grades than what is mandated as per the AgMark standards.

The lack of time is one of the cited reasons for not using more machine-based grading systems. However, while traders and agents often prefer to assess grades as per their set practices, they are also prone to make mistakes, since entire grading is based on judgement at the field level, while further down the value chain the larger processing and trading houses (such as processors, organised retailers, exporters etc) use more mechanised system of grade assessment when purchasing from commission agents and local traders.

Time apart, around 60% of agents interviewed felt that the infrastructure for grade assessment was insufficient at the APMC, however manual grading was more a preference issue rather than an infrastructure issue. Many farmers are sceptical of electronic forms of grading citing fears of manipulation by agents as well as comfort level due to familiarity with the manual grading process. There are certain agents that feel a need for electronic grading but then the farmers are not aware about the same and prefer manual grading.

9.1.1 Agriculture Support Services

Input Market

The input supply system in Dharashiv is well established with a mix of private players and cooperatives providing agricultural inputs to farmers. In the case of seeds, fertilisers and pesticides, while there are many retailers who source their produce from company distributors (for onward sales), direct distributors of major brands are also present in good numbers in the district. As a result, the latest products are always available in sufficient numbers and at MRP or below to farmers.

Farmers in general are satisfied with the input availability in Dharashiv. Though access to inputs in very interior villages is poor. Some farmers complained regarding affordability, though dealers routinely sell inputs at MRP or below MRP, which can be reasonably assumed to be set after factoring in purchasing power of farmers. Hence, the affordability comment of some farmers may not be very viable.

9.1.2 Processing and post-harvest infrastructure

Processing

Dharashiv and its talukas are categorised under the D+ category in the latest Industrial Policy of Maharashtra. The district has few industries, with very little industrial production being inclined towards agro-processing industries. Currently, amongst the food processing industries, there are only 3 dal mills, followed by oil mills, Sugar processing. In addition to this, there are also a handful of Jaggery units and small food processing units.

Despite the prominence of soybean production in the district, soybean processing is not present in the district, and hence all the soybean produced is transported to Latur for further processing. Dal Mill is also a very small business and a significant amount of pulses are transported to neighbouring markets for further processing. Similar experiences are with Jowar and coriander. The marketable surplus of Jowar gets transported to Latur either for sale to grain based distilleries or to be sorted, graded and packaged to be sold for local consumption. Similarly, almost the entire coriander in the district is sold to Hyderabad markets, with little or no processing options in the district.

Post-Harvest processing by Farmers

The processors interviewed rate the quality of produce available in the district very high. Almost all processors have rated produce as 4 out of a scale of 5 in terms of quality and potential processing recovery. However common complaints included moisture in produce and incorrect grading. Almost all farmers are aware that better post-harvest activities would increase their price realisation (by an average of 10%). However, no farmers clean their produce after harvest. The lack of post-harvest activities is attributed to the fact that farmers are worried that once graded, the second and third grade portion of their produce may not find a market or they may be cheated in the bargain. And consequently, they feel that the extra price on the first-grade produce, may not be enough to cover such losses.

Year Wise Marketable surplus and its rate of major crops of the district

Sr. No.	Crop	2018-19		2019-20		2020-21		2021-22		2022-23	
		Supply in Quintal	Average Rate per Quintal (Rs.)	Supply in Quintal	Average Rate per Quintal (Rs.)	Supply in Quintal	Average Rate per Quintal (Rs.)	Supply in Quintal	Average Rate per Quintal (Rs.)	Supply in Quintal	Average Rate per Quintal (Rs.)
1	Pigeon Pea	29862	5060	23259	4431	46362	5783	21825	5449	7095	5994
2	Maize	6276	1338	4653	1743	4593	1583	8298	1839	8289	2046
3	Bengal Gram	50319	3516	30129	3917	70338	4116	60159	4447	36933	4332
4	Black Gram	42477	4061	28656	5507	43653	5570	52743	4951	28848	5919
5	Green Gram	11700	4344	11262	5400	12984	4740	7203	5950	1374	5814
6	Jowar	45270	2300	36798	2933	73782	2480	111957	1900	88962	3127
7	Wheat	1227	1819	1056	1976	1662	1806	4902	1447	3699	2082
8	Millet	120	1733	15	3475	195	1491	4.5	1000	58.5	2255
9	Groundnut	1167	3106	1005	3497	22.5	5094	3189	3774	442.5	4262.5
10	Safflower	18	3281	4.5	5100	28.5	3635	57	4490	72	4846
11	Sunflower	330	3418	21	3400	33	3239	16.5	4340	12	5000
12	Turmeric	66	4907	189	4405	15	4078	88.5	4228	225	5594
13	Soybean	438534	3487	561819	3508	918141	4976	575316	5167	612435	5286

Year wise Price Variation of Major crops

Sr. No.	Crop Name	Average Rate Per Quintal (Rs.)		Price Variation	Average Rate Per Quintal (Rs.)		Price Variation	Average Rate Per Quintal (Rs.)		Price Variation
		2018-19	2019-20		2020-21	2021-22		2021-22	2022-23	
1	Pigeon Pea	5060	4431	-629	5783	5449	-334	5449	5994	545
2	Maize	1338	1743	405	1583	1839	256	1839	2046	207
3	Bengal Gram	3516	3917	401	4116	4447	331	4447	4332	-115
4	Black Gram	4061	5507	1446	5570	4951	-619	4951	5919	968
5	Green Gram	4344	5400	1056	4740	5950	1210	5950	5814	-136
6	Jowar	2300	2933	633	2480	1900	-580	1900	3127	1227
7	Wheat	1819	1976	157	1806	1447	-359	1447	2082	635
8	Millet	1733	3475	1742	1491	1000	-491	1000	2255	1255
9	Groundnut	3106	3497	391	5094	3774	-1320	3774	4262.5	488.5
10	Safflower	3281	5100	1819	3635	4490	855	4490	4846	356
11	Sunflower	3418	3400	-18	3239	4340	1101	4340	5000	660
12	Turmeric	4907	4405	-502	4078	4228	150	4228	5594	1366
13	Soybean	3487	3508	21	4976	5167	191	5167	5286	119

9.1.2. c Commodity wise markets available in the district

Sr. No.	APMC	Commodities
1	Paranda	Soybean, Bengal Gram, Jowar, Maize, Black Gram, Green Gram
2	Kalamb	Soybean, Bengal Gram, Pigeon Pea, Sunflower, Green Gram, Turmeric, Safflower, Sunflower
3	Murum	Soybean, Pigeon Pea, Bengal Gram, Jowar, Black Gram, Green Gram
4	Dharashiv	Soybean, Pigeon Pea, Bengal Gram, Jowar, Black Gram, Green Gram, Groundnut, Millet, Wheat
5	Tuljapur	Soybean, Pigeon Pea, Bengal Gram, Jowar, Black Gram, Green Gram, Groundnut, Millet, Wheat
6	Bhoom	Soybean, Pigeon Pea, Bengal Gram, Jowar, Black Gram, Green Gram
7	Washi	Soybean, Pigeon Pea, Bengal Gram, Jowar, Black Gram, Green Gram
8	Umarga	Soybean, Pigeon Pea, Bengal Gram, Jowar, Black Gram, Green Gram

9.2 SWOT Analysis of Commodity wise Value Chains Development

With good rains, connectivity to major cities and well-established neighbouring markets, Dharashiv has a big opportunity to prosper agriculturally. However, infrastructure related weaknesses may inhibit growth.

Strengths

- Favourable Agri-related conditions in terms of some deep black soil suited for soybean and Red Gram with rains sufficient for growth of these crops (despite fluctuations).
- High quality perception of produce from the district - particularly soybean, pulses and Jowar - indicate potential for the district to be developed as a preferred sourcing point for processing units.
- Locational advantages- direct access to major districts in Maharashtra - Solapur, Latur and Ahmednagar. The district is also located on a direct rail and road link to both Hyderabad and Pune.

Weaknesses or Constraints in the existing value Chain

- **Lack of processing units**, storage facilities (warehouses & cold storages) etc mean lower prices for farmers and hurdles for growth of trading activity in the district.
- **Poor extension structure and outreach** as well as poor use of farm machinery inhibit any gains in farming from better efficiencies. They also inhibit any systematic attempts to involve farmers in agri-business activities such as contract farming, co-operatives etc.
- **Under-developed markets** due to overpowering presence of two neighbouring districts - Latur and Solapur distort the trading activity and prices in the district.
- **Lack of Infrastructure**: One of the biggest issues that farmers face is lack of infrastructure. This includes roads, transportation facilities. Farmers have to depend on others for transport services which increase their costs significantly.
- **Water Scarcity:** Major populations of the district depend on Agriculture Sectors, which puts a strain on water resources, making it difficult for farmers to irrigate their crops.
- **Price and Market Volatility:** It can impact procurement decisions. Inefficient Record-keeping of farmers data results in delays and inaccuracies. Lack of grading procured stocks Quality and Safety standards. Lack of Fair pricing for farmers leading to economic uncertainties.
- **Increasingly Volatile weather and more extreme events like floods and droughts**: It can change growing seasons, limit the availability of water. Allows weeds, pests and fungi to thrive and it can reduce crop productivity.
- **Poor quality storage facilities**, which leads to high post-harvest losses; weak market linkage; poor safety standards and lack of consumer trust in the quality of agriculture produce.
- **Limited financial support** and capacity building in post-harvest handling, processing and marketing.
- There are large numbers of production of milk in Dharashiv District but as compared to that **milk processing units are very low**.

- **Lack of Osmanabadi Goat Breeding Centres** though it is very Famous in India for meat.
- **Lack of Cattle feed** as compared to dairy animals.
- **Vegetable Nurseries:** There are increasing areas under Cultivation of vegetable crops in the district but farmers have to leave the district for seedlings.

Potential or Opportunities Available in the district

- There are opportunities for setting up more processing facilities in the district. Across all crops.
- Farmer collective based custom hiring model for farm machinery is an opportunity that can be tapped into as a business activity.
- Realignment of existing areas to crops such as Coriander, cut Flowers and Maize can help introduce crop diversification as well as help producer incomes through better margins.
- Aggregation and sale of Jowar to neighbouring markets presents an opportunity for the producer group, particularly in the Paranda block.

Following facilities can increase scope for efficient development of commodity wise value chains

- **Transportation vehicles**: Availability of these facilities for those farmers who produce perishable crops like vegetables and fruits etc.
- **Agri Input Sale, Agri mall, Custom Hiring centre-** These are the basic needs of farmers because day by day land holding capacity of farmers are decreasing and expenditure on Agri inputs are increasing.
- **Training and Workshop** of Marketing to FPCs and Farmers
- Providing Weather Forecast Services to FPCs and Farmers at Village Level
- **Small Godown, warehouse, Cold Storage-** Godowns and cold storage helps farmers for storage of produced goods, reduce damages and increase life of goods.
- Special Finance Support from Bank to Farmer
- **Milk Processing Unit-** it helps dairy farmers to get a good price for milk.
- **Goat Breeding Centre-** As Osmanabadi Goat is famous all over India but there is no Osmanabadi Goat Breeding Centre in the district, so there is need to develop more breeding centres.
- **Cattle feed units-** There are large numbers of dairy animals in the district but no cattle feed project exists in the district so there is a large scope for such projects.
- **Processing Unit on these commodities** can run a long time Because Production of these commodities in the district is very large.
- **Nursery Udyog**: As day-by-day vegetable farmers are increasing, there is a huge need of seedlings in the district and available nursery's capacity are very less so such projects can run for a long time. And also, will be a very profitable project.

Threats

- Rainfall fluctuations could play a spoiler as low rainfall years can damage crop yields and quality, at the same time dent plans on promoting horticulture crops

9.3 FPCs contribution in value chain development

9.3.1 Status of FPCs in the district

Under MACP project there 16 FPCs were established, in NDKSP (PoCRA) 24 are established and in SMART project 47 FPCs are funded. Till no FPC is formed or funded under MAGNET project in the district

Information about FPCs supported by MACP/SMART/AND KSP/MAGNET

Sr. No.	Scheme Name	Number of Supported FPCs
1	MACP	16
2	NDKSP	24
3	SMART	47

(Source-NDKSP And SMART Project district data)

9.3.2 Evaluation of FPCs in the district

9.3.2.a Objectives of Evaluation

The study is an attempt to assess the Farmer Producer Companies of project area and find whether these companies are performing and earning sufficient returns to sustain business. The report has also proposed a rating method to measure the performance of FPCs considering different 8 parameters. The reports analysed 139 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.

9.3.2.b Criteria for Evaluation of FPC

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

9.3.2.c 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 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:

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

9.3.2.d Output of evaluation.

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

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

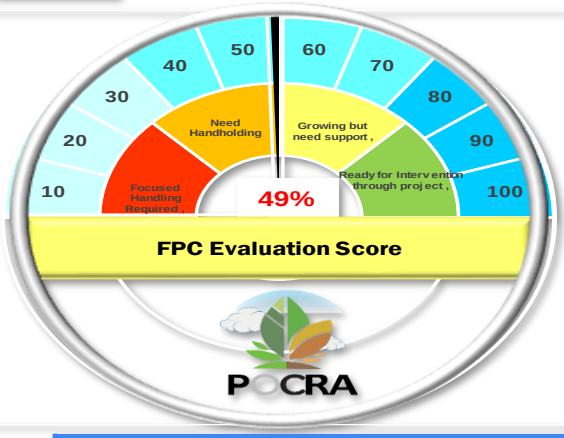
Customized Evaluation Report

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

Alamprabhu Agro Farmer Producer Company

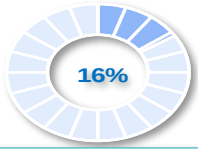
Address

Dhanegaon,Tq-Bhoom, Dist-Osmanabad, Pincode- 413504

Score Report

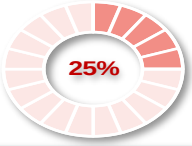
Criteria	Max. Score	Score Obtained
Organization & Adminstration (Core Foundation Strength)	21	14
Governance (Control Systems in Place)	11	10
Management (Decision making processes)	8	8
Infrastructure (Assets and resources)	5	3
Finance (Financial base and health)	25	4
Business & Market Linkages (Resource quality)	21	7
Capacity Building (Resource quality)	5	2
Climate Resilience (Adaptability to climate risk)	4	1
Final Score	100	49

What could improve your FPC?



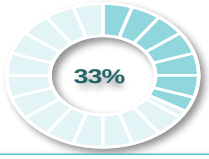
Finance

Regular auditing, regular share transfers to members, regular compliances to ROC will help in better financial management. Various financial resources maybe tapped to generate additional finances



Climate Resilience

The FPC should promote various climate resilient agricultural technologies.



Business & Market Linkages

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

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

9.4 Details of commodity transacted by the FPCs

Sr. No.	Name of FPC	Name of Commodity	Processing Unit
1	ODSF Agro Producer Company Ltd	Soyabean	Seed Processing
2	Varadvinayak Farmer Producer Company Ltd	Gram	Dal Mill
3	Sanvad Agri Producer Company	Milk	Khava Udyog
4	Anandwadi Agro and Animal Husbandry Producer Company Ltd	Maize	*Murghas*, Other Cattle Feed

(Source-NDKSP And SMART project district data)

9.5 Details of services provided by FPCs

Sr. No.	Project Name	Name of FPC
1	Seed Processing	Peakland Farmers Producer Company Ltd
2	Cold Storage	Viranyu Farmer Producer Company Ltd
3	Wearhouse	Ganarajya Agro Producer Company Ltd
4	Custom Hiring Centre	Sant Shiromani Maruti Maharaj Agro Ltd
5	Goat Breeding Centre	Shri Shankar Shetkari Gat
6	Cleaning Grading Unit	Kartikisakas Farmer Producer Company Ltd
7	Agri-mall (Market Outlet)	ODSF Agro Producer Company Ltd
8	Electronic Weigh Bridge (50 Ton.)	Brahmanath Agro Producer Company Ltd
9	Nursery	Narwade Agro Producer Company Ltd
10	Dal Mill	Varadvinayak Farmers Producer Company
11	Milk Processing Unit	Sanvad Agri Producer Company Ltd
12	Sale of Agricultural Input	Naitik Agro Producer Company Ltd
13	Spice Unit	Yedai Agro Producer Company Ltd

(Source-NDKSP And SMART project district data)

Chapter 10: Extension Strategies for Adaptation to Climate Change

10.1 Preparation of Village Adaptation Plan

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

❖ **Planning for water security**

a. Computation of water budget
b. Water conservation structures
c. Groundwater recharge structures (including recharge of wells)
d. Water harvesting structures
e. Micro-irrigation plan

❖ **Planning for soil health**

a. Soil health Card status of the village
b. Status of Organic Carbon content
c. Soil health based advisory- crop suitability
d. On-farm production of biofertilizers
e. Production of organic inputs
f. Regenerative agriculture plan
g. Soil erosion/ degradation arresting measures

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

a. Current cropping pattern
b. Available water balance (post monsoon)
c. Last year prices of crops
d. Crop diversification
e. Proposed cropping pattern (season and crops)

❖ **Planning for Carbon sequestration**

a. Agro-forestry plantation
b. Horticulture plantation
c. Forage/ Cover crop cultivation
d. Bamboo plantation
e. Live fencing plan

❖ **Planning for reduction of production cost**

a. Reducing cost on labour intensive operations (by mechanization)
b. Reducing use of chemical fertilizers (by enhancing use of bio/ organic fertilizers)
c. Reducing use of chemical pesticides (by enhancing use of bio/ natural pesticides)
d. Reducing tillage operations (by conservation agriculture)
e. Reducing excessive water usage (by micro-irrigation)

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

a. Identification of CRV.
b. Production programme for Truthful/ Certified/ Foundation seeds- status
c. Conservation of indigenous seed having climate resilient characters- details of such seeds with location and characteristics

❖ **Adoption of climate resilient technologies**

a. Identification of CRT useful to the village and creating awareness
b. Plan of demonstration of CRT (FFS, Method/ Result Demonstrations)
c. Most prominently adopted technologies and their impact
d. Innovative technologies adopted
e. Validation of technologies developed by Progressive farmers

❖ **Integrated Pest Management Plan**

a. Identification of common pests on major crops based on *CROPSAP*
b. Plan of IPM technologies to be adopted
c. On-farm production of bio-pesticides, natural pesticides etc.
d. Skill training to reduce pesticide hazard

❖ **Integrated farming systems**

a. Potential for crop based and other livelihood activities
b. Households to be engaged in IFS
c. Plan for market linkage for IFS produce

❖ **Preparation of contingency plan**

a. Village level weather forecast mechanism
b. Preparedness for contingencies
c. Crop insurance promotion and status
d. Monitoring of contingencies
e. Assessment of losses due to natural calamities if any

❖ **Strengthening of commodity value chains**

a. Assessing existing commodity value chains
b. Identification of gaps in existing value chains
c. Assessing volume of commodity to be marketed
d. Assessing warehouse availability and available capacity
e. Assessing transportation facilities

f. Plan for infrastructure

g. Plan for market linkage of major commodities

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

10.2. Convergence of Govt. Programs with Extension Plan (District Data)

Aligning government efforts with well-designed extension plans is crucial for efficiently delivering services in agriculture. Extension plans focus on sharing knowledge and teaching essential skills to help farmers adopt advanced technologies.

Collaboration between government programs and thoughtful extension strategies is vital. It involves strategic integration to optimise resources and expertise, improving the effectiveness of interventions for sustainable agricultural practices and rural development.

This teamwork ensures a smooth flow of knowledge from research institutions to grassroots levels, empowering farmers with the latest insights, skills, and technologies. The coordination creates a responsive system, boosting agricultural productivity and building lasting resilience in rural communities.

In essence, the coordination of government programs with carefully planned extension initiatives signifies a shift towards an integrated and impactful approach to agricultural development, paving the way for a more prosperous and sustainable future for farming communities.

Sr. No.	Programme	Activities Done
1	**ATMA (Agricultural Technology Management Agency)**	In the year 202-23, 2840 farmer trainings have been completed under the Atma in the district, including 42 trainings within the district regarding goat rearing, seed treatment, organic farming, poultry rearing, honey bee keeping, etc. Farmers' trips outside state and within state each 15 groups of farmers which consist of 2288 farmers have completed their farmer trips. Within district 3 trip and 120 farmers completed farmer trip. 80 agricultural schools have been completed. 600 crop demonstrations have been completed under Atma Yojana.
2	***Ran bhaji Mahotsav***	District Level Ran bhaji Mahotsav was organised on 25 August 2023 on behalf of Maharashtra State, Department of Agriculture, Project Director ATMA, Dharashiv. It was inaugurated by Superintendent Police, Dharashiv. According to the suggestion of Director ATMA, according to the natural availability of wild vegetables at district level and taluka level. 1300 farmers participated in the vegetable festival organised at district and tehsil level. At this time 50 wild vegetables were available for sale.
3	***Krishi Sanjeevani Saptah***	From 23st June to 1st July 2023, meetings were organised in 750 villages with the participation of 23400 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.

4	***Vikel Te Pikel Abhiyan***	In the year 2023-24, a total of 65 farmer groups / farmer producer companies are selling agricultural produce to bulk buyers / sellers / processors. In this, 50 farmer groups 160 Metric tonne of their produce have been sold, 15 farmers producing companies, 7500 Metric tonne of agricultural produce has been sold.
5	**SMART**	32 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.
6	**NDKSP**	Till date 76,822 farmers of the district have been registered on the online portal DBT PoCRA (NDKSP) and a total of 73,432 individual benefit applications have been registered. Out of which till date 58467 farmers have been given subsidy amounting to Rs.204 cr,19 lakh. Also, under the agribusiness component till date 111 farmer groups and farmer producer companies in the district have distributed subsidies amounting to Rs.12.41 Crore.

10.3 Monitoring Mechanism for Village Adaptation Plan Progress *(District Data)*

In order to effectively monitor the progress of village adaptation plans, a robust and comprehensive monitoring mechanism is essential. Several strategies are proposed to ensure the success and sustainability of these plans:

- **Engagement with Field Functionaries:**

Organise monthly meetings with field functionaries involved in various agriculture schemes. This interaction will provide a platform for exchanging insights, addressing concerns, and ensuring the seamless implementation of initiatives.

- **Field Farm Schools for Guidance:**

Utilise field farm schools to provide farmers with guidance on climate-resilient technologies, fostering sustainable livelihood opportunities. This practical approach ensures that farmers receive hands-on training and support for the adoption of innovative agricultural practices.

- **Effective Communication and Inspiration:**

Employ effective communication strategies to inspire farmers to embrace new technologies and schemes. Creating awareness about adaptive climate-resilient agriculture technologies will be crucial for sustained development.

- **Needs Identification for Effective Implementation:**

Regularly identify the needs and problems of farmers to tailor the implementation of various agriculture schemes. This proactive approach ensures that interventions address the specific challenges faced by the farming community.

- **Training for Extension Workers and Officials:**

Conduct training sessions for extension workers, government officials, and agricultural experts to equip them with the necessary skills for guiding and supporting farmers in the adoption of mechanisation.

- **Enhanced Information Accessibility:**

Improve access to information on the latest trends in mechanisation and government support programs through online platforms and local agricultural extension offices. This empowers farmers with up-to-date knowledge for informed decision-making.

- **Promotion of Farmer Cooperatives:**

Encourage the formation of farmer cooperatives, promoting joint investments in and shared ownership of machinery. This collaborative approach facilitates small farmers' access to modern equipment, contributing to increased efficiency and productivity.

Monitoring Adoption of Agricultural Technologies:

Regularly monitor the adoption of modern agricultural technologies and machinery, including tractors, harvesters, irrigation systems, and precision agriculture tools. This ongoing assessment helps gauge the effectiveness of interventions and identifies areas for improvement.

10.4 Strategy for Revisiting the Village Adaptation Plan

Revisiting and updating the village adaptation plan is a crucial aspect of ensuring its continued relevance and effectiveness. The following comprehensive strategy outlines key steps for this process:

1. **Stakeholder Engagement:**
   Identify and engage key stakeholders, including local government officials, community leaders, farmers, NGOs, and agricultural experts. Conduct meetings and workshops to gather input and feedback, ensuring a collaborative approach to plan revision.
2. **Assessment of Changing Climate Patterns:**
   Consider the impact of changing climate patterns on agriculture and rural communities. Conduct a thorough assessment to understand the evolving needs and challenges, incorporating climate-resilient strategies and adaptations.
3. **Technology and Mechanization Review:**
   Evaluate the adoption of modern agricultural technologies and machinery in villages. Assess the effectiveness of support or subsidies provided for technology adoption and identify areas for improvement.
4. **Market and Value Chain Analysis:**
   Analyse local and regional markets for agricultural produce. Identify opportunities to strengthen value chains, improve market access, and increase farmers' income by integrating market-oriented strategies.
5. **Resource Management Evaluation:**
   Evaluate the sustainable management of natural resources, including water, soil, and forests. Develop strategies for resource conservation and the promotion of sustainable agricultural practices.
6. **Climate-Smart Agriculture Integration:**
   Incorporate climate-smart agricultural practices and technologies into the plan to help farmers adapt to changing weather patterns. Emphasise techniques such as crop diversification and efficient water management.
7. **Capacity Building and Training Review:**

Review the effectiveness of training and capacity-building programs for farmers. Ensure that farmers have access to the knowledge and skills needed for modern and sustainable farming practices.

8. **Community Participation Emphasis:**

Emphasise community participation in the planning and decision-making process. Encourage community-led initiatives and the formation of self-help groups, fostering a sense of ownership and sustainability.

This comprehensive strategy ensures that the village adaptation plan remains dynamic, responsive to changing circumstances, and aligned with the evolving needs of the communities it serves.

Annexure I (Sample Village Level Micro-Plan)

https://mlpv2.mahapocra.gov.in/vdp.php?census_code=561360

(Village: Wanewadi, Tq. Kalamb)

गाव विकास आराखडा प्रपत्र

महाराष्ट्र शासन - कृषि विभाग
नानाजी देशमुख कृषि संजीवनी प्रकल्प

POCRA

गाव विकास आराखडा

गाव समुहाचा क्रमांक- 525_mr-10_04

गावाचे नाव-	वानेवाडी	सेन्सस कोड-	561360
महसुल मंडळ-	Moha	तालुका-	कळंब
उपविभाग-	भूम	जिल्हा-	धाराशिव

गावसमुहातील इतर समाविष्ठ गावे

अ. क्र	गावाचे नाव	सेन्सस कोड	अ. क्र	गावाचे नाव	सेन्सस कोड
1	शेलगाव दिवनी	561359	2	बारमाचीवाडी	561354
3	गौर	561357	4	भोसा	561358
5	साटेफळ	561361			

सुक्ष्मनियोजन प्रक्रिया कालावधी	- 21-03-2021 ते 28-03-2021
गाव विकास आराखडा तयार करणा-या कृषि सहाय्यकाचे नाव	- Naikwadi S.A.
गाव विकास आराखडयाची तांत्रिक तपासणी करणारे कार्यालय	- उपविभागीय कृषि अधिकारी,भूम
ग्राम कृषि संजीवनी समिती मंजूरी ठराव क्रमांक व दिनांक	- ठराव क्रमांक 3 दि. 08-03-2021
ग्रामसभा मंजूरी ठराव क्र व दिनांक	- ठराव क्रमांक 3 दि. 24-04-2022
जिल्हास्तरीय समन्वय समितीकडील मंजूरीचा दिनांक	- _____

जिल्हा अधिक्षक कृषि अधिकारी,धाराशिव कार्यालय

अनुक्रमणिका

१) प्रस्तावना व पार्श्वभूमी, प्रकल्पाची गरज

नानाजी देशमुख कृषि संजीवनी प्रकल्पांतर्गत दि. च्या शासन निर्णयानुसार मौजे **वानेवाडी** ता. **कळंब** जि. **धाराशिव** गावाची निवड झालेली आहे. मौजे **वानेवाडी** 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 **वानेवाडी** 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 **0** प्रक्रिया उद्योग आहेत. गावातील शेतीमाल विक्रीकरिता येथे बाजारपेठ उपलब्ध आहे. गावात शेती बरोबरच हे शेतीपुरक व्यवसाय आहेत. सद्यस्थितीत गावाच्या पाण्याच्या ताळेबंदानुसार **0 (कोटी लिटर)** इतका अपधाव शिल्लक आहे. गावात **सिमेंट नाला बांध, शेततळे - अस्तरीकरणा शिवाय (३० X ३० X ३ मी. पर्यंत), गाव तलाव, शेत बांध बंदिस्ती/कंपार्टमेंट बंडिंग** 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 **520** 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 वैशिष्ट्यामुळे 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. 21-3-2021 पासून दि. 28-3-2021 पर्यंत राबविण्यात आली. त्याचा तपशील पुढीलप्रमाणे आहे.

सुक्ष्मनियोजन दिवस	तारीख	कार्यक्रम (सुक्ष्मनियोजन तंत्र / उपक्रम)	उपस्थिती	
			महिला	पुरुष
1	21-3-2021	प्रभात फ़ेरी	9	3
		संसाधन नकाशा	7	9
		संकलित सामाजिक व आर्थिक माहितीवर चर्चा	5	11
		गावातील शेती व निगडीत बाबीसंबंधी ऋतूचक्र, समयरेषा आणि परिस्थिती विश्लेषण विषयी चर्चा	7	9
		-शिवार फ़ेरी व विहीर निरिक्षण	7	7
		-संसाधन नकाशा व अहवाल व त्यावर चर्चा	4	9
2	24-3-2021	-शिवार फ़ेरी व विहीर निरिक्षण	7	7
		लक्ष्य गट चर्चा - शेती मुल्यसाखळी, शेती परिस्थिती विश्लेषण, नैसर्गिक संसाधने व शेतीचे नियोजन ;	7	9
		शेतकरी गट/ कृषि आधारीत उद्योग/ प्रगतीशील शेतकरी माहिती	6	9
		- प्रस्तावित कामांचा मसुदा App द्वारे/ प्रिटद्वारे वाचून दाखविणे	8	5
		महिला सभा	12	--
3	27-3-2021	- पाण्याचा ताळेबंद नुसार जलसंधारण कामे व पिक नियोजन आराखडा अंतिम करणे	5	8
		प्रस्तावित कामांचा मसुदा अंतिम करणे	5	8
		सामाजिक व पर्यावरणीय सुची	6	9
		ग्राम कृषि संजीवनी समिती सभा	6	6
4	28-3-2021	- ग्रामसभा	4	11
		प्रस्तावित कामांच्या मसुद्यास व गाव विकास आराखड्यास मंजूरी देणे	5	10

Annexure II *(Sample Village Profile)*

https://ffsauditlogs.blob.core.windows.net/mahapocra/scripts/pdf/pocra-village-profile-561360-2024-36.pdf

नानाजी देशमुख कृषि संजीवनी प्रकल्प — कृषी विभाग महाराष्ट्र शासन

अहवाल क्रमांक : **नादेकृसप्र/गामाप्र/561360/2024/36** दिनांक : 05/02/2024

ग्राम कृषी संजीवनी विकास दर्शिका

गावाचे नाव : वानेवाडी	गावाचा सांकेतांक : 561360	ग्रामपंचायत: Wanewadi (s)
गावाचा (प्रकल्प) टप्पा : 3	गाव खारपान मध्ये येते का ?: नाही	समूह कोड: 525_mr-10_04
तालुका : कळंब	उपविभाग : भूम	जिल्हा : उस्मानाबाद

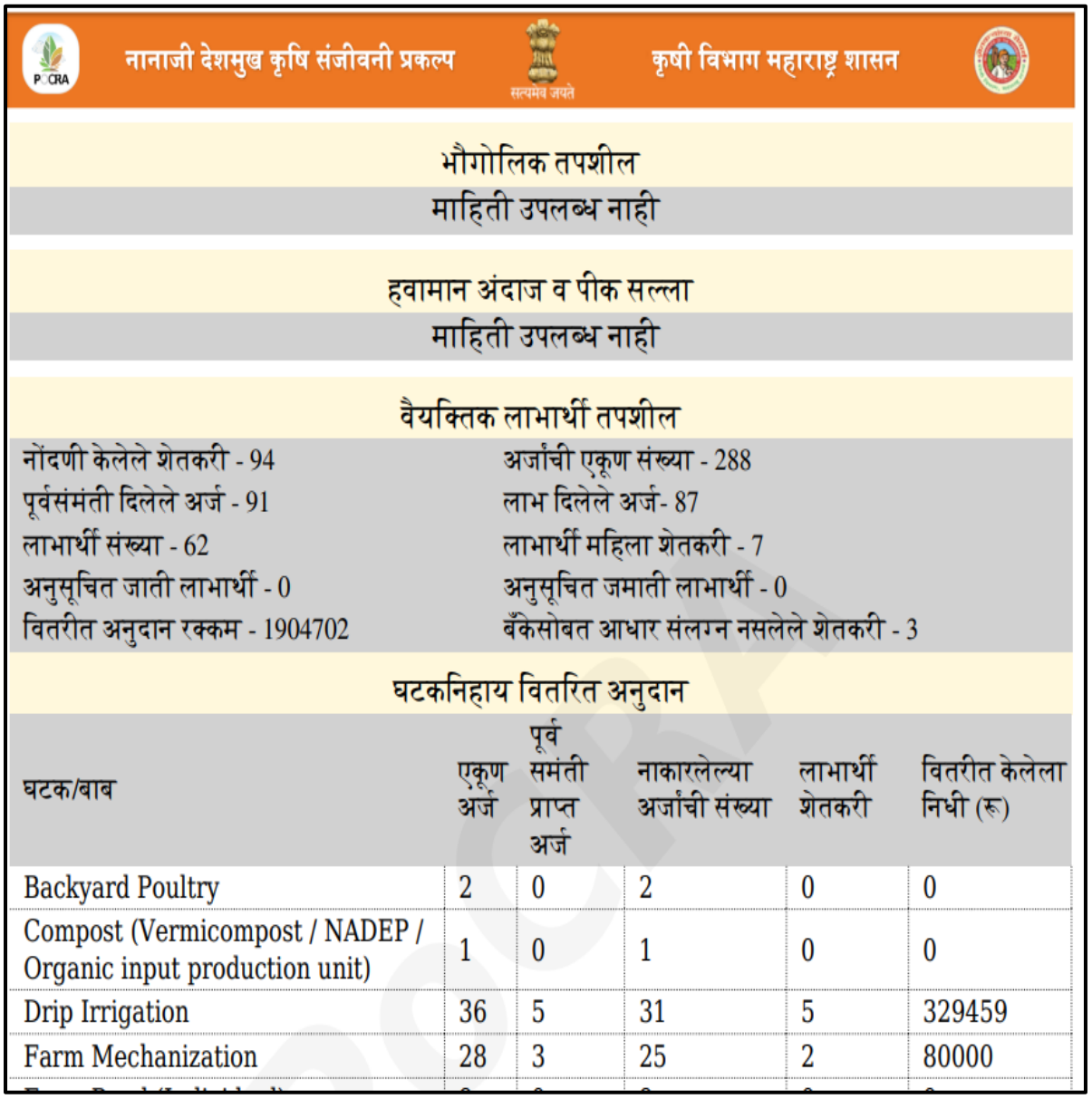
प्रकल्प कर्मचारी/अधिकारी

पदनाम	पूर्ण नाव	भ्रमणध्वनी क्रमांक
उपविभागीय कृषी अधिकारी	GUDUP VIVEK	7498844976
तालुका कृषी अधिकारी	Jadhav B B	9822023973
कृषी सहाय्यक	Naikwadi S.A.	7588190079
समूह सहाय्यक	Gaikwad Dipti Sahadeo	7875269600
शेतीशाळा प्रशिक्षक	Magar Mahesh	9623797913
कृषीमित्र	Maindad Pravin	9011290920
कृषीताई	Ubale Manisha Nilesh	9881851143

ग्राम कृषी संजीवनी समिती

पदनाम	पूर्ण नाव	भ्रमणध्वनी क्रमांक
सरपंच	Pachbhai Vishal V	8668521223
उपसरपंच	Ubale Nilesh Nagesh	9881851143
ग्रामपंचायत सदस्य	Ugale Prabhavati A	NA
ग्रामपंचायत सदस्य	Aran Suraj A	NA
प्रगतिशील शेतकरी	Aran Ashok B	NA
प्रगतिशील शेतकरी	Ugale Sudarshan H	8668624272
महिला शेतकरी	Shelke Asha S	NA
महिला शेतकरी	Shelke Sushma Bhairvnath	9822428323
महिला शेतकरी	Pachbhai Shivanya Shivling	9527634735
शेतकरी उत्पादक कंपनी प्रतिनिधी	Dahitankar Kapleshwar D	8999391567
बचत गट महिला प्रतिनिधी	Shelke S B	NA
कृषि पूरक व्यावसायिक शेतकरी	Ugle Taramati H	NA
कृषि पूरक व्यावसायिक शेतकरी	Shelke Mainabai S	NA

ग्राम कृषी संजीवनी समिती		
पदनाम	पूर्ण नाव	भ्रमणध्वनी क्रमांक
सरपंच	Pachbhai Vishal V	8668521223
उपसरपंच	Ubale Nilesh Nagesh	9881851143
ग्रामपंचायत सदस्य	Ugale Prabhavati A	NA
ग्रामपंचायत सदस्य	Aran Suraj A	NA
प्रगतिशील शेतकरी	Aran Ashok B	NA
प्रगतिशील शेतकरी	Ugale Sudarshan H	8668624272
महिला शेतकरी	Shelke Asha S	NA
महिला शेतकरी	Shelke Sushma Bhairvnath	9822428323
महिला शेतकरी	Pachbhai Shivanya Shivling	9527634735
शेतकरी उत्पादक कंपनी प्रतिनिधी	Dahitankar Kapleshwar D	8999391567
बचत गट महिला प्रतिनिधी	Shelke S B	NA
कृषि पूरक व्यावसायिक शेतकरी	Ugle Taramati H	NA
कृषि पूरक व्यावसायिक शेतकरी	Shelke Mainabai S	NA


नानाजी देशमुख कृषि संजीवनी प्रकल्प
सत्यमेव जयते
कृषी विभाग महाराष्ट्र शासन
भौगोलिक तपशील
माहिती उपलब्ध नाही
हवामान अंदाज व पीक सल्ला
माहिती उपलब्ध नाही
वैयक्तिक लाभार्थी तपशील
नोंदणी केलेले शेतकरी - 94
अर्जांची एकूण संख्या - 288
पूर्वसंमंती दिलेले अर्ज - 91
लाभ दिलेले अर्ज- 87
लाभार्थी संख्या - 62
लाभार्थी महिला शेतकरी - 7
अनुसूचित जाती लाभार्थी - 0
अनुसूचित जमाती लाभार्थी - 0
वितरीत अनुदान रक्कम - 1904702
बँकेसोबत आधार संलग्न नसलेले शेतकरी - 3
घटकनिहाय वितरित अनुदान
घटक/बाब
एकूण अर्ज
पूर्व समंती प्राप्त अर्ज
नाकारलेल्या अर्जांची संख्या
लाभार्थी शेतकरी
वितरीत केलेला निधी (रू)
Backyard Poultry 2 0 2 0 0
Compost (Vermicompost / NADEP / Organic input production unit) 1 0 1 0 0
Drip Irrigation 36 5 31 5 329459
Farm Mechanization 28 3 25 2 80000

Saline and Sodic lands (Farm ponds/ Sprinklers / Water pump/ FFS)	4	0	4	0	0
Seed Production	31	18	13	17	72670
Sericulture	6	0	6	0	0
Shadenet House	3	0	3	0	0
Sprinkler Irrigation	126	64	57	57	1422573
Well	3	0	3	0	0
Total	288	91	191	81	1904702

कृषी व्यवसाय घटकाचा तपशील

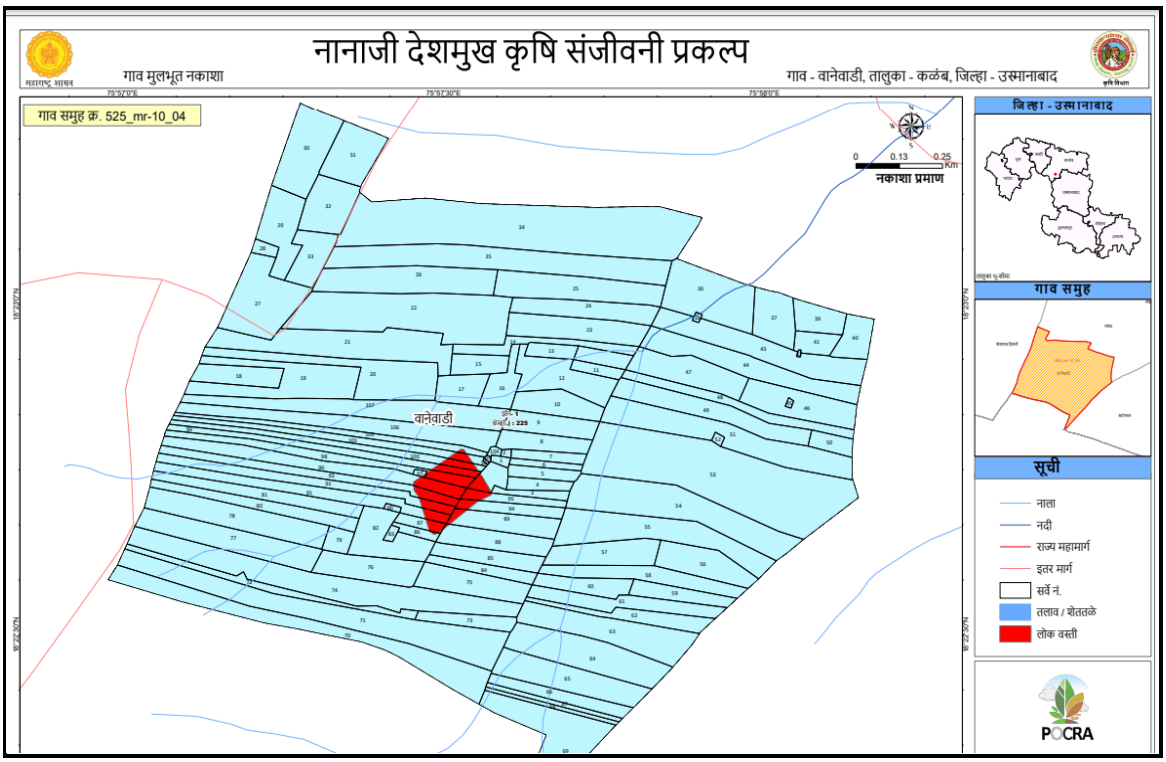
नोंदणी केलेल्या FPC/SHG/Farmer Group ची संख्या - 0
एकूण अर्जांची संख्या - 0
पूर्वसंमती दिलेल्या अर्जांची संख्या - 0
कार्यारंभ आदेश दिलेल्या अर्जांची संख्या - 0
लाभ दिलेल्या FPC/SHG/Farmer Group ची संख्या - 0
अनुदान वितरीत रक्कम, रु. - 0

मृद व जलसंधारण तपशील

पावसाचे प्रमाण (मिमी) - 718
उपलब्ध अपधाव (TCM) - 373.02
अडवलेला अपधाव (TCM) - 140.6
शिल्लक अपधाव (TCM) - 232.42
प्रस्तावित क्षेत्र उपचार (हे.) - 0
प्रस्तावित नाला उपचार संख्या - 0
कामांची एकूण रक्कम - 0
तयार अंदाज पत्रकांची संख्या - 0
एकूण तांत्रिक मंजुरींची संख्या - 0
पूर्ण झालेल्या ई निविदा संख्या - 0
सुरु झालेल्या कामांची संख्या - 0
पूर्ण झालेल्या कामांची संख्या - 0
निधी वितरण केलेल्या कामांची संख्या - 0
खर्च झालेली एकूण रक्कम (रू) - 0

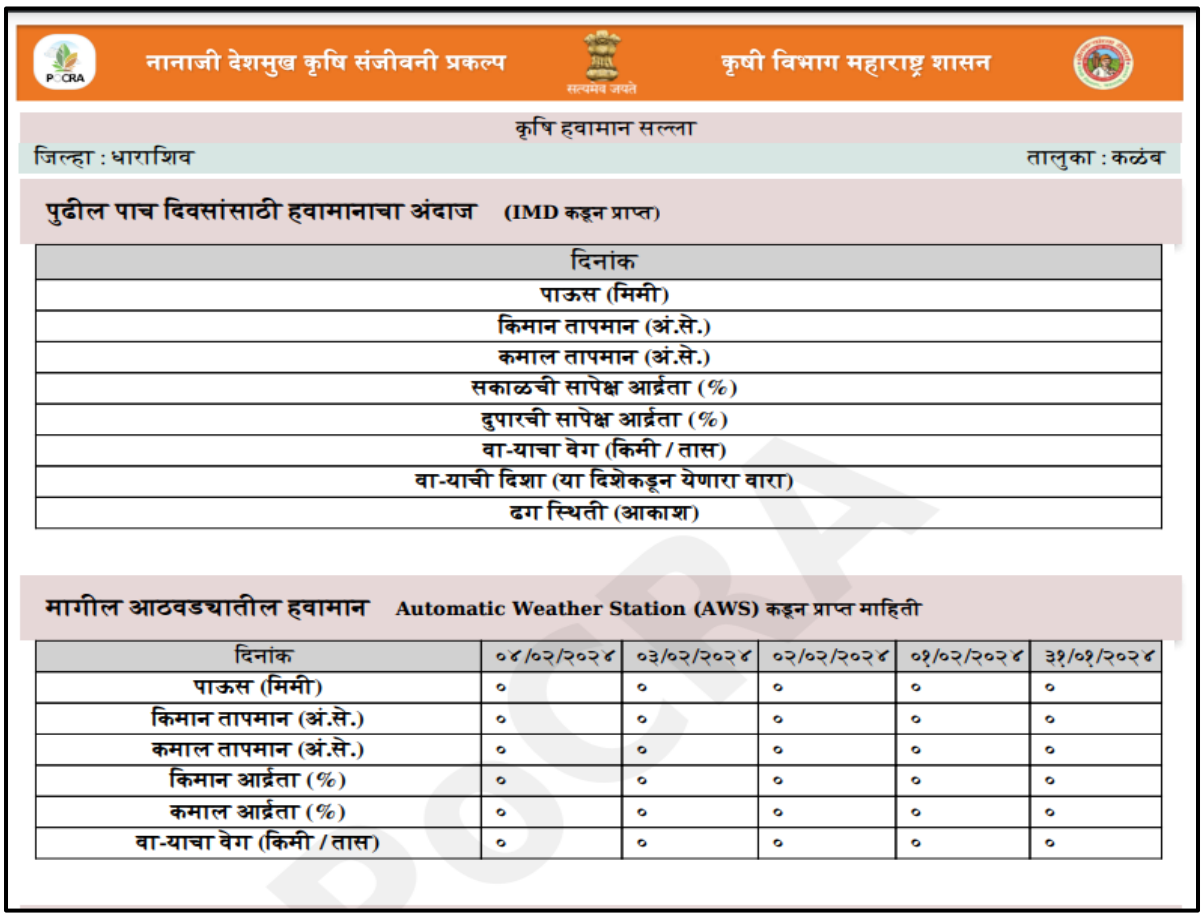
Annexure III (गावाचा मुलभूत नकाशा) ***Base Map Of The Village***

https://mahapocra.gov.in/maps/BaseMap/561360.pdf



Annexure IV *Sample Agro-met Advisory / **तालुका निहाय हवामान अंदाज व कृषी सल्ला***

https://ffs.mahapocra.gov.in/scripts/weatheradvisory.pdf



हवामान अंदाज

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

पीक सल्ला

पीक	पीक सल्ला

आपला अभिप्राय/सूचना नोंदवा

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

टीप :

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