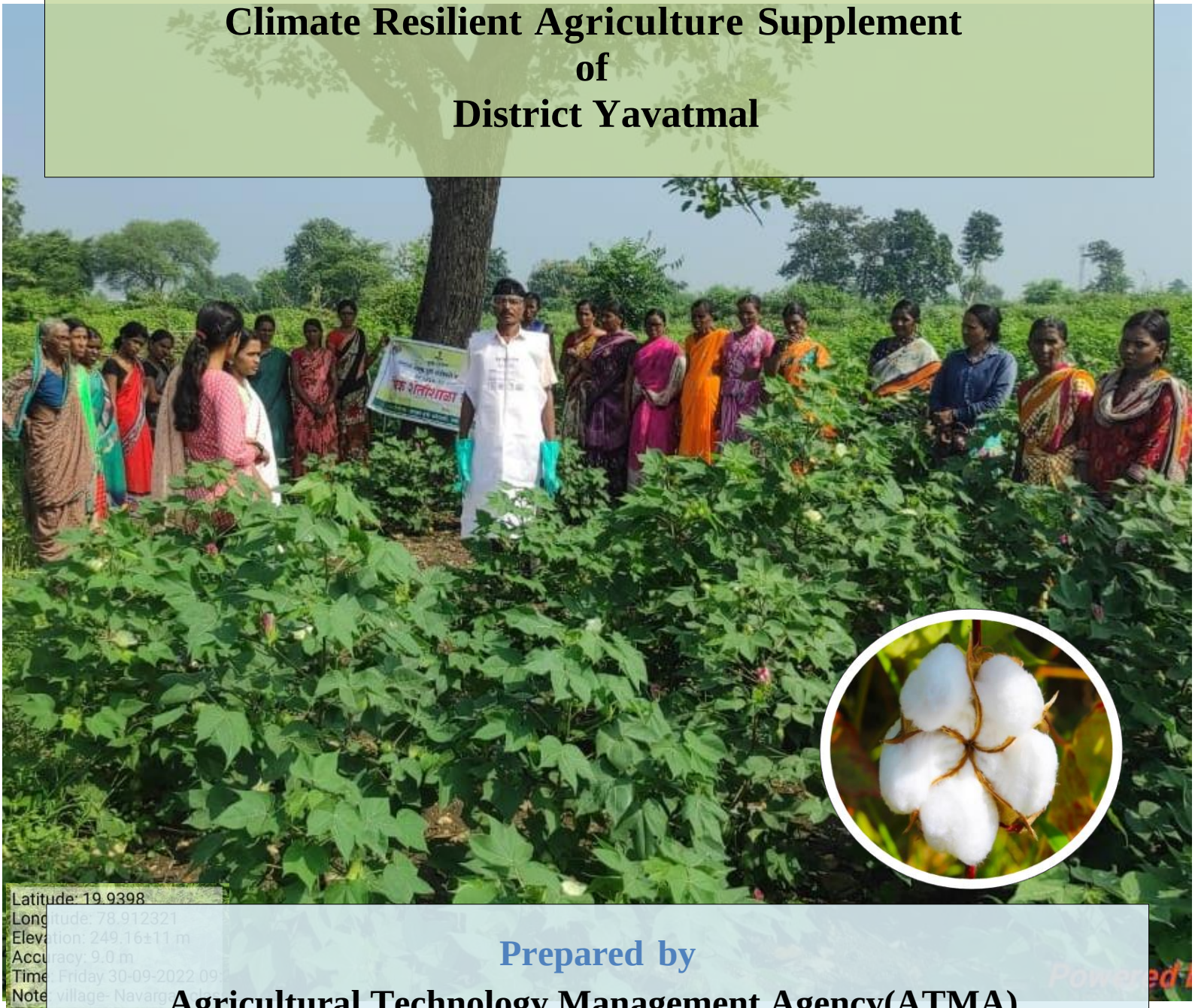
Nanaji Deshmukh Krushi Sanjeevani Prakalp

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



Prepared by

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INTRODUCTION

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

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

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Chapter 1: General Profile of the District

1.1 Geographical area and location of the district

Yavatmal District is situated in the south-western part of Wardha Painganga-Wainganga basin. The geographical location of the district falls in 19.26 and 20.42 north latitudes and 77.18 to 7.9.9 in the eastern line. Amravati and Wardha districts, from east to Chandrapur district, Telangana and Nanded district are from the north whereas Parbhani and Akola districts are surrounded by west.

"The district has an area of 13,582 sq. km (4.41 percent of the state). The total length of the district is 193 kilometers, and the maximum width from north to south is 160 km. Amongst the 30 districts in the state, Yavatmal ranks 6th in terms of area and 19th in terms of population. The district headquarters are located at Yavatmal, a town with a population of 1,16,551 as per the 2011 census. It is well connected by roads to the different tehsil headquarters and is also connected to Achalpur by a narrow gauge railway line."

Its greatest length, from east to west, is about 193 Km, and its greatest breadth, from north to south, nearly 161 Km. It occupies the southeastern quarter of Berar on the west of Washim and Akola District. On the north is the Amravati to the east where the Wardha river forms the boundary, lie two Districts of the Central Provinces Wardha and Chandrapur. Along the south lie the Nanded District and Andhra Pradesh. The Painganga River, which flows in great curves and loops, marks the whole of the southern boundary and unites at the southeastern extremity with the Wardha River.

(Source - SREP,DIP)

Agro-climatic zone:

The district Yavatmal falls under 8th Agro-climatic Zone i.e. Moderate Rainfall Zone. Only a small western part of Darwha & Ner Tahsils falls under assured rainfall zone No. 7th. The Average rainfall received in this Zone usually exceeds 900 m. m. The climate is hot and dry. More than 75% rainfall in this zone is received in Kharif Season, hence Kharif cropping system predominates in the zone. *(Source - SREP, DIP)*

1.2 Tehsils details

Yavatmal is one of the districts of Maharashtra in India. There are 16 Talukas, 2145 villages and 18 towns in Yavatmal district.

Sr. No	Tehsil	No. Of Gram Panchayats	No. Of Villages
1	Yavatmal	75	152
2	Kalamb	62	143
3	Ralegaon	69	133
4	Ghatanji	71	122
5	Darwha	84	146
6	Ner	51	121
7	Arni	76	111
8	Babhulgaon	64	127
9	Pusad	119	189
10	Digras	54	82
11	Mahagaon	114	116
12	Umarkhed	92	157
13	Pandharkawada	71	141
14	Wani	101	162
15	Maregaon	58	115
16	Zari	56	128
	Total	1217	2145

(Source – SREP, DIP census)

1.3 Demographic Information

In 2011, Yavatmal had a population of 27,72,348 of which male and female were 14,19,965 and 13,52,383 respectively. In the 2001 census, Yavatmal had a population of 24,58,271 of which males were 12,65,681 and remaining 11,92,590 were females. Yavatmal District population constituted 2.47 % of total Maharashtra population.

Average literacy rate of Yavatmal in 2011 was 82.82. With regards to Sex Ratio in Yavatmal, it stood at 952 per 1000 male compared to the 2001 census figure of 942.

The initial provisional data released by census India 2011, shows that the density of Yavatmal district for 2011 is 204 people per sq. km. Yavatmal district administers 13,582 square kilometers of areas. Out of the total Yavatmal population for 2011 census, 21.58% lives in urban regions and 78.42 % population lives in rural areas of villages of the district.

(Source –census india.gov.in)

Block wise Demographic Information of Yavatmal District

Sr. No.	Name Of the Block	No. of the Gram Panchayat	No. of the Villages Covered	Population			SC		ST		General		Total	
				M	F	Total	No. of Household	No. of Members	No. of Household	No. of Members	No. of Household	No. of Members	No. of Household	No. of Members
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Arni	76	111	82745	79088	161833	3805	15429	6888	27929	29222	118475	39915	161833
2	Babhulgaon	64	127	45120	43053	88173	3024	11879	4312	16940	15109	59354	22445	88173
3	Darwha	84	146	98255	92848	191103	5889	25045	3630	15440	35418	150618	44937	191103
4	Digras	54	82	79406	74716	154122	2966	13652	4463	20547	26050	119923	33479	154122
5	Ghatanji	71	122	71157	67430	138587	2756	11371	9709	40056	21125	87160	33590	138587
6	Kalamb	62	143	52461	50563	103024	2661	10810	7831	31812	14870	60402	25362	103024
7	Mahagaon	71	141	79289	77494	156783	2305	9672	13490	56616	21563	90495	37358	156783
8	Maregaon	114	116	98088	92164	190252	5156	22702	6082	26776	31975	140774	43213	190252
9	Ner	58	115	40099	38614	78713	1007	4009	6605	26289	12164	48415	19776	78713
10	Pandharkawada	51	121	61407	58825	120232	5492	22333	2000	8134	22075	89765	29567	120232
11	Pusad	119	189	175905	165281	341186	10746	50592	10852	51089	50872	239505	72470	341186
12	Ralegaon	69	133	57384	54819	112203	2227	8869	8156	32485	17788	70849	28171	112203
13	Umarkhed	92	157	133208	126149	259357	9785	45588	7495	34919	38389	178850	55669	259357
14	Wani	101	162	110248	103420	213668	4840	20429	6767	28562	39017	164677	50624	213668
15	Yavatmal	75	152	194829	188136	382965	12153	51521	15453	65510	62730	265934	90336	382965
16	Zari-Jamani	56	128	40364	39783	80147	1150	4617	7712	30953	11107	44577	19969	80147
	Total	**1217**	**2145**	**1419965**	**1352383**	**2772348**	**75962**	**328518**	**121445**	**514057**	**449474**	**1929773**	**646881**	**2772348**

(Source –census india.gov.in)

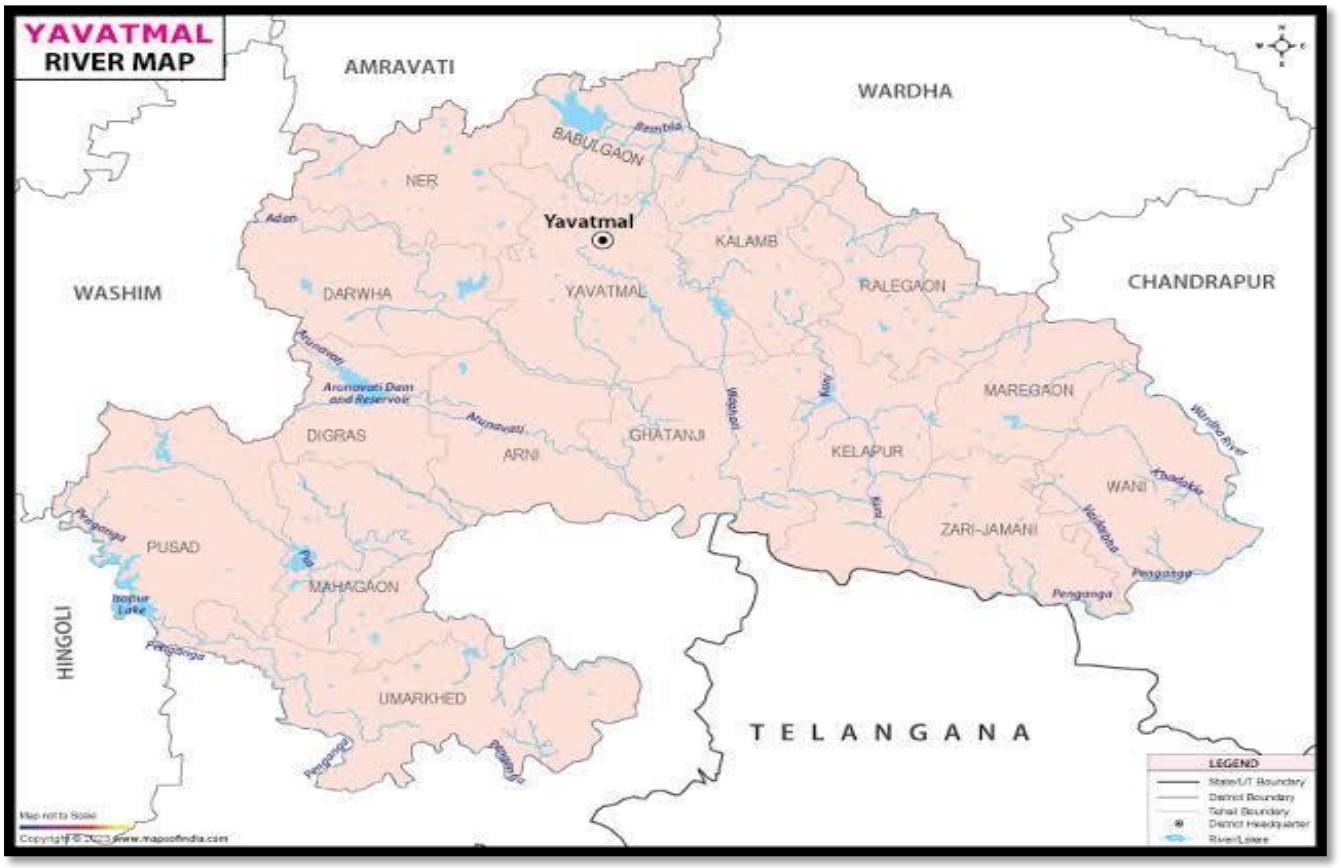
1.4 Annual Average rainfall and temperature of the district

The climate of the district is in, general hot and dry with moderately cold winters. The year may be divided into four seasons. The hot season begins in March and extends up to the first week of June. This is followed by the south west monsoon season which last up till the end of September, October and November constitute the post monsoon season and is followed by the cold season which last up till February. The district receives rainfall during the southwest monsoon. The rainfall is not uniform in all parts of the district. The average rainfall is 800-900mm. The maximum temperature during summer goes up to 46 °C. While the minimum temperature during winter drops to 10°C. Ralegaon Tehsil records highest rainfall of 1062 mm whereas Ner tehsil registered lowest rainfall of 820 mm. The highest temperature goes up to 46.02°C in summer In Maregaon tehsil whereas minimum temperature is observed up to 10^{o} C in winter in Zari-jamni taluka.

(Source: IMD, regional ICAR center(s), SAUs, KVKs, Yavatmal etc.)

1.6 River Network in the District

The Wardha and the Painganga are the two important rivers in Yavatmal district. The Wardha rivers flow on the north east boundary of the district. The Bembla, Ramganga, Nirguda are the tributaries of the Wardha. They meet the wardha from the west. The Painganga flows on the southern boundary of the district. The Poos, Adan, Waghadi, Khuni & Vidarbha are its tributaries. The famous sahastrakund waterfall on the Painganga river is near to the town of Murli. The Painganga meets the Wardha on the eastern boundary of the district.



1.7 Irrigation Potential of the district

Water availability in Yavatmal district is 0.8815 BCM/ha. In this different source's contribution occurs, out of this total water availability 102.4045 mm^3 per ha. Water available from canal irrigation source 46.8305 mm3 per ha, in Kharif and Rabi season canal irrigation water available. Minor irrigation tanks have 0.0021 mm^3 / ha water availability in kharif and 0.0062 mm3 per HA in Rabi. Ground water availability available from open well, deep tube well, medium tube well and shallow tube well sources in 3 seasons. In the year, a major source of irrigation is available in Rabi season in Yavatmal district.

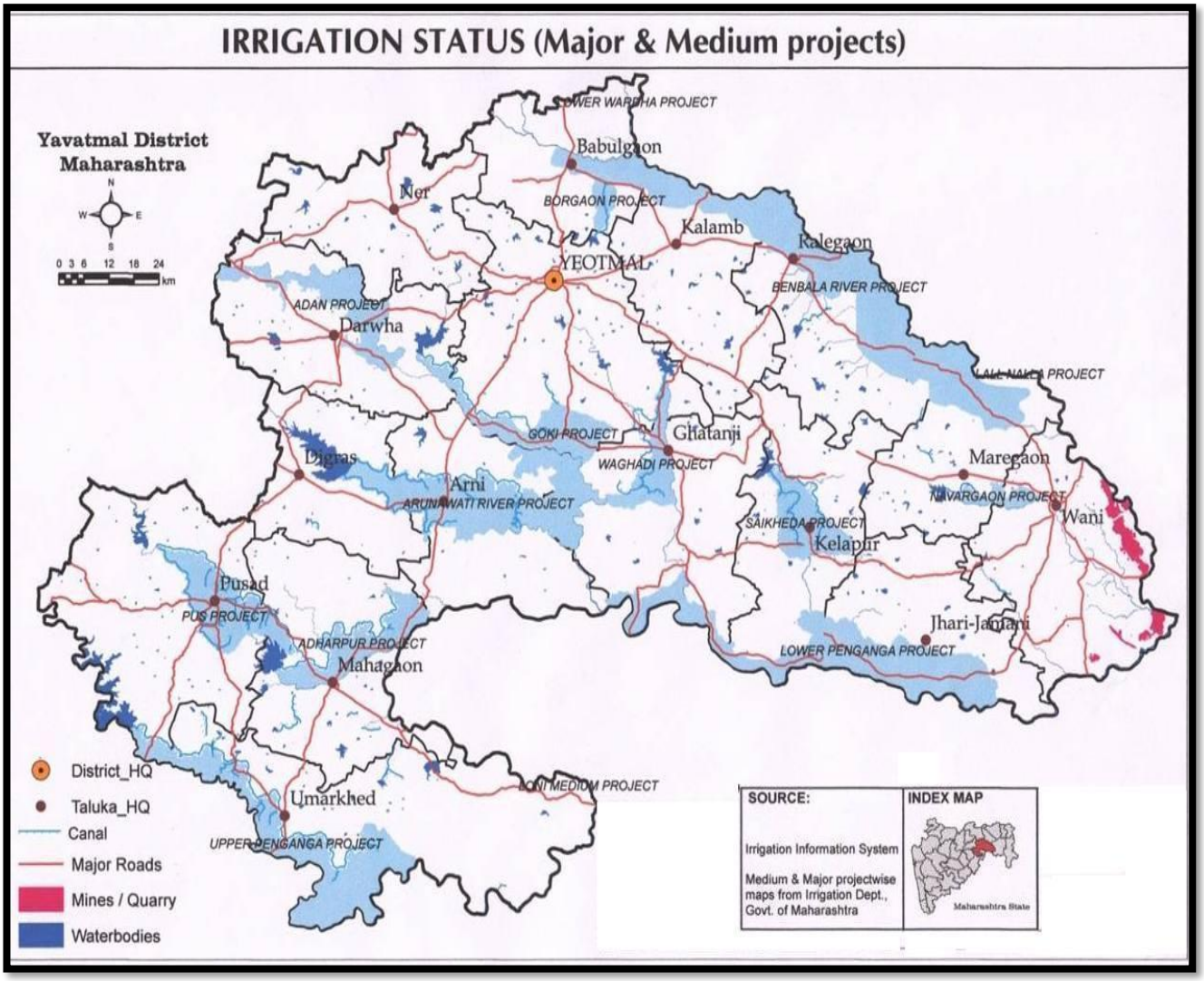
Status of water availability (mm^3/Ha)

Sr. No.	Sources	Kharif	Rabi	Summer	Total
1	Surface Irrigation				
(i)	Canal (major & Medium irrigation) TOTAL	46.8305	55.5029	0.0711	102.4045
(ii)	Minor Irrigation tanks (TOTAL)	0.0021	0.0062	0.0000	0.0083
(iii)	Lift Irrigation tanks (Dehni)	356.6322	422.4741	0.0033	779.1096
(iv)	Major + Medium +Minor + Dehni (In MM3/Ha)	403.4648	477.9832	0.0744	881.5224
(v)	Various Water Bodies Including Rain Water Harvesting	-	-	-	-
(vi)	Treated Effluent Received From STP	-	-	-	-
(vii)	Untreated Effluent	-	-	-	-
(viii)	Perennial sources of water	-	-	-	
2	Ground Water				-
(i)	Open Well	0.0003	0.0029	0.0023	0.0056
(ii)	Deep Tube Well	0.0003	0.0029	0.0023	0.0056
(iii)	Medium Tube Well	-	-	-	-
(iv)	Shallow Tube Wells	0.0003	0.0029	0.0023	0.0056
	Total (MM^3/Ha.)	0.0010	0.0088	0.0070	0.0168
	Grand Total (1 + 2)	403.4658	477.9920	0.0814	881.5392
	Grand Total (1+2) in BCM/Ha	0.4035	0.4780	0.0001	0.8815

(Source: CWC, CGWB, district irrigation & agriculture office record)

Existing Types of Irrigation

Existing irrigation contains canal and Ground water irrigation sources. In surface irrigation 118955.68 ha. Government canal and 92375.66 ha. Dams. Ground water distributed into 80499.18 ha government and Private open wells, In the Yavatmal district 87530 Electricity pump, 2082 diesel pump. are water extraction devices.



(Source: CWC, CGWB, district irrigation & agriculture office record)

1.8 Soil formation in the district and type of soil

There are five major categories of the soil in the district. These categories include very small soil depth ranging between 0 - 7.5 cm, with shallow soils with depth of 7.5 - 25 cm, light to medium soils 25 - 50 cm, deep medium soils with 50-100 cm depth and deep block soil of more than 100 cm depth. The soils in the districts as per the soil Survey Department are shown in table. Area occupied by different land capability classes in Yavatmal district

S.N.	Land Capability Classes	Area (Ha)	% TGA
1	Class – II	484787.71	35.58
2	Class – III	197307.84	14.48
3	Class – IV	311302.95	22.85
4	Class – VI	219617.58	16.12
5	Class – VII	115731.01	8.49
6	Water bodies	33612.9	2.47
TOTAL		1362360	100

Area occupied by different soil texture classes in Yavatmal district

Sr No.	Soil Texture Classes	Area (Ha)	% TGA
1	Light soils	214442.06	15.74
2	Medium soils	364837.84	26.78
3	Heavy soils	749467.2	55.01
4	Water bodies	33612.9	2.47
TOTAL		1362360	100

(Source: SLUSI, NBSS, Indian institute of Soil Science, department of land resources)

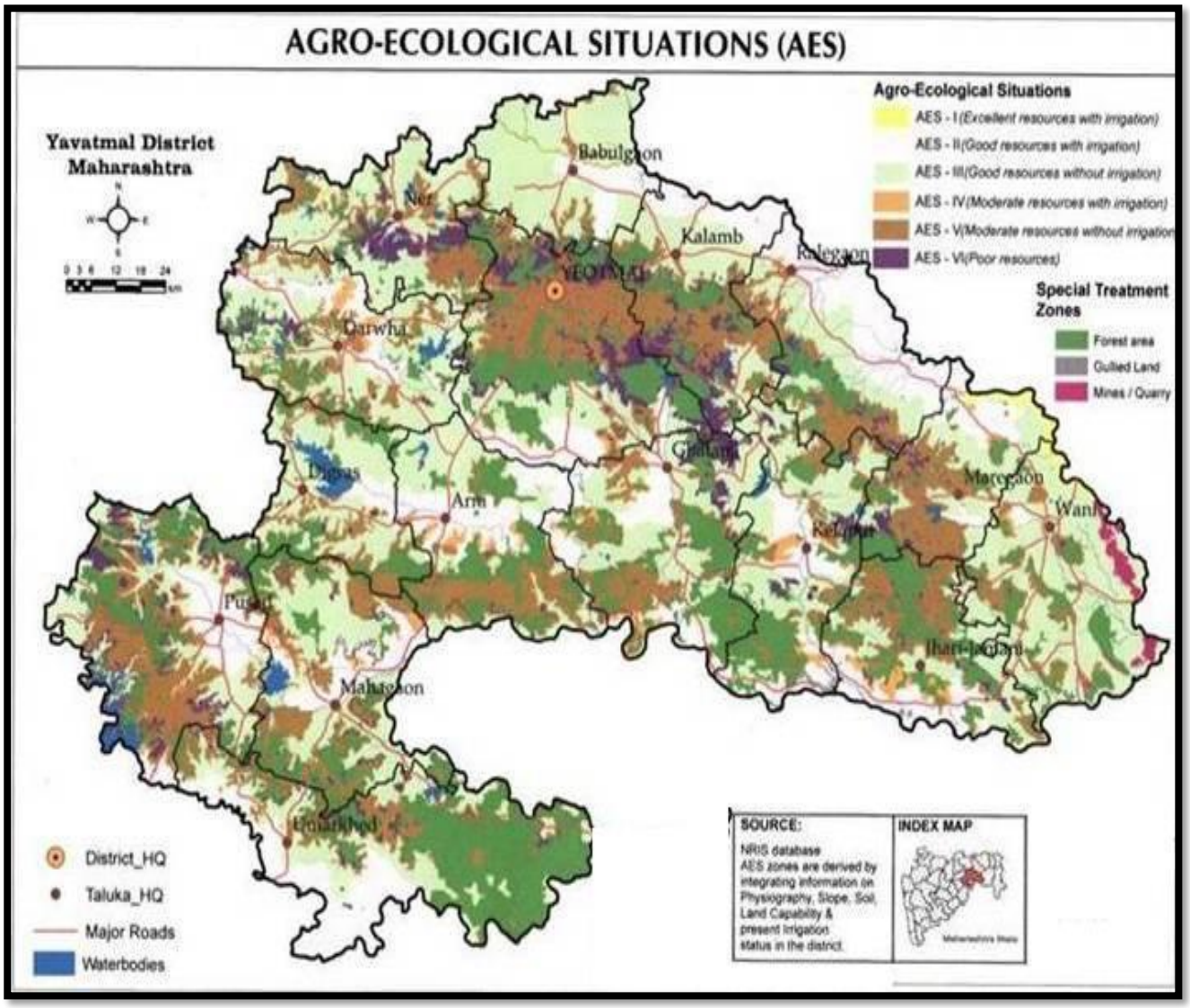
1.9 Different zones according to prevailing agro-ecological situation:

Yavatmal district is divided into eight prominent agro ecological situations on the basis of the soil types, Rainfall, topography, irrigation, Soil textures, soil depths, Land capability maps and forest maps. The description of each agro ecological situation for the formation of strategies on participatory management practices are given below. The characteristic features of the agro ecological situation are described below.

Agro-Ecological Situation including their characteristics and coverage:

Sr. No.	Description of the AES	Area (Ha)	% TGA
1	AES - I (Excellent resources with irrigation)	6129.37	0.45
2	AES - II (Good resources with irrigation)	203086.11	14.91
3	AES - III (Good resources without irrigation)	501784.04	36.83
4	AES - IV (Moderate resources with irrigation)	17885.52	1.31
5	AES - V (Moderate resources without irrigation)	260732.74	19.14
6	AES - VI (Poor resources)	63512.91	4.66
Special treatment zone.			
1	Forest AREA	268751.33	19.73
2	Gullied Land	2484.87	0.18
3	Mines / Quarry	4380.21	0.32
4	Waterbodies	33612.9	2.47

(Source -District Irrigation Plan, Yavatmal)



1) AES I – Excellent resources with irrigation –

This AES has a small area as compared to the other AES. The area occupied in this AES is 6129.37 ha, which is 0.45% of the total area of the district. This situation is prevailing in Ralegaon, Ner, Babhulgaon, Wani & Maregaon. In this AES soil is very good & fertile with irrigation facilities. The main crops grown in this AES are Cotton, Soybean, Tur, Gram & Wheat.

2) AES II – Good resources with irrigation –

This AES has good natural resources and irrigation facilities. The soil of this AES fertilizes from surface and underground water. This AES has 203086.11 ha area which comprises 14.91% of the total area of the district. This AES is found almost in the entire block in some parts. The main crop grown in this AES is Cotton, Soybean, Tur, Gram, Wheat & summer groundnut.

3) AES III – Good resources without irrigation –

This AES comprises a larger area than other AES. The area occupied by this AES is 501784.04 ha, which is 36.83% of the total area of the district. This AES is found in all Taluka's of the District. The soil of this AES is very good and has good moisture retentive capacity. The rainfall is very good and rainfall farming is in practice. The main crops are cotton, Tur, Soybean, & gram etc.

4) AES IV – Moderate resources with irrigation –

This Agro ecological situation is present in all taluka except Kalamb & Ner taluka. The Soil of this AES is high to medium and undulating but with irrigation facilities. This AES having area 17885.52 ha comprise 1.31% of total area of the district. The main crop grown in this AES is cotton, Tur, Soybean, & Wheat and some crops like Banana.

5) AES V – Moderate resources without irrigation –

This AES Spread all over the districts having the area 260732.74 ha comprising 19.14% of the total area of the district. In this AES natural resources are moderate and no irrigation facilities present, so rain fed farming, crops grown are cotton, Soybean, tur & Gram.

6) AES VI – Poor Resources –

In this AES natural resources are poor, soil is light, undulating and having less fertility and productivity, less irrigation facilities are available for irrigation. The main crop grown in this AES is cotton, Soybean, tur & Gram. This AES has area 6351.91 ha which comprises 4.66% of total area of the district, mostly present in all taluka.

Special treatment zone.

1) Forest area –

This AES includes forest area, gullied land and miner / Quarry land having the area of 275616.41 ha compressing 20.23% of the total area of the district. This AES spread in all taluka, having a forest area, gullied land. In this forest species like, tick, bamboo are present. Coal mines are present in Wani & Zari- Jamani tehsil.

2) Water Bodies –

This AES includes all the water bodies present in the district, having an area of 33612.90 ha to comprise 2.47%of the total area of the district. This water is used for irrigation, drinking & for industry purposes. Fishery farming is done in those water bodies, where water remains for more than 9 months.

(Source -District Irrigation Plan, Yavatmal)

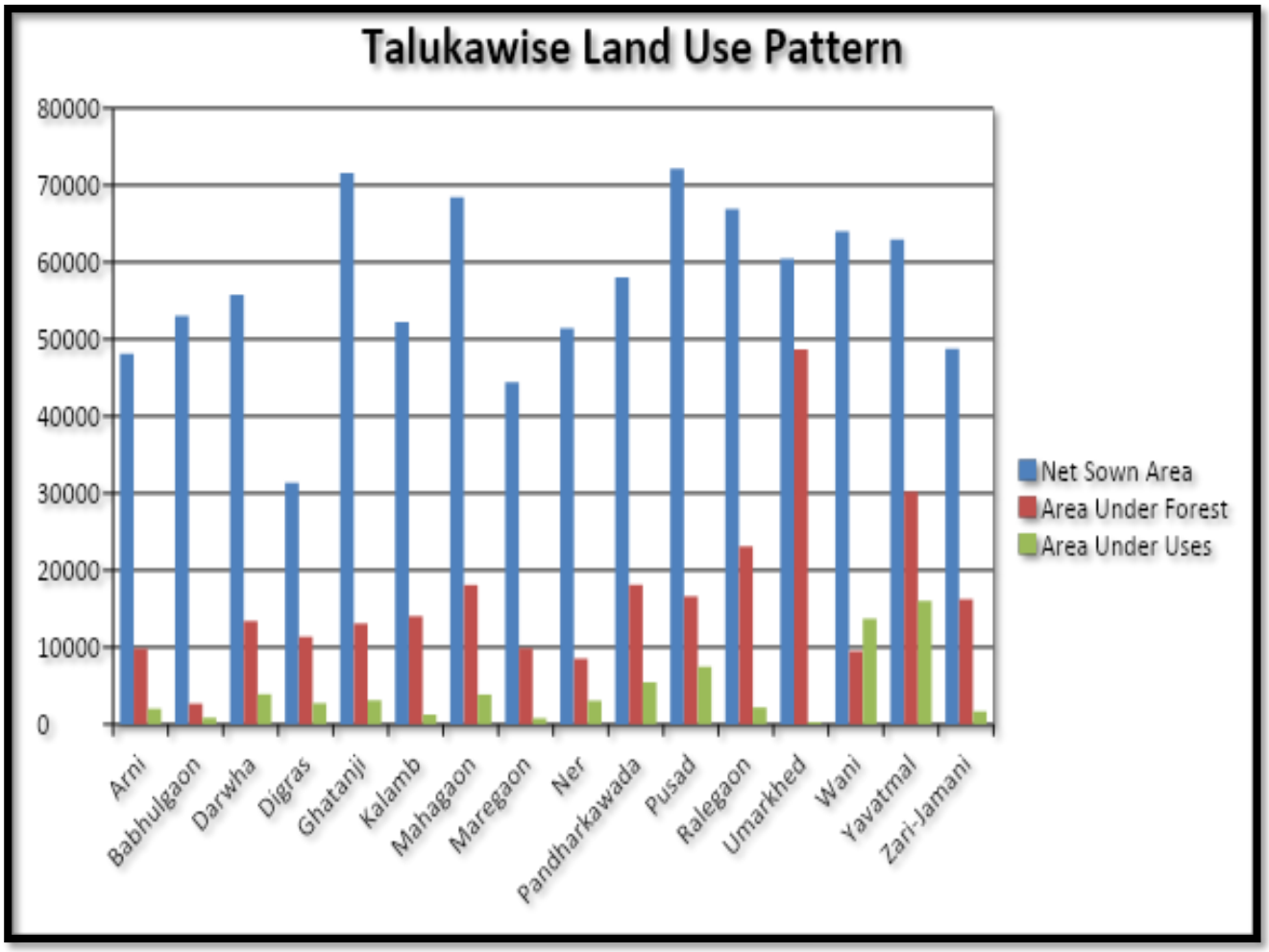
Chapter 2: Agriculture Profile of District

2.1 Land use classification of the district

Land Use pattern. Table describes 1217 Gram Panchayat & 2145 villages present in Yavatmal. Total Geographical area of Yavatmal District is “13,62,360” ha. Out of which “10,15,700” ha gross cropped area, “9,09,550” ha area is net sown area in Yavatmal district & “1,18,638” ha area sown more than once therefore 113.044% is cropping intensity occurred in Yavatmal district.

The area under the Forest is “2,63,282” ha, which is only 19.33% of the total geographical area. Area under Other Uses is “68,397” about 5.05% & Area under wasteland is “14,981” (1.10%) of total geographical area respectively.

The land use pattern of Yavatmal district is compared with the land use pattern of Maharashtra state.



(Source: DIP, DAP, PPR, Land use Plan)

Land Use Pattern.

Sr. No.	Name Of the Block	Name of Gram Panchayat	Name of the Village Covered	Total Geographical Area	Area under Agriculture				Area Under Forest	Area Under Wasteland	Area Under Other Uses
					Gross Cropped Area (1)	Net Sown Area (1)	Area sown more than once (1-2)	Cropping intensity (%)			
1	2	3	4	5	6	7	8	9	10	11	12
1	Arni	76	111	83356.58	70029.58	48110	6069	112.615	9826	1478	2023
2	Babhulgaon	64	127	58522.13	53750.13	53020	7034	113.267	2675	1247	850
3	Darwha	84	146	87599.04	70093.04	55770	9793	117.560	13403	200	3903
4	Digras	54	82	57966.19	43754.19	31360	14029	144.735	11368	112	2732
5	Ghatanji	71	122	95872.6	79685.6	71610	6459	109.020	13080	0	3107
6	Kalamb	62	143	73024.62	56942.62	52210	2668	105.110	14039	773	1270
7	Mahagaon	71	141	91353.5	69016.5	68460	17963	126.239	18085	391	3861
8	Maregaon	114	116	60738.3	48880.3	44380	2636	105.940	9863	1214	781
9	Ner	58	115	68923.46	57123.46	51420	2608	105.072	8524	216	3060
10	Pandharkawada	51	121	81987.89	58324.89	58020	4007	106.906	18107	109	5447
11	Pusad	119	189	116036.11	91421.11	72130	14075	119.513	16613	526	7476
12	Ralegaon	69	133	77126.02	49707.02	66900	2437	103.643	23096	2143	2180
13	Umarkhed	92	157	131234.58	80732.58	60480	12522	120.704	48663	1534	305
14	Wani	101	162	93197.65	67511.65	64030	6685	110.440	9503	2473	13710
15	Yavatmal	75	152	113815.52	66439.52	62920	7130	111.332	30200	1158	16018
16	Zari-Jamani	56	128	71605.81	52287.81	48730	2523	105.178	16237	1407	1674
Total		**1217**	**2145**	**1362360**	**1015700**	**909550**	**118638**	**113.044**	**263282**	**14981**	**68397**

(Source: DIP, DAP, PPR, Land use Plan)

2.2 Agriculture land holdings

Distribution according to size

Sr. No.	Land Holding	No. of Farmer	Area of land holding (Ha)
1	Below 1.00 Ha (Marginal Farmer)	52980	32018.37
2	1.00 Ha to 2.00 Ha. (Small Farmer)	212002	265772.77
3	2.00 Ha to 4.00 Ha. (semi medium Farmer)	131966	324970.77
4	4.00 Ha to 10 Ha. (Medium Farmer)	42380	229619.64
5	More than 10 Ha. (Large Farmer)	3213	50718.09

(Source: DIP, DAP, PPR, Land use Plan, Yavatmal)

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

Sr. No.	Sources	Kharif	Rabi	Summer	Total
1	**Surface Irrigation**				
(i)	Canal (Major & Medium Irrigation) Total	46.8305	55.5029	0.0711	102.4045
(ii)	Minor Irrigation Tanks (Total)	0.0021	0.0062	0	0.0083
(iii)	Lift Irrigation Tanks (Dehni)	356.6322	422.4741	0.0033	779.1096
	Major+ Medium+ Minor+ Dehni (In Mm3/Ha)	403.4648	477.9832	0.0744	881.5224
(iv)	Various Water Bodies Including Rain Water Harvesting	-	-	-	-
(v)	Treated Effluent Received From STP	-	-	-	-
(vi)	Untreated Effluent	-	-	-	-
(vii)	Perennial sources of water	-	-	-	-
2	**Ground Water**				
(i)	Open Well	0.0003	0.0029	0.0023	0.0056
(ii)	Deep Tube Well	0.0003	0.0029	0.0023	0.0056
(iii)	Medium Tube Well	-	-	-	-
(iv)	Shallow Tube Wells	0.0003	0.0029	0.0023	0.0056
Total (MM^3/Ha.)		0.001	0.0088	0.007	0.0168
Grand Total (1 + 2)		403.4658	477.992	0.0814	881.5392
Grand Total (1+2) in BCM/Ha		0.4035	0.478	0.0001	0.8815

(Source: CWC, CGWB, District Irrigation & Agriculture office records)

- **Existing Irrigation Facilities:**

Sr. No.	Name Of Taluka	Source of Irrigation	Surface Irrigation		Grond water	other Sources Including Tracing Traditional WHS	Water extraction devices / Lift		Total	
			Canal Based	Tank/ ponds/ Reservoir	open well		Electricity Pump	Diesel Pumps	Irrigation Sources	Water extraction units
			Govt. Canal	Govt. Reservoir/Dams	Private					
1	2	3	4	5	6	7	8	9	10	11
1	Arni	No	7	14	7390	130	5001	60	7541	5061
		Command Area (ha)	20506	1952	8647	711.29	0	0	31816.3	0
2	Babhulgaon	No	137	89	4317	340	4176	103	4883	4279
		Command Area (ha)	3900	2562	4138.63	110	0	0	10710.6	0
3	Darwha	No	16	65	7206	130	6973	95	7417	7068
		Command Area (ha)	6421	3300	7206	190.84	0	0	17117.8	0
4	Digras	No	6	30	5202	130	6176	103	5368	6279
		Command Area (ha)	9751	4768	5921.39	354	0	0	20794.4	0
5	Ghatanji	No	12	64	5816	132	4563	143	6024	4706
		Command Area (ha)	14798	25685	6551.23	384	0	0	47418.2	0
6	Kalamb	No	23	58	2512	136	3668	91	2729	3759
		Command Area (ha)	8026.14	3563.76	2570	390	0	0	14549.9	0
7	Mahagaon	No	17	45	10072	136	8803	51	10270	8854
		Command Area (ha)	7860.58	9602	11000	360	0	0	28822.6	0
8	Maregaon	No	10	44	1878	130	1503	41	2062	1544
		Command Area (ha)	7764	3699	1917.93	300	0	0	13680.9	0

(Source: DIP, NWDA, CGG)

Sr. No.	Name Of Taluka	Source of Irrigation	Surface Irrigation		Grond water	other Sources Including Tracing Traditional WHS	Water extraction devices / Lift		Total	
			Canal Based	Tank/ ponds/ Reservoir	open well		Electricity Pump	Diesel Pumps	Irrigation Sources	Water extraction units
			Govt. Canal	Govt. Reservoir/Dams	Pvt.					
1	2	3	4	5	6	7	8	9	10	11
9	Ner	No	18	57	5950	130	5764	40	6155	5804
		Command Area (ha)	1430	1579.43	5950	230	0	0	9189.43	0
10	Pandhar kawada	No	9	65	3538	130	3704	303	3742	4007
		Command Area (ha)	4212.62	13947	3620	210	0	0	21989.62	0
11	Pusad	No	15	79	5800	135	10143	39	6029	10182
		Command Area (ha)	1654	3003	5800	110	0	0	10566.65	0
12	Ralegaon	No	13	66	5541	133	3284	133	5753	3417
		Command Area (ha)	23835.77	4790.24	5541	311	0	0	34478.01	0
13	Umarkhed	No	11	27	700	135	12449	456	873	12905
		Command Area (ha)	1454	1589	700	100	0	0	3843.38	0
14	Wani	No	8	55	1591	137	3879	177	1791	4056
		Command Area (ha)	1592.9	759	1591	120	0	0	4062.9	0
15	Yavatmal	No	24	102	4270	134	5567	170	4530	5737
		Command Area (ha)	2185.67	3080	4270	343	0	0	9878.67	0
16	Zari Jamani	No	5	34	5075	130	1877	77	5244	1954
		Command Area (ha)	3564	8496	5075	210	0	0	17345.2	0
Total Yavatmal District		No	331	894	76858	2328	87530	2082	80411	89612
		Command Area (ha)	118955.68	92375.7	80499.2	4434.13	0	0	296264.65	0

2.5: Types of crops grown, cropping pattern, cropping intensity and farming systems

Types of Crops Grown:

- Kharif Crops:
  - Jawar: 3082 ha.
  - Mung: 4298 ha.
  - Udid: 3618 ha.
  - Tur: 111824 ha.
  - Soyabean: 292476 ha.
  - Cotton: 462707 ha.
- Rabi Crops:
  - Wheat: 49102 ha.
  - Gram: 147655 ha.
- Summer Crop:
  - Ground Nut: 7732 ha.
- Horticultural Crops (2022-23)
  - Orange: 143.10 ha. Mango: 48.0 ha.
  - Sapota: 6.0 ha. Mosambi: 22.1 ha.
  - Guava: 9.4 ha. Kagzi Lime: 44.8 ha.
  - Custard Apple: 20.15 ha. Pomegranate: 4.0 ha.
  - Jack Fruit: 6.45 ha. Sugarcane (2023-24):
  - Sown on 7252 ha.

Cropping Pattern:

- Kharif crops dominate the cropping pattern, including Jawar, Mung, Udid, Tur, Soybean, and Cotton.
- Rabi crops like Wheat and Gram contribute significantly to the cropping pattern.
- Ground Nut is the representative summer crop.
- Horticultural crops add diversity to the overall cropping pattern.

Cropping Intensity:

- The Net Sown Area of 909550 ha and Gross Cropped Area of 1015700 ha indicate a cropping intensity of over 100%, suggesting multiple cropping cycles in a year.
- Area Sown More Than Once (118638 ha) reflects the adoption of double or even triple cropping practices, showcasing the agricultural efficiency of the region.

Farming Systems:

- Diversified Farming System: The cultivation of kharif, rabi, and summer crops, along with horticultural crops and sugarcane, indicates a diversified farming approach.
- Mixed Farming: The combination of traditional cereals, pulses, cash crops, and horticultural crops represents a mixed farming system, reducing risks and ensuring year-round income for farmers.
- Sustainable Agriculture: The inclusion of legumes in the cropping pattern contributes to soil fertility through nitrogen fixation, promoting sustainable agricultural practices.
- The addition of sugarcane on 7252 ha in the upcoming year indicates a response to market demands, potentially contributing to the district's economy through sugar production and allied industries.

In conclusion, Yavatmal District's agriculture is marked by its diversity, efficiency, and sustainability. The farming community's adaptability to multiple cropping cycles and the incorporation of horticulture and sugarcane showcase a well-rounded agricultural landscape with the potential for both food security and economic growth. The district's commitment to sustainable practices bodes well for the future of agriculture in the region.

CROPPING INTENSITY		
Agricultural land use	Area '000 ha	Cropping intensity %
Net sown area	909550	113.044%
Area sown more than once	118638	
Gross cropped area	1015700	

Major Inter cropping systems	Crop	Ratio
	Cotton + Tur	(8:1) (12:2)
	Soybean + Tur	(10:1) (5:1)

(Source - KVK, Agriculture office records, Statistic)

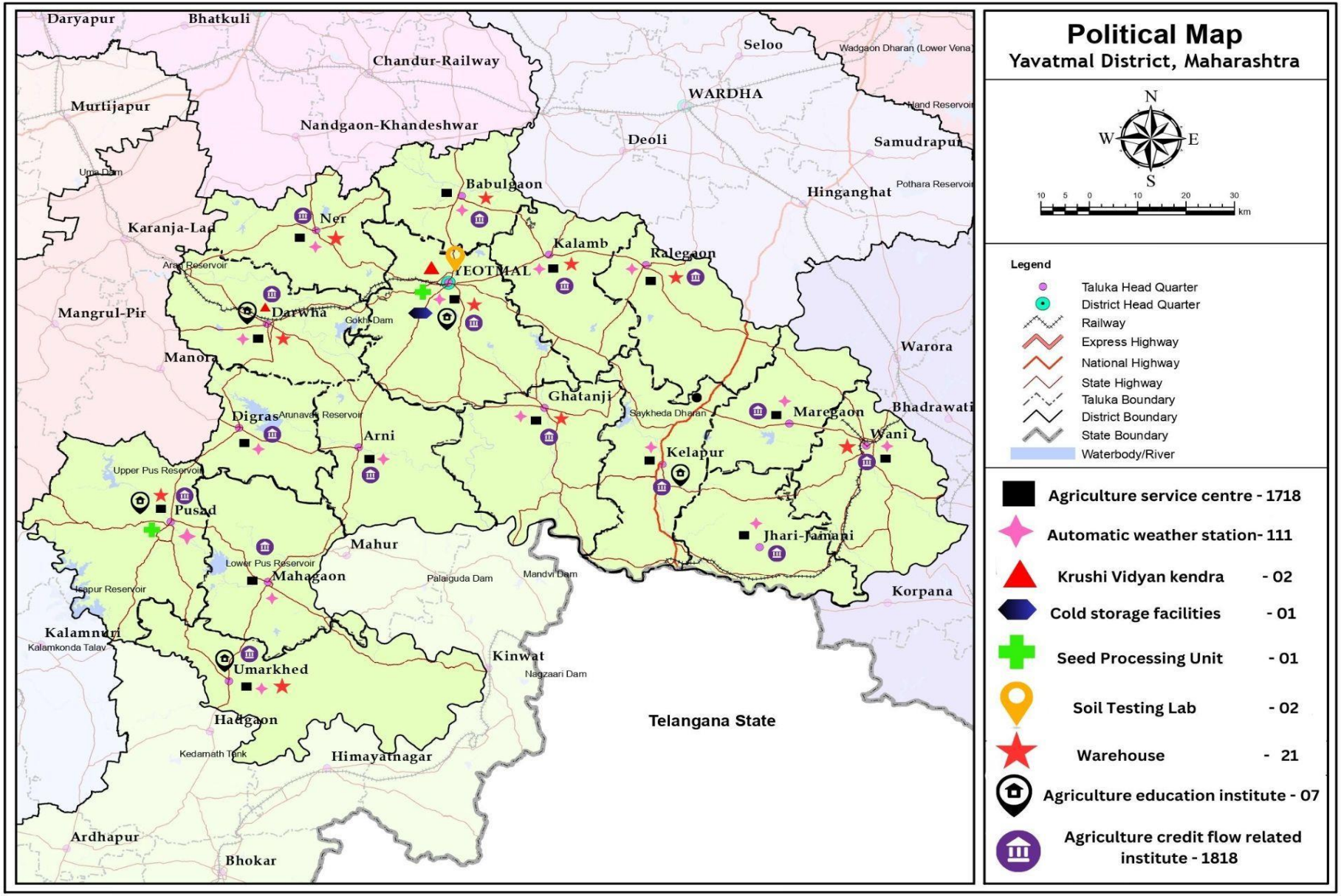
2.5 Year wise area, production and productivity of major crops for last 5 Year

(A-Area ‘00’ha., P- Production ‘00’mt., Y- Productivity kg/ha.)

crop	A	P	Y
	Year 2018-19		
jawar	14471	4798	270
mung	8634	3293	245
Udid	7228	2114	292
Tur	130309	144950	1061
Soyabean	277505	327206	1230
cotton	459533	146380	324
Wheat	34612	49966	1463
Gram	99180	111856	1129
Ground Nut	6012	6822	1129
Year 2019-20			
jawar	12591	3077	258
mung	5610	1863	268
Udid	5196	1615	293
Tur	118281	35981	313
Soyabean	362345	309192	851
cotton	476916	271374	553
Wheat	52414	105733	1965
Gram	116611	178021	1464
Ground Nut	11478	12843	675
Year 2020-21			
jawar	10324	3024	293
mung	5965	1969	321
Udid	5282	1837	363
Tur	107735	73360	681
Soyabean	281674	263635	936
cotton	465562	126741	265
Wheat	50388	72014	1467
Gram	126057	144611	1171
Ground Nut	12263	6455	341
Year 2021-22			
jawar	8391	2042	243
mung	4604	1483	322
Udid	4332	1415	327
Tur	120149	87394	714
Soyabean	302580	311981	1031
cotton	433240	113662	262
Wheat	44542	59009	1305
Gram	128816	138312	1027
Ground Nut	8303	9403	973

Continue…..

crop	A	P	Y
	Year 2022-23		
jawar	3082	778	252
mung	4298	1222	284
Udid	3618	1074	297
Tur	111824	57924	518
Soyabean	292476	234308	801.12
cotton	462707	98267	218
Wheat	49102	51136	1055
Gram	147655	104502	743
Ground Nut	7732	6388	585
Year 2018-19 to 2022-23 average			
jawar	9772	2744	263
mung	5822	1966	288
Udid	5131	1611	314
Tur	117660	77328	657
Soyabean	244821	289265	970
cotton	459592	151285	324
Wheat	46212	67077	1451
Gram	123664	136842	1107
Ground Nut	9158	6781	740


Political Map
Yavatmal District, Maharashtra
N
W
E
S
10 5 0 10 20 30
km
Legend
Taluka Head Quarter
District Head Quarter
Railway
Express Highway
National Highway
State Highway
Taluka Boundary
District Boundary
State Boundary
Waterbody/River
Agriculture service centre - 1718
Automatic weather station- 111
Krushi Vidyan kendra - 02
Cold storage facilities - 01
Seed Processing Unit - 01
Soil Testing Lab - 02
Warehouse - 21
Agriculture education institute - 07
Agriculture credit flow related institute - 1818
Daryapur
Bhatkuli
Chandur-Railway
Murtijapur
Nandgaon-Khandeshwar
Seloo
Wadgaon Dharan (Lower Vena)
WARDHA
Deoli
Samudrapur
Hinganghat
Pothara Reservoir
Uma Dam
Karanja-Lad
Babulgaon
Ner
Kalamb
Ralegaon
YEOTMAL
Arna Reservoir
Mangrul-Pir
Darwha
Gokhi Dam
Manora
Warora
Ghatanji
Digras
Arunavati Reservoir
Arni
Saykheda Dharan
Maregaon
Bhadrawati
Wani
Kelapur
Upper Pus Reservoir
Pusad
Jhari-Jamani
Mahur
Lower Pus Reservoir
Mahagaon
Palaiguda Dam
Mandvi Dam
Korpana
Kalamnuri
Kalamkonda Talav
Kinwat
Umarkhed
Nagzaari Dam
Telangana State
Hadgaon
Kedarnath Tank
Himayatnagar
Ardhapur
Bhokar

Block wise existing Facilities (in No.)

Sr.no	FACILITIES	Total	Arni	Babulgaon	Digras	kalamb	Yavatmal	Darwha	Ghatanji	Maregaon	Pusad	Ralegaon	Zari-jamani	Umarkhed	Mahagaon	Wani	Kelapur (Pandharka	Ner
1	Agriculture service center (ASCs)	1718	91	75	95	71	147	130	63	80	185	113	58	115	146	172	119	58
2	KVK	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
3	Agri-Clinic agri-Business training centers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Cold Storage	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
5	warehouse (MSWC)	5	0	0	0	0	1	1	0	0	1	0	0	1	0	1	0	0
	warehouse (APMC)	10	0	1	0	1	2	1	0	0	0	1	0	1	0	1	1	1
	warehouse (MAHACOT)	5	0	1	0	0	0	0	1	0	1	0	0	0	0	1	1	0
	warehouse (MARKFED))	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	TOTAL WAREHOUSE	21	0	2	0	1	4	2	1	0	2	1	0	2	0	3	2	1
6	soil testing labs	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
7	soil testing labs (PVT)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Fertilizers testing labs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	Leaves testing labs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	Water testing labs	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0

11	Automatic weather stations	111	6	5	5	6	11	7	7	5	9	7	5	9	7	9	7	6
12	Seed processing center(Mahabeej)	2	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
13	Nurseries of fruit crop	5	0	0	0	0	1	2	0	0	1	0	0	0	0	0	1	0
14	Nurseries of fruit crop (Pvt)	5	0	0	0	0	1	0	0	0	2	0	0	0	2	0	0	0
15	Nurseries of forestry crop	19	0	1	2	1	1	2	1	0	2	1	1	2	0	2	1	2
16	Nurseries of forestry (pvt)	5	0	0	1	0	2	0	0	0	1	0	0	0	0	0	1	0
17	Nurseries of Vegetables (gov)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	Nurseries of Vegetables (pvt)	14	1	0	1	0	1	0	1	1	1	0	2	0	2	2	1	1
19	Nurseries of sugarcane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	FPC	146	9	2	8	7	18	2	13	5	17	11	2	14	10	7	13	8
21	SHGs	24663	1509	1232	1305	1488	1744	1664	1353	1194	2012	1377	1242	2097	1785	2041	1322	1322
22	Regulated market(apmc)	16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
23	agriculture credit flow and related institutes	1818	95	93	116	89	383	160	64	40	153	77	46	109	72	132	98	91
24	Agriculture education institutes	7	0	0	0	0	3	1	0	0	1	0	0	1	0	0	1	0

Chapter 3: Weather trend of district

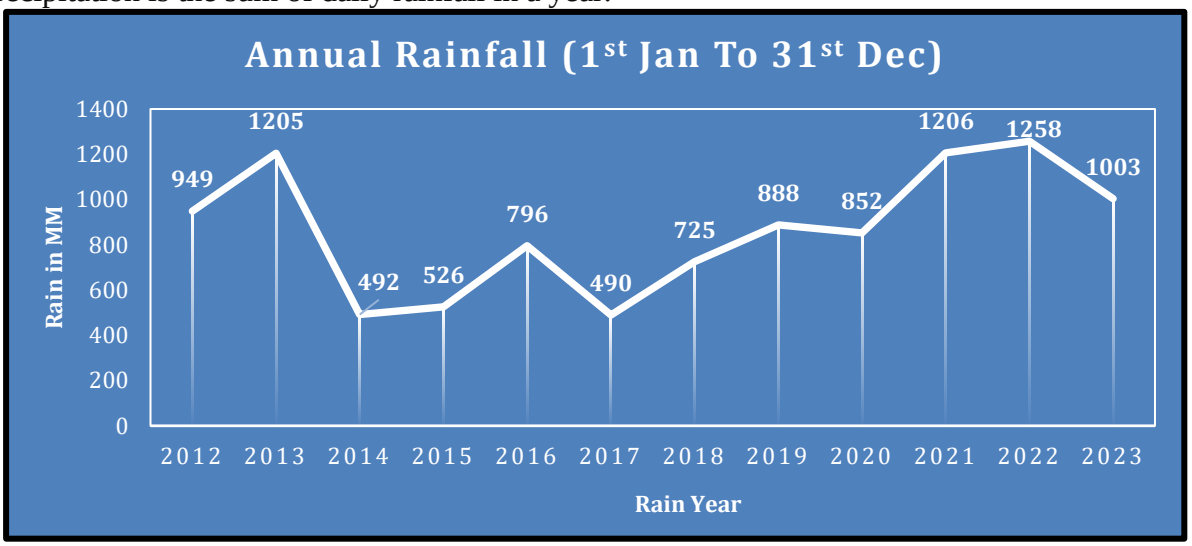
Introduction

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

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

3.1 Annual average rainfall of last twelve years

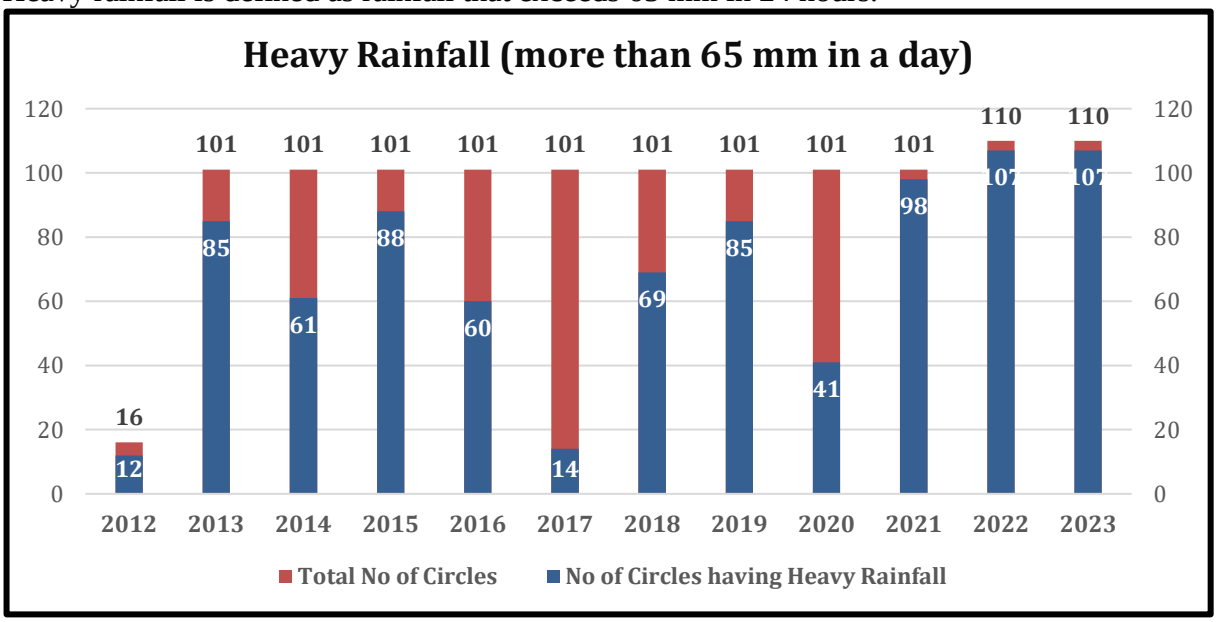
Normal or average rainfall is the amount of precipitation that we expect per year (in a given area). It is obtained and set by calculating the average (mean) of precipitation recorded in an area. Annual rainfall or precipitation is the sum of daily rainfall in a year.



The graph 3.1 presents annual rainfall data of Yavatmal district from 2012 to 2023, highlighting fluctuations in precipitation. Notably, the lowest recorded rainfall was in year 2017 at 490 mm, while the highest occurred in year 2022 with a total of 1258 mm annual average rainfall.

3.2 Heavy rainfall

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



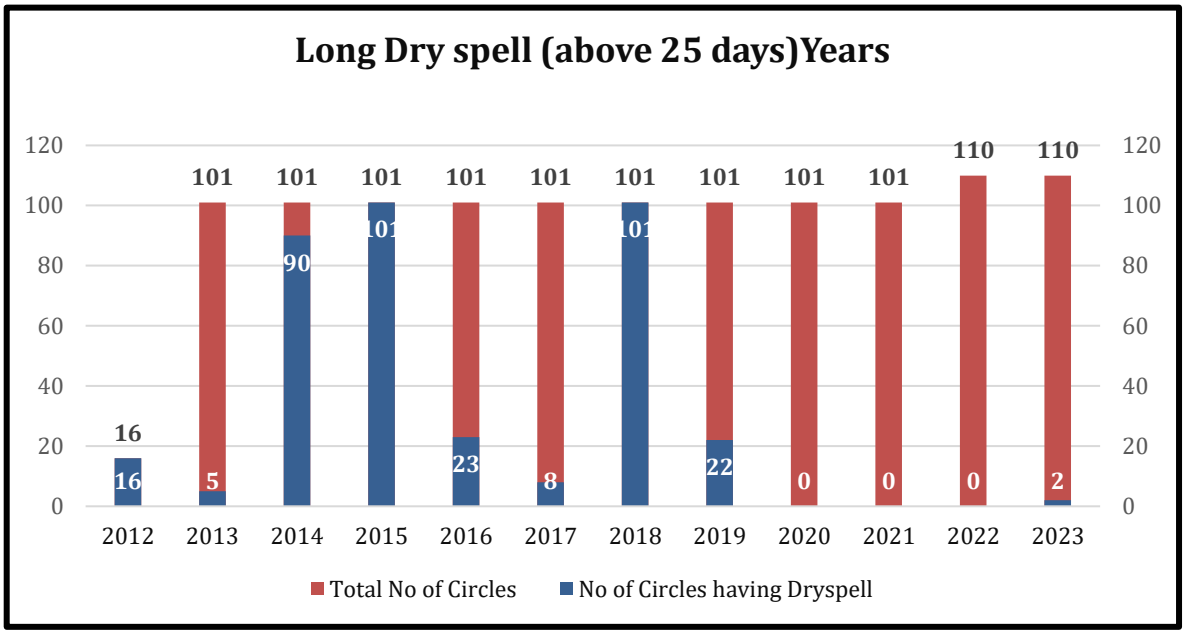
The provided graph 3.2 illustrates occurrences of heavy rainfall in the circles of the Yavatmal district from year 2012 to 2023. Notably, in year 2022 and 2023, heavy rainfall affected the maximum number of circles, with 107 circles out of the 110 circles experiencing such conditions. Conversely, the year 2017 recorded a lower incidence of heavy rainfall, with only 14 circles out of the 101 circles being affected in Yavatmal District.

3.3Dry spells

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

3.3.1 Long Dry spell

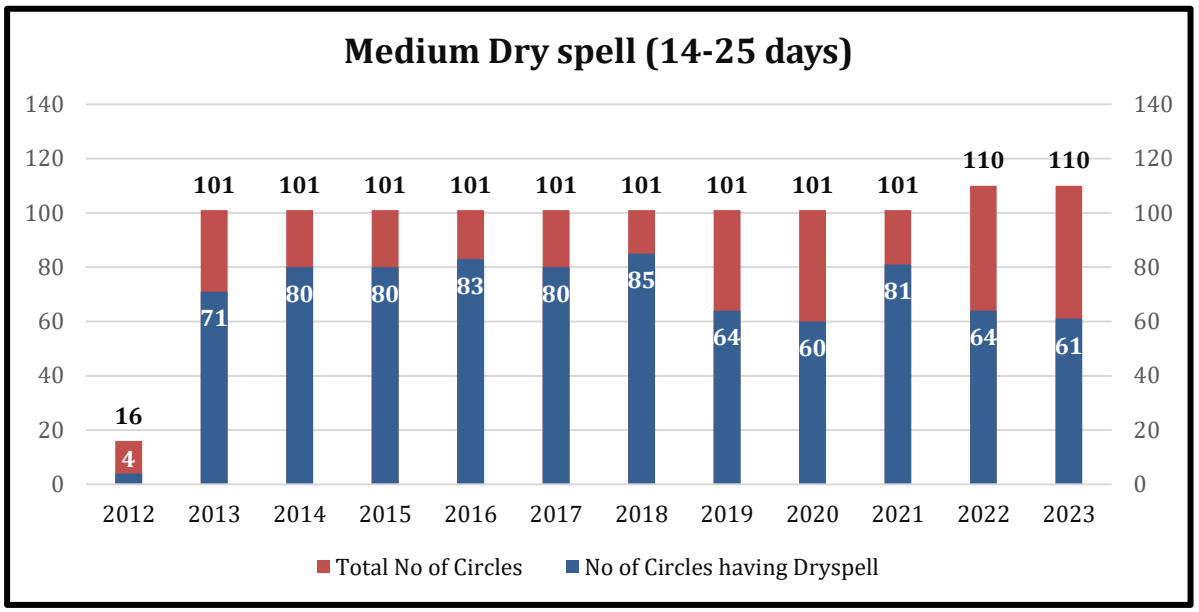
Long Dry spell is a prolonged period above 25 days of dry days in monsoon period



A graph (Graph 3.3.1) that shows the trend of long dry spells observed in a Yavatmal district. The data covers the total number of circles and the circles that affected long dry spell (more than 25 days) from the year 2012 to 2023. The graph shows that in year 2015 and 2018, all circles in the district experienced long dry spells. Conversely, in year 2020, 2021 and 2022 there was no long dry spell, across all circles in the district.

3.3.2 Medium Dry spell

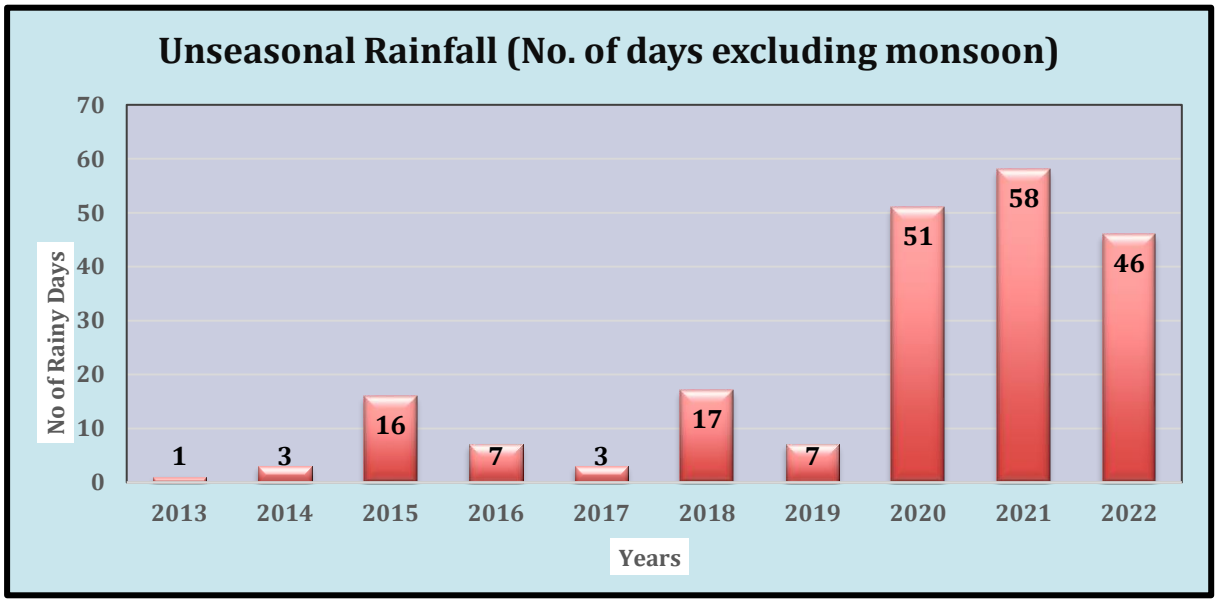
Medium Dry spell a period of 14-25 days of dry weather.



A graph (Graph 3.3.2) that shows the trend of medium dry spells observed in a Yavatmal district. The data covers the total number of circles and the circles that affected medium dry spell (14 to 25 days) in Yavatmal district from the year 2012 to 2023. The graph shows that in year 2018, out of 101 circles 85 circles in the district experienced medium dry spells. Conversely, in year 2020, there was only 60 circles out of 101 circles experienced medium dry spell in the district.

3.4Unseasonal rainfall.

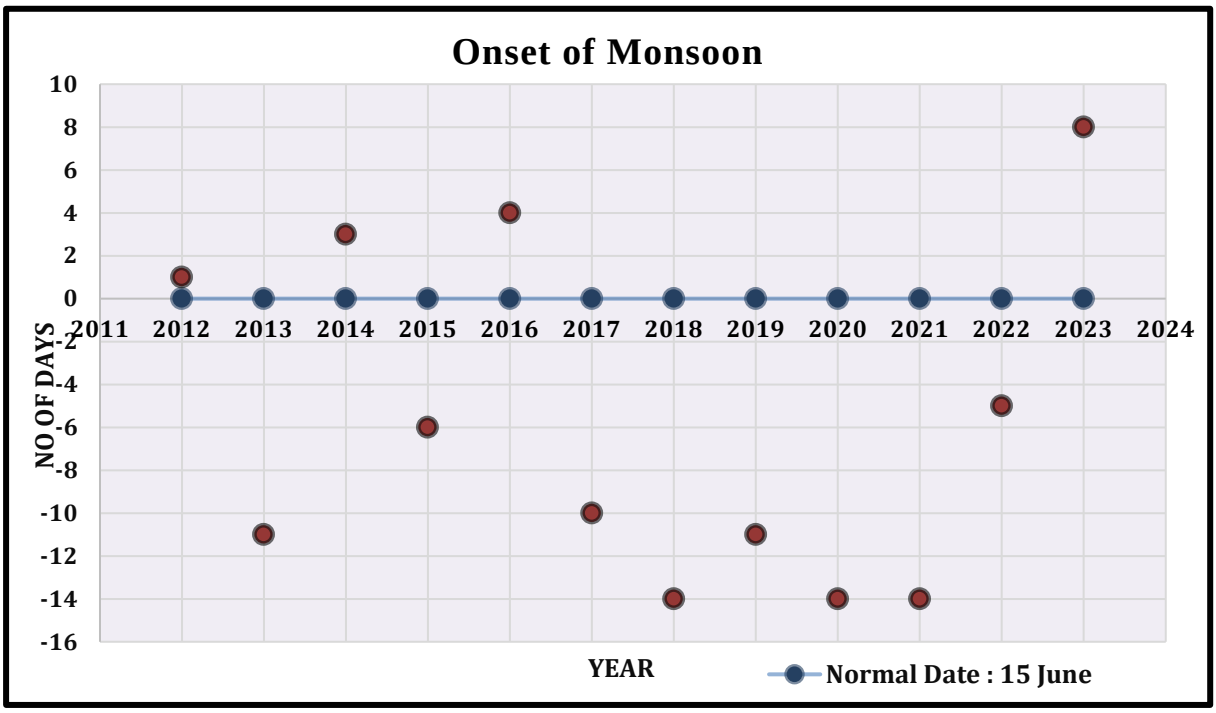
Rainfall received during non mosoon days is treated as unseasonal rainfall. Unseasonal rains-when there is a sudden change in atmospheric pressure, it can result in precipitation, even during non-monsoon seasons.



The graph 3.4 illustrates the annual occurrences of unseasonal rainfall in the Yavatmal district from year 2013 to 2022. The data reveals a variation ranging from 1 days to 58 days of unseasonal rainfall.

3.5Monsoon onset delay

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

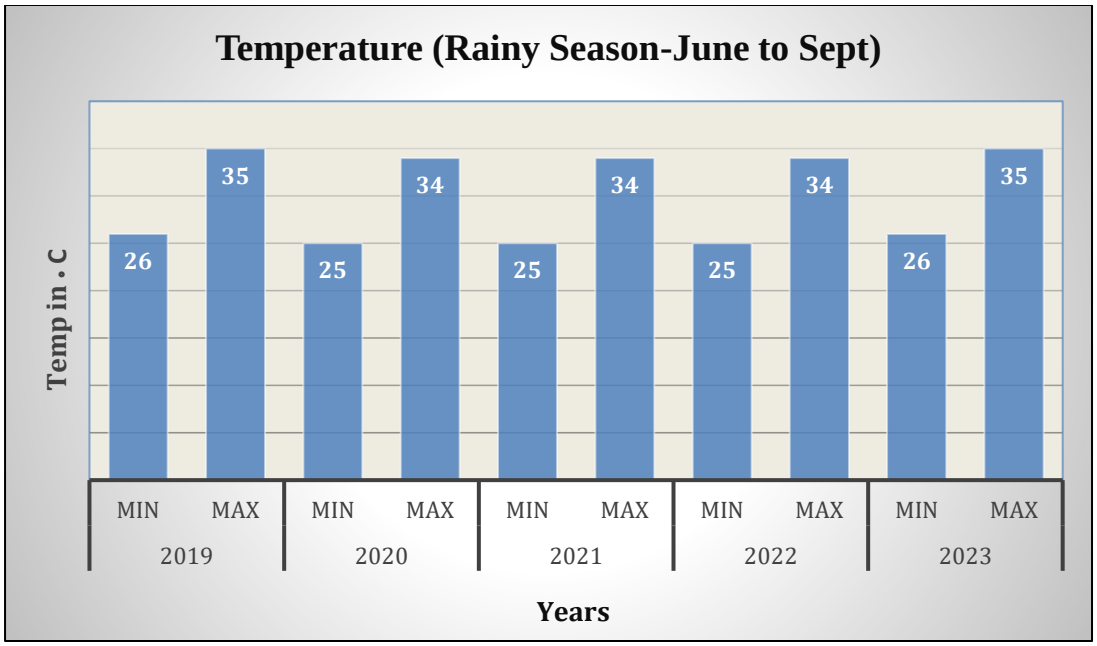


The graph 3.5 depicts the annual onset of the monsoon. The blue line represents the normal day of onset of monsoon. The onset days show variations ranging from -14 to 8 days. Notably, in year 2012, 2014, 2016 and 2023 the monsoon arrived delayed than the normal onset date. However, in remaining years the monsoon was notably arrived earlier.

3.6Temperature.

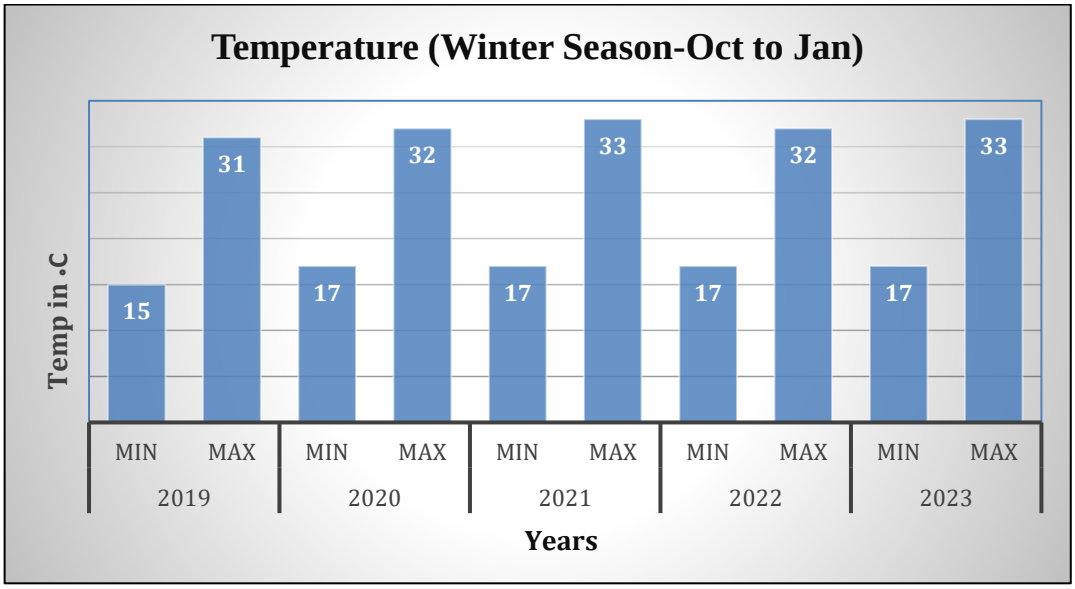
Temperature is a physical quantity that quantitatively expresses the attribute of hotness or coldness. The average temperature is 28 °C, with a minimum of 19°C and a maximum of 37°C. On the coldest nights, the temperature usually drops to around 13°C. On the warmest days, the temperature usually reaches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

3.6.1 Temperature (Rainy Season-June to Sept)



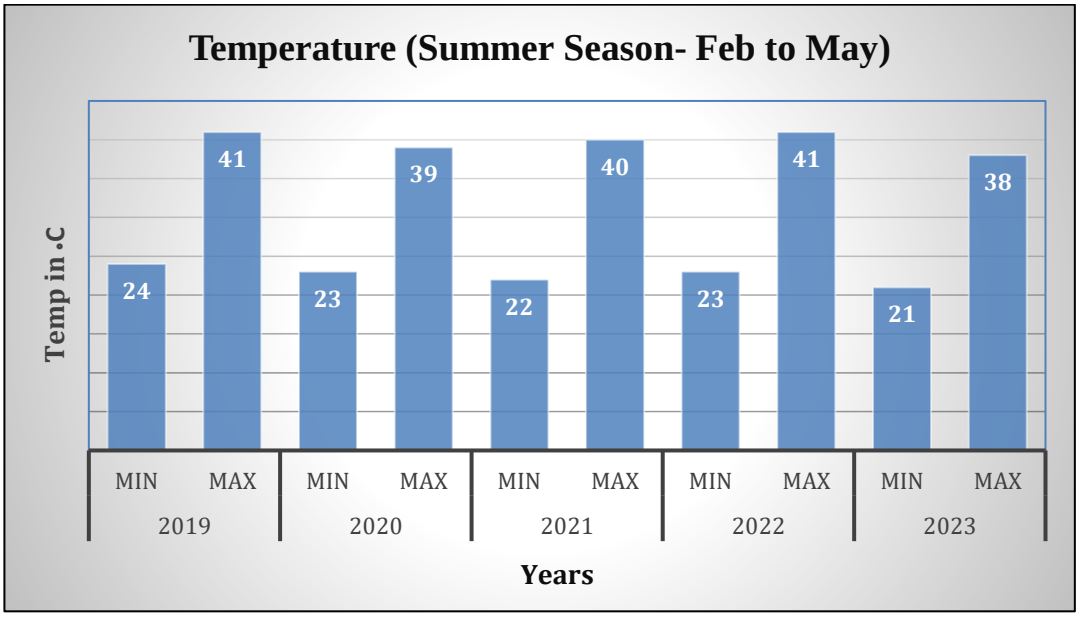
The graph 3.6.1 presents the temperature in the Yavatmal district during the rainy season from year 2019 to 2023 exhibited a consistent range, with minimum temperatures fluctuating between 25-26 °C and maximum temperatures ranging from 34-35 °C.

3.6.2 Temperature (Winter Season-Oct to Jan)



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

3.6.3 Temperature (Summer Season- Feb to May)

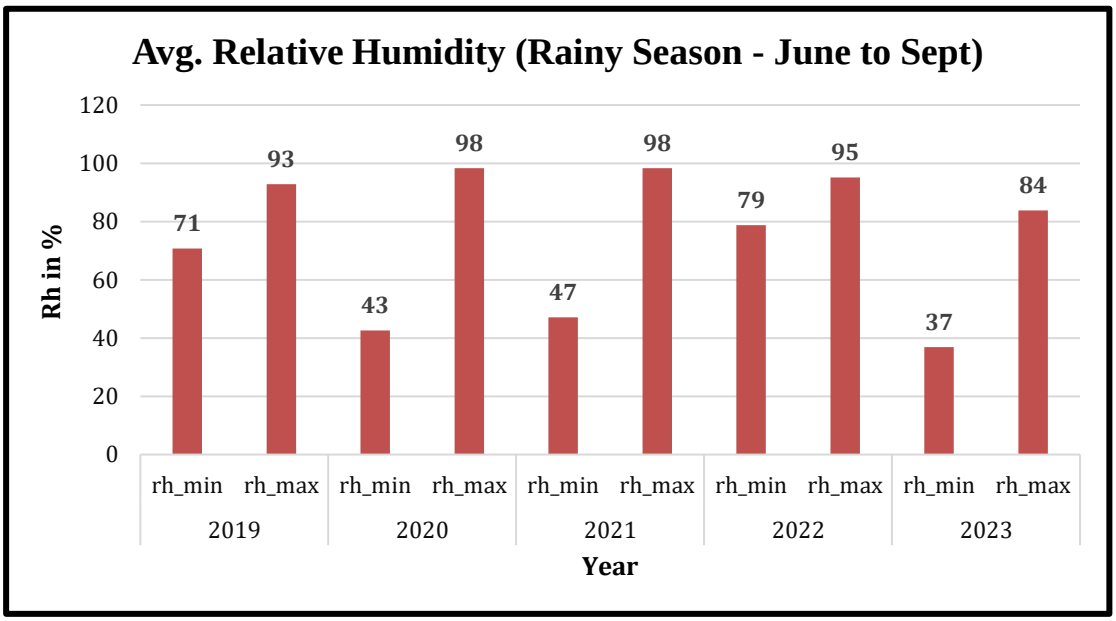


The graph 3.6.3 presents the temperature in the Yavatmal district during the summer season from 2019 to 2023 exhibited a consistent range, with minimum temperatures fluctuating between 21-24 °C and maximum temperatures ranging from 38-41 °C.

3.7Relative Humidity

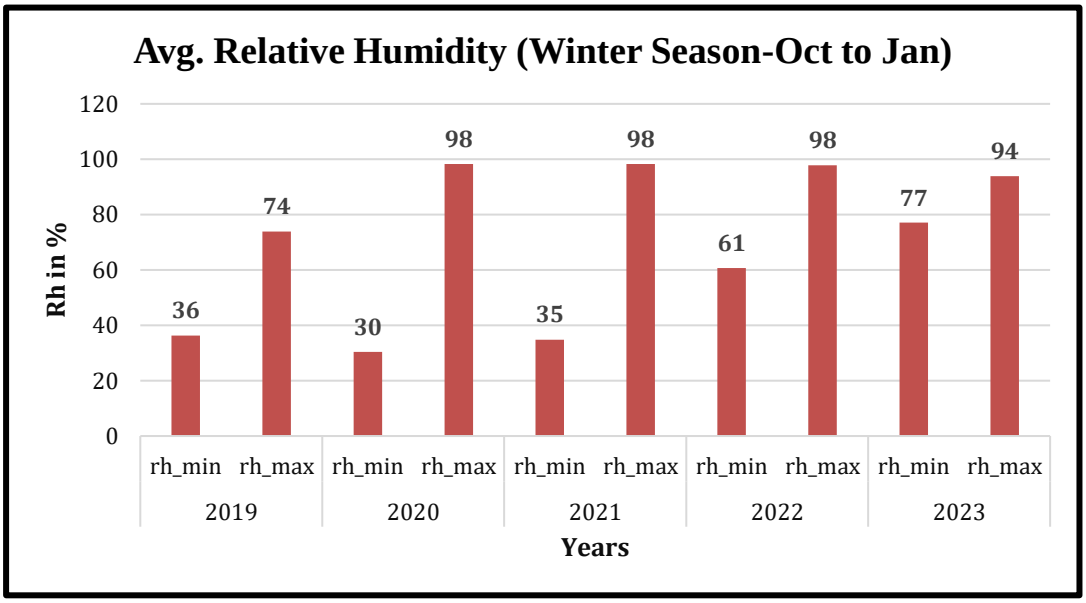
Relative Humidity is the ratio of the actual quantity of moisture at a certain temperature and pressure to the maximum it can hold at the same temperature and pressure. It is usually multiplied by 100 and expressed in percent.

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



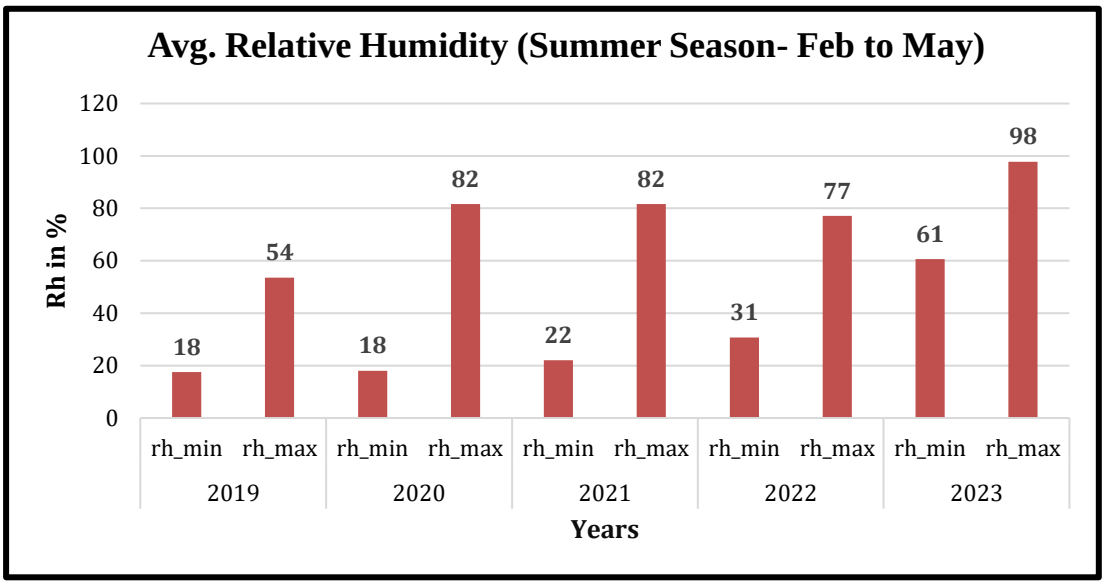
The graph 3.7.1 illustrates humidity levels during the rainy season in the Yavatmal district, revealing a variation in minimum humidity from 37% to 79% and maximum humidity ranging between 84% and 98%.

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



The graph 3.7.2 illustrates humidity levels during the winter season in the Yavatmal district, revealing a variation in minimum humidity from 30% to 77% and maximum humidity ranging between 74% and 98%.

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



The graph 3.7.3 illustrates humidity levels during the summer season in the Yavatmal district, revealing a variation in minimum humidity from 18% to 61% and maximum humidity ranging between 54% and 98%.

Chapter 4: Impact of climate variability on agriculture production

4.1.1 Impact of Temperature on Crop growth and yield

General	Kharif			Rabbi		Summer
	Soybean	Tur	Cotton	Bengal gram	Wheat	ground-nut
1) High temperature is a devastating environmental factor that influences crop growth and yield by affecting numerous crop mechanisms 2)	The optimum temperature for soybean is 20-30°C, the optimum soil temperature for germination and early seedling growth is 25 to 30oC. Temperatures	Optimal temperature 20-30°C. Soil temperature plays a crucial role in germination and early seedling growth, with an optimum range of 25 to 30°C. Temperatures exceeding 31°C may lead to a reduction in the number of pods formed. Severe limitations in pod	Optimum temperature 24-30°C. Cotton seeds germinate well when soil temperatures range from 20-30°C. High temperatures above 35°C can negatively impact	Bengal gram requires a cool climate for growth and high temperature for maturity. The crop performs better at 20-25°C temperature,	Optimal temperature 15-24°C during the vegetative and reproductive stages. Cool temperature for germination and early seedling. Wheat is particularly	The optimal temperature range for groundnut growth is typically between 25-30°C. Groundnut is sensitive to extreme temperatures. Prolonged exposure to temperatures above 35°C can result in heat stress,

Low temperature affects several aspects of crop growth viz., survival, cell division, photosynthesis, water transport, growth and finally yield.	exceeding 31° C can result in a decreased number of pods while temperatures above 37° C. severely limit pod formation. For every 1°C increase, soybean yield decreases by an average of 17%. warm temperatures and periods of * decreasing the number of flowers *vegetative growth stunned *yield loss up to 20%	formation can occur when temperatures rise above 37°C. For every 1°C increase beyond the optimal range, red gram yield may experience an average reduction of around 17%. During red gram crop's flowering to pod formation stage, if the temperature falls below 7 degrees Celsius, early morning fog can lead to flower and pod scorching. Smoke treatment is applied during night hours to mitigate this issue.	cotton pollination, potentially leading to a decrease in boll formation. Extreme temperatures, especially above 40°C, can cause heat stress, affecting overall plant health. More than optimum temperature may result in reduction in the number of bolls and affect fiber quality. Cooler temperatures during the flowering period can lead to delayed maturity and impact yield.	cool temperature for germination and early seedling moderate temperature for flowering and pod formation. High temperatures exceeding 30°C. can lead to heat stress resulting in flowering, pod setting, and yield. Yield loss 10%-30% due to heat stress.	sensitive during its reproductive stage, including flowering and grain filling. High temperatures during these stages can lead to reduced grain setting and negatively impact yield. 1°C increase in temperature beyond the optimal range during the grain-filling stage, wheat yield can decrease by about 5-10%. Temperature conditions can also influence the prevalence of certain diseases and pests in wheat. Warmer temperatures may favor the development of specific pathogens and pests.	affecting flowering, pod development, and overall crop productivity. High temperatures during critical growth stages, especially during flowering and pegging, can lead to poor pod formation and reduced yield. The impact may vary based on the severity and duration of heat stress.

4.1.2 Impact of Temperature on Water Availability

General	Kharif			Rabbi		Summer
	Soybean	Tur	Cotton	Bengal gram	Wheat	ground-nut
1) Raising temperatures cause soils to become drier. *Many weeds, pests, and fungi thrive under warmer temperatures, wetter climates, and increased CO2 levels. *disturbances of terrestrial precipitation, evaporation and soil moisture 2)soil cracking 3)wilting of crop	Higher temperatures generally lead to increased evaporation rates from the soil surface. Higher temperatures often lead to increased transpiration rates. If temperatures are high and there is insufficient water in the soil to meet the demands of evaporation, transpiration, and plant growth, soybean plants can experience drought stress. Drought stress negatively impacts plant development and can lead to yield losses.	Elevated temperatures, coupled with inadequate water availability, can result in water stress for red gram crops. Water stress can negatively impact plant growth, flowering, and pod development, potentially leading to a decrease in yield. Higher temperatures often lead to increased transpiration rates, contributing to the overall water demand of the crop.	Cotton plants undergo transpiration, where water is taken up by the roots and released into the atmosphere through small pores in the leaves (stomata). Higher temperatures often lead to increased transpiration rates, contributing to the overall water demand of the crop. Elevated temperatures, coupled with insufficient water availability, can result in water stress for cotton crops. Water stress during critical growth stages, such as flowering and boll development, can negatively impact yield and fiber quality.	Soil characteristics, such as texture and structure, influence water retention. Warmer temperatures can accelerate evaporation and potentially reduce soil moisture, impacting water availability for Bengal gram. Elevated temperatures, coupled with insufficient water availability, can result in water stress for Bengal gram crops. Water stress during critical growth stages can negatively impact plant development and reduce yield.	Wheat often requires a period of exposure to cold temperatures (vernalization) for proper flowering. Warmer temperatures during the flowering stage can lead to increased water demand. Elevated temperatures, especially during critical growth stages, can exacerbate water stress in wheat crops. Prolonged exposure to high temperatures, especially during the grain-filling stage, can result in heat stress and impact yield. Elevated temperatures during the grain-filling period can affect grain quality. High temperatures can lead to reduced kernel weight and negatively impact the protein content of wheat grains.	Groundnuts typically thrive in warm temperatures. The optimal temperature range for groundnut growth is generally between 25-30°C. Temperatures outside this range can affect plant development and water use efficiency. Higher temperatures generally lead to increased evaporation rates from the soil surface. Groundnut produces pods above the ground. Adequate water availability during pod development and maturation is crucial for achieving optimal yields. Insufficient water during these stages can lead to reduced pod filling and smaller seeds. Elevated temperatures, combined with insufficient water availability, can result in water stress for groundnut crops. Water stress during critical growth stages can negatively impact pod development, seed filling, and overall yield.

4.1.3 Impact of Temperature on Pest & Disease Infestation

General	Kharif			Rabbi		Summer
	Soybean	Tur	Cotton	Bengal gram	Wheat	ground-nut
Because insects are exothermic, they tend to be more active under warmer conditions. A typical effect of elevated temperature is therefore to increase consumption rates and therefore decrease the time to pupation, making them less apparent to natural enemies and in some cases increasing the potential number of generations per season. Crop diseases are following a similar pattern, particularly when it comes to pathogens like fungi. Climate change further increases outbreak risks by altering pathogen evolution and host–pathogen interactions and facilitating the emergence of new	1) Soybean aphids thrive in cooler temperatures. Warmer temperatures may slow down their reproduction rates, while cooler temperatures favor their development and population growth. 2) Bean leaf beetles are influenced by temperature during their overwintering and spring emergence. Warmer temperatures in winter may reduce mortality rates, allowing higher populations to emerge in the spring. 3) Stink bugs, such as the Brown Marmorated Stink Bug, are influenced by temperature during their development. Warmer temperatures may accelerate their life cycle, leading to increased population sizes. 4) Soybean rust development is favored by warm and humid conditions. Warmer temperatures can accelerate the spread of	1) Pod borers are influenced by temperature during their developmental stages. Warmer temperatures may accelerate their life cycle, leading to increased damage to red gram. 2) Aphids can thrive in a wide range of temperatures. Warmer temperatures may promote faster reproduction rates, increasing the potential for aphid infestations. 3) Fusarium wilt is influenced by soil temperatures. Warmer soil temperatures may favor the development and spread of Fusarium wilt, impacting the roots of red gram plants. 4) Pod blight is favored by moderate temperatures and high humidity. Warmer temperatures combined with humidity can create conditions conducive to the	1) Diseases increase. 2)Increased Insect pests infesting cotton can cause significant damage to the crop, leading to lower yields and economic losses. Sucking pests, leaf feeders and bollworms cause serious damage to cotton crops which if not managed at the right time would lead to 40 – 50% of crop loss. 5)Warm and humid climate, late sowing, monocropping, poor irrigation management and lack of natural predators can create favorable conditions for tobacco caterpillar infestation. Heavy and continuous rains can lead to	1) flowering shedding. 2)Ascochyta blight fungal Disease emergence if favored by wet weather; spores are carried to new plants by wind and water splash. 2) Aphids can thrive in a wide range of temperatures. Warmer temperatures may promote faster reproduction rates, increasing the potential for aphid infestations. ETL: ETL for aphids in chickpeas is typically around 20-30 aphids per plant, but it can vary based on factors like plant growth stage 3) Ascochyta blight development is influenced by temperature and humidity. Warmer temperatures combined with high humidity can contribute to the spread of the disease.	1) Warmer temperatures may promote faster reproduction rates, leading to increased aphid populations in wheat. 2) Armyworm activity is influenced by temperature, and warmer conditions may lead to increased feeding and crop damage. 3) Warmer temperatures can limit the spread of stripe rust, but the disease can still occur in certain temperature ranges. 4) Fusarium head blight development is favored by warm and humid conditions during the flowering stage. Warmer temperatures and high humidity contribute to the spread of the disease. 5) Septoria tritici blotch is favored by moderate temperatures and high humidity.	1) Warmer temperatures may promote faster reproduction rates, leading to increased aphid populations in groundnut 2) Warmer temperatures may accelerate thrips' life cycle, leading to increased feeding damage to groundnut foliage. 3) Pod borers, such as Helicoverpa armigera, are influenced by temperature during their developmental stages. Warmer temperatures may accelerate their life cycle, leading to increased damage to groundnut pods 4) Early leaf spot development is influenced by temperature and humidity. 5) Late leaf spot is favored by warm and humid conditions.

pathogenic strains. Pathogen range can shift, increasing the spread of plant diseases in new areas.	soybean rust, leading to increased severity of the disease. 5) Soybean cyst nematodes are influenced by soil temperatures. Warmer soil temperatures may enhance their activity and reproduction rates, potentially increasing damage to soybean roots. 6) Phytophthora root rot is favored by warm and wet conditions. Higher temperatures, especially during periods of excessive rainfall, can contribute to the development and spread of this disease. 7)*Rust development is favored by high humidity.	development of pod blight in red gram.	waterlogging in well-tilled cotton fields, promoting the occurrence of para wilt disease. To avoid this problem, earthing up operations are essential during the second hoeing in the cotton crop. ETL: 8 egg masses per 100-meter row			

4.2.1 Impact of rainfall on Crop growth and yield

General	Kharif			Rabi		Summer
	Soyabean	Tur	Cotton	Bengal gram	wheat	ground-nut
Crops are affected through rainfall in two different ways-high and low rainfalls. Avoiding the problem of low rainfall is nearly possible through irrigation, but High rainfall at the end of crop cycle causes destructive damages of the output The potential impacts of heavy precipitation include crop damage, soil erosion, and an increase in flood risk due to heavy rains	1) Adequate rainfall is essential for the germination of soybean seeds. 2)Critical Stage: Soybeans are particularly sensitive to water stress during flowering and pod formation. Inadequate rainfall or drought during this period can lead to poor pod development and reduced yield. 3)Critical Stage: Adequate moisture is crucial during seed filling to ensure optimal development and size of soybean seeds. Insufficient	1) Critical Stage: Adequate moisture during pod filling is crucial for the development and filling of seeds. Insufficient rainfall can result in smaller and fewer seeds, reducing overall yield. 2)Red gram is known for its relatively higher drought tolerance compared to some other pulse crops. However, prolonged drought can still have negative effects on yield. 3) Excessive rainfall near the harvest period can delay harvesting and may increase	1)Critical Stage: Cotton is highly sensitive to water stress during flowering and boll formation. Inadequate rainfall during this period can lead to flower and boll shedding, reducing the potential for high yields. 2)Critical Stage: Adequate moisture during boll development is crucial for fiber elongation and quality. Insufficient rainfall during this stage can result in reduced fiber length and quality. 3)Excessive rainfall and high	1) Critical Stage: Bengal gram is sensitive to water stress during flowering and pod formation. Insufficient rainfall during this period can lead to poor pod setting and reduced yields 2)Critical Stage: Adequate moisture during pod filling is crucial for the development and filling of seeds. Insufficient rainfall can result in smaller and fewer seeds,	1)Wheat plants require sufficient water during tillering and vegetative growth for the development of a robust root and shoot system. This supports the formation of tillers and contributes to a higher potential yield. 2)Critical Stage: a)Jointing and Booting, B)Heading and Flowering: C) Gain filling during these stages Inadequate rainfall can lead to reduced grain number per spike, poor pollination and reduced grain filling, leading to lower yields, also smaller and lighter grains.	1) Adequate rainfall is crucial for germination and vegetative growth for optimal leaf development, flowering, and nutrient uptake 2)critical stages A) flowering and pegging. B) development and filling during these stages Insufficient rainfall can lead to underdeveloped and smaller pods, affecting overall yield 3) Excessive rainfall near the harvest period can delay groundnut harvesting. Delayed harvesting may increase the risk of pod decay, mold development, and reduced seed quality.

	rainfall during this stage can result in smaller and fewer seeds, leading to reduced yields. 4)Excessive rainfall, in poorly drained soils, can lead to waterlogging,	the risk of seed damage, particularly from sprouting or fungal infections.	humidity can create favorable conditions for certain cotton diseases, including fungal infections. 4)Excessive rainfall during harvest period can delay cotton harvesting. can decreases fiber quality deterioration and yield losses due to boll rot	impacting overall yield		

4.2.2 Impact of rainfall on Irrigation supply, drought, and flood

General	Kharif			Rabi		Summer
	Soyabean	Tur	Cotton	Bengal gram	wheat	ground-nut
If rainfall is sufficient to cover the water needs of the crops, irrigation is not required. If there is no rainfall, all the water that the crops need has	1) Insufficient rainfall/drought a) Reduced germination Stunted growth Flower and pod abortion Smaller and fewer seeds. b)	1) Insufficient rainfall/drought: a) Impact on red gram- delay germination. Reduce vegetative growth, flowering and pod abortion, smaller and fewer	1) Insufficient rainfall/drought: reduced germination, stunted plants, flowering and boll-setting stages can result in poor fruit set and reduced yield. boll	1)Optimal rainfall have positive impact such as uniform emergence, healthy and vegetative growth, good	1) Insufficient rainfall/drought: can lead to reduced germination, stunted plants, reduced leaf area, and limited biomass production. reduced tiller	1) Insufficient rainfall/drought- : reduce germination ,stunted plants growth Flower and pod abortion Smaller and fewer seeds. pod development can lead to

to be supplied by irrigation. A single soaking rain will provide lasting relief from drought conditions, but multiple such rains over several months might be required to break a drought and return conditions to within the normal range; however Excessive rainfall and associated waterlogging can seriously impede plant growth and lead to significant yield losses in many crop species. Flash floods may wash away or ruin entire swaths of agricultural land and completely destroy crops.	impact on irrigation supply: Increased demand of irrigation, Water scarcity. 2)excessive rainfall/ flood impact on crop : a) Waterlogging, Disease susceptibility, Seedling damage, Delayed planting or harvesting. B) impact on irrigation supply: Reduced need for irrigation: Excess rainfall can temporarily reduce the need for supplemental irrigation, as soil moisture levels may be sufficient	seeds, impacting overall yield. B) impact on irrigation supply: Increased demand for irrigation, Water scarcity.. 2)excessive rainfall/ flood impact on crop :a) Waterlogging, Disease susceptibility, Seedling damage, Delayed planting or harvesting. B) impact on irrigation supply : Reduced need for irrigation: Excess rainfall can temporarily reduce the need for supplemental irrigation, as soil moisture levels may be sufficient	development can lead to smaller bolls and lower fiber quality 2)excessive rainfall/ flood a) Waterlogging, Disease susceptibility, staining and discoloration of the cotton lint., Delayed planting or harvesting " B) impact on crop impact on irrigation supply : Reduced need for irrigation: Excess rainfall can temporarily reduce the need for supplemental irrigation, as soil moisture levels may be sufficient. ETL: 10% of damaged flowers or bolls	flowering and pod setting, quality seed development Excessive rainfall can lead to waterlogging, causing oxygen deprivation in the soil and inhibiting root growth, Disease susceptibility	formation, limiting the potential number of grains per spike.Drought during grain-filling stages can result in smaller and fewer grains, reducing overall yield. 2)excessive rainfall/ flood a) Waterlogging, Disease susceptibility, reduced root functionality, affecting nutrient uptake	smaller pods and fewer, smaller seeds, impacting overall yield. 2)excessive rainfall/ flood impact on crop :a) Waterlogging, Disease susceptibility, pod rot & seedling damage Delayed planting or harvesting. B) impact on irrigation supply : Reduced need for irrigation: Excess rainfall can temporarily reduce the need for supplemental irrigation, as soil moisture levels may be sufficient.

4.2.3 Impact of rainfall on Pest and Disease infestation and its management

GENERAL	Kharif			Rabi		Summer
	SOYABEAN	TUR	cotton	Bengal gram	wheat	ground-nut
Heavy Rainfall may cause disease in the field , water logging causes fungal disease.Water logging is responsible for the decrease in oxygen availability to roots.	Waterlogging stress has been revealed to significantly reduce seed yield by 40–80% in soybeans,poor pod formation, reduced seed yield, and plant mortality are the damaging effects of chlorophyll degradation and stomatal closure when soybean .Bacterial pustule Disease is prevalent in soybean growing regions which experience warm temperatures and frequent rainfall during the growing season. Stink Bugs and Pod Borers: Increased humidity and moisture can favor the development of stink bugs and pod borers, causing damage to soybean pods.	1) Wilt Fungal population is highest at 30% soil water-holding capacity and at soil temperatures between20 and 30° C. 2)sterility mosaic disease increases due to Shade and humidity encourage multiplication of the virus. 3)stem blight occurs when Soils with poor drainage Low lying areas Heavy rain.Temperature 28-30o C. Fusarium Wilt: Wet conditions can favor the development of Fusarium wilt, affecting the roots and vascular system of red gram plants.	Bollworms: Excessive rainfall can lead to increased bollworm infestations, causing damage to cotton bolls. Aphids and Whiteflies: Wet conditions may favor the multiplication of aphids and whiteflies Bacterial Blight: Rain splash can facilitate the spread of bacterial blight in cotton fields.	Pod Borers: Excessive rainfall can create conditions conducive to pod borer infestations in chickpea pods. Helicoverpa armigera: Wet conditions may favor the development of Helicoverpa armigera larvae Ascochyta Blight: Wet and humid conditions can contribute to the spread of ascochyta blight in chickpea crops..	Heavy Rainfall may cause disease in the field , water logging causes fungal disease.Water logging is responsible for the decrease in oxygen availability to roots. Aphids: Increased humidity can create favorable conditions for aphid populations in wheat fields. Armyworms: Wet conditions may contribute to the proliferation of armyworms in wheat crops. Stripe Rust: Excessive rainfall and high humidity can promote the development and spread of stripe rust in wheat.	Heavy Rainfall may cause disease in the field , water logging causes fungal disease.Water logging is responsible for the decrease in oxygen availability to roots. Leafhoppers: Wet conditions can favor the presence of leafhoppers in groundnut fields Early Leaf Spot: Excessive rainfall can contribute to the spread of early leaf spot, a fungal disease affecting groundnut foliage.

4.2.4 Impact of rainfall on soil erosion and nutrient loss

GENERAL	Kharif			Rabi		Summer
	SOYABEAN	TUR	cotton	Bengal gram	wheat	ground-nut
. High-Intensity Rainfall: Intense rainfall events, especially when occurring over a short duration, can lead to increased runoff and soil erosion. Surface Runoff: Heavy rain can create surface runoff, carrying away the topsoil and causing erosion. This is particularly problematic on sloping terrain where water can flow more rapidly. Erosion can result in the loss of the nutrient-rich topsoil, which contains organic matter and essential nutrients necessary for plant growth.Nutrient Forms: Nutrients can be lost in different forms during erosion, including dissolved in runoff water, attached to sediment particles, or as organic matter. Yield Reduction: Soil erosion can lead to reduced soil fertility, negatively impacting crop yields.Water Quality: Sediment and nutrients carried by runoff can enter water bodies, affecting water quality and causing environmental issues.	Rainfall Impact: A heavy rainfall event, such as a sudden intense storm, can increase the risk of soil erosion in soybean fields. Erosion Example: For example, an increase of 50 mm of rainfall in a short duration might result in a 10% increase in soil erosion in soybean fields. Soil erosion can lead to the loss of topsoil, potentially carrying away nutrients with it.	. Rainfall Impact: Intense rainfall can increase the vulnerability of red gram fields to soil erosion, especially on sloping terrain. Erosion Example: A 60 mm increase in rainfall might cause a 15% increase in soil erosion in red gram fields.	Erosion Example: A 60 mm increase in rainfall might cause a 15% increase in soil erosion in red gram fields. Heavy rainfall can lead to surface runoff in cotton fields, contributing to soil erosion Eroded soil may carry away essential nutrients, impacting cotton plant nutrition and development	Rainfall Impact: Chickpea fields may experience soil erosion during intense rainfall events, affecting soil structure. Erosion Example: A 40 mm increase in rainfall might lead to a 12% increase in soil erosion in Bengal gram fields. Nutrient Loss: Loss of topsoil can result in nutrient loss, impacting chickpea yield and nutrient availability	. Rainfall Impact: Heavy rainfall can increase the risk of soil erosion in wheat fields, especially if the soil is left bare. Erosion Example: A 55 mm increase in rainfall might cause a 18% increase in soil erosion in wheat fields. Nutrient Loss: Erosion can lead to the loss of nutrient-rich topsoil, affecting wheat crop nutrition.	Rainfall Impact: Groundnut fields are susceptible to erosion during heavy rainfall, especially if the soil is not adequately protected. Erosion Example: A 45 mm increase in rainfall might result in a 14% increase in soil erosion in groundnut fields. Nutrient Loss: Erosion can result in nutrient loss, impacting groundnut growth and yield

4.2.5. Impact of rainfall on harvest and storage

GENERAL	Kharif			Rabi		Summer
	SOYABEAN	TUR	cotton	Bengal gram	wheat	ground-nut
Heavy Rainfall can make it difficult or impossible to harvest the crops, and can also cause damage to the crops that have already been harvested. The moisture from the rain can cause the crops to become wet and heavy, making them more difficult to handle and transport. Overwatering or too much rain can also lead to bacteria, fungus, and mold growth in the soil.	1)Delay in Harvest: Heavy rainfall can saturate the soil, making it challenging for machinery to access fields for harvest. This may result in delays and potential yield losses. 2) Intense rainfall during or before harvest can increase pod shattering, leading to losses in yield and seed quality. 3) If soybeans are harvested and stored when wet, it can lead to mold development, reduced seed quality, and increased risk of storage pests	Pod and Seed Damage: Heavy rainfall can cause pod rot and seed damage, reducing overall yield and quality.2) Harvesting Delays: Saturated fields may cause delays in harvesting, affecting the timely collection of mature pods. 3) Mold and Fungal Growth: If red gram is stored with high moisture content, it is susceptible to mold and fungal growth, leading to storage losses	1)Excessive rainfall during the cotton boll-opening period can lead to staining and discoloration of the lint, affecting its quality. 2) Wet conditions may delay harvesting, increasing the risk of quality deterioration. 3) Mold and Rot: If cotton is stored with high moisture content, it can be prone to mold and rot, compromising fiber quality.	1) Heavy rainfall can cause pod splitting, leading to seed loss and reduced quality.2) Saturated fields may pose challenges for machinery during harvesting. 3) Chickpeas stored with high moisture content are susceptible to mold and spoilage	1) Heavy rainfall during the wheat maturation period can lead to sprouting in the wheat heads, reducing grain quality.2) Wet conditions may make fields inaccessible for machinery, causing delays in harvest. 3) If harvested wheat is stored with elevated moisture levels, it can be prone to mold development and mycotoxin	1) Heavy rainfall can lead to pod rot and seed damage, reducing overall yield and quality. 2) Saturated fields may cause delays in harvesting, affecting the timely collection of mature pods. 3) Groundnuts stored with high moisture content are susceptible to mold growth and aflatoxin contamination.

4.3 Impact of other calamities (cyclones, hailstorm) on crop damage loss

Kharif			Rabi		Summer
SOYABEAN	**TUR**	**cotton**	**Bengal gram**	**wheat**	**ground-nut**
1)Hail can cause physical damage to soybean plants, including bruised leaves, broken stems, and damaged pods. 2) Severe hailstorms may lead to defoliation, affecting the plant's ability to photosynthesize and produce energy. 3) Hailstones hitting developing pods can result in pod damage, reducing seed development and overall yield 4) Depending on the severity, a hailstorm & cyclone both can lead to varying degrees of yield loss, ranging from 10% to more than 50%. 5) cyclones can cause lodging, where the plants are flattened, making harvesting difficult cyclones can lead to waterlogging, affecting root health and nutrient uptake	Hail can cause physical damage to developing pods, leading to pod bruising, splitting, and reduced seed quality, stems and leaves, impacting the plant's ability to photosynthesize. Hail can dislodge seeds from developing pods, resulting in yield loss. 2) cyclones can lead to lodging, where the plants are flattened, making harvesting challenging. Also negatively affecting root health and nutrient uptake. Strong winds and heavy rain can cause physical damage to pods and stems. 3) Cyclones & hailstorms can cause varying degrees of yield loss in red gram, with percentages ranging from 10% to over 50%, depending on the severity of the cyclone.	The cotton damages caused by hail exhibit different relationships with hail diameter and hail fall density and the cotton damages also vary with different growth stages. defoliation rate, branch injury rate, and boll falling rate increase with increasing hail diameter and hail fall density. Hail can cause physical damage to cotton plants, resulting in bruising and staining of the lint fibers. Hail damage can lead to reduced fiber quality, affecting the market value of the cotton. The percentage of yield and fiber quality loss in cotton due to hailstorms can vary, depending on the severity and timing of the hail event. Losses can range from 10% to more than 50%.	A hailstorm caused some damage to the standing rabi crop due to lodging and led to delays in harvesting, with a potential output loss of around 10% in case of chana,steam & branches injuries ,flower & pod falling also led by hailstorm. Hail can cause physical damage to developing pods, leading to pod bruising, splitting, and reduced seed quality. The percentage of yield loss in Bengal gram due to hailstorms can vary, depending on the severity and timing of the hail event. Losses can range from 10% to over 50%.	1)HAILSTORM can cause physical damage to developing wheat heads, resulting in the breaking of stems and damage to grain-filled heads, 2) physical damage to developing wheat heads, resulting in the breaking of stems and damage to grain-filled heads. 3) Hail damage can lead to reduced kernel quality, affecting the market value of the wheat. 4) Hailstorm & Cyclones can cause varying degrees of yield loss in wheat, with percentages ranging from 10% to over 50%, depending on the severity of the hail storm cyclone.	1) Hail can cause physical damage to developing pods, resulting in bruising, splitting, and reduced seed quality. 2) Hailstones hitting the plants can cause damage to stems and leaves, impacting the plant's ability to photosynthesize. 3) Heavy rainfall from cyclones can result in waterlogging, negatively affecting root health and nutrient uptake.

(Source - kvk Yavatmal.)

Chapter 5: Measures to cope with climate variability

5.1 Recommendations of universities

Rainfall condition	1. Heavy rainfall	. 1) Try contour farming 2) Improve drainage 3) Implement crop rotation. 4) Strategise cultivation 5) Build adequate support. 6) Cover the crops 7) Use windbreakers. 8) Plan regular inspection of the field condition 9) keep an eye on the weather updates. 10)to avoid water logging, then make proper drainage system. 11)use Broad Bed and Furrow (wide bed method) or ridge furrow so thatproduction is not affected during drought/heavy rain. 12)to keep the soybean field weed free during the initial 45-60 days toreduce the yield loss due to weeds. plantation of horticulture crop.
	2. Low rainfall	1) use Broad Bed and Furrow (wide bed method) or ridge furrow. 2) drip irrigatation. 3) use drought tollerens veriety 4) creat farm pond, well recharge shaft are good option for avaibility ofemergency water 5) dryland agriculture agri system 6) bamboo plantation 7) SRT –intervention 8) Organic farming 9)Protective irrigation 10) Protective cultivation Surface runoff harvesting. Rooftop 11) rainwater/storm runoff can be harvested in urban areas through: • Recharge Pit • Recharge Trench • Recharge Well. 12)Groundwater recharge. :Gully Plug • Contour Bund • Dugwell Recharge • Percolation Tank • Check Dam/Cement Plug/Nala Bund • Recharge Shaft
	3.Dry Spells/Water Stress	1) SRT -intervention 2) Organic farming 3) Protective irrigation 4) Protective cultivation 5) use Broad Bed and Furrow (wide bed method) or ridge furrow. 6) Undertake rainwater harvesting. Water harvesting practices like farmponds, community tanks, watersheds and pools can prove a life saver. 7) Repair and rejuvenate local water bodies before the rainy season. 8) Use drought-resistant / low water requiring crop varieties / plants.

		9) Plant drought-tolerant grasses, shrubs, trees to protect soil moisture. 10) Use sprinkler method/drip irrigation method for irrigation; irrigate cropsduring evenings. 11) Undertake water conservation measures. 12) Arrange for irrigation facilities from available water resources. 13) Remove the weeds from fields. Those weeds can be used for mulching to avoid water loss. Take up hoeing or intercultural operations to make soil dust mulch to conserve soil moisture, remove weeds and break soil surfacecrust. 14) Prepare contingency plan in case of late onset of monsoon / dry spells during the season with appropriate cropping pattern. 15) Crops with short duration and requiring relatively little water need to be encouraged in drought-prone areas; arrange availability of seeds with short duration varieties. Arrange stocking of quality seeds, well in
	4.Terminal Drought	1) SRT –intervention, 2) Organic farming 3) Protective irrigation, 4) Protective cultivation 5) use Broad Bed and Furrow (wide bed method) or ridge furrow. 6) Undertake rainwater harvesting. Water harvesting practices like farmponds, community tanks, watersheds and pools can prove a life saver. 7) Repair and rejuvenate local water bodies before the rainy season. 8) Use drought-resistant / low water requiring crop varieties / plants. 9) Plant drought-tolerant grasses, shrubs, trees to protect soil moisture. Use sprinkler method/drip irrigation method for irrigation; irrigate cropsduring evenings.
	5.Late onset of monsoon	• keep an eye on the weather updates. Use variety as per kvk, agricultureuniversity recommded· 1) SRT –intervention, 2) Organic farming 3) Protective irrigation, 4) Protective cultivation 5) use Broad Bed and Furrow (wide bed method) or ridge furrow. 6) Undertake rainwater harvesting 7) Adaptation of drip irrigation 8) Application of biofertilizer to mitigate the water stress 9) Adaption of new cropping patter and drought tollerns varieties. Watershed and rainwater harvestin.
Temperature conditions	1.High Temperature	1) SRT -intervention 2) Organic farming 3) Protective irrigation (use drip irrigation with mulching/ sprinkler irrigation) 4) Protective cultivation (plant short duration varieties, avoid climate sensitivecrop varieties) 5) use Broad Bed and Furrow (wide bed method) or ridge furrow. 6) Undertake rainwater harvesting 7) Application of bio fertilizer to mitigate the water stress 8) Overhead Netting (use shed net/poly house) 9) Mulching. ... 10) Soil Management. ... 11) Avoid Pruning. ... 12) Apply Light-Reflecting Materials. .. plant more tress

	2.Cold waves/Low Temperature	1) trash burning on the corner of the field to maintain temperature 2) frequently irrigation to field 3) apply light and frequent irrigation in the evening hours, 4) to protect sensitive crop like gram from forst attack, spray dilute sulphuricacid @0.1% or thioures@500ppm. plant wind/ shelters breaks/alley crop
Hailstorms		1) shelter belt & wind breaks around the farm. 2) use shed net. 3) Use control measure to avoid loss in farming ,such as damage crop should beremove from field and destroy, use fungicide and pesticide to control the disease & pest spared 4) buy crop insurance for hailstorm suppression. As hail is the sudden event, and highly unpredictable, it is always better to take some precautions to minimize the hail damage. However once the damage has occurred, the coping strategies would depend upon the severity of damage and nature of crops.
Soil degradation		Apply conservation tillage techniques. 1) SRT -intervention 2) Organic farming 3) Protective irrigation 4) Protective cultivation 5) use Broad Bed and Furrow (wide bed method) or ridge furrow. 6) Undertake rainwater harvesting. 7) Practice crop rotation 3)Alternate crops using strip cropping . 8) Avoid over-irrigation. 9) Apply the right amount of fertilizer. 10) Plant cover crops. 11) Aim for organic farming. 12) Adopt contour farming. 13) crop rotation, 14) windbreaks crop planting, 15) conservation tillage operation, counter farming

(Source - Kvk Yavatmal)

5.2 Best Practices Developed by Farmers in the District

1) SUCCESS STORY

Naushad Khan Pathan resides in the village wai-hatola in the Yavatmal district of Maharashtra. For the past thirteen years, he has been engaged in agriculture, focusing on intercropping in fields. Over the last seven years, he have not plowed the land but instead created beds of five feet height. he have been cultivating crops like bananas, papayas, watermelons, muskmelons, soybeans, pigeon peas, onions, garlic, and various other crops without using conventional plowing methods. he adopted sustainable farming practices, and in the past seven to eight years, his earning an annual income of Rs. 25,000 to 30,000 by cultivating crops on seven acres. prioritize the use of equipment such as the Nangar Rotavator Bed Maker, also carefully calculate the expenses,

including the cost of the bed maker. This approach has significantly increased the organic carbon content in the soil, and the number of earthworms has multiplied. The soil has become softer, and I use fewer fertilizers and chemicals in my farming.

With the help of SRT techniques able to improve the fertility of the soil. This has led to a substantial increase in productivity. also emphasize water and chemical conservation in his farming practices. By using SRT, he has successfully cultivated crops like bananas and papayas without the use of chemicals, resulting in good yields. The savings in time and money, along with improved soil health, make SRT a valuable technique for sustainable and profitable agriculture. He believes that by using SRT techniques, farmers can significantly enhance their productivity and income, even if they cultivate only three to four crops in a year. This technology is a boon not only for farmers growing cash crops but also for small-scale farmers like me, cultivating crops such as cotton.

2) Success Story:

Name of the Farmer: Mr. Abhishek Ingole
Village: Pimpri Durg
Complete Address: Pimpri Durg, Taluka: Ralegaon, District: Yavatmal, Maharashtra, India
Contact Number: 7378433901
Total Farming Area: 25 acres
Crops/Processes/Supplementary Industries: Cultivation of watermelons and muskmelons (Kalingad and Kharbuja)

Irrigation Method: . Drip Irrigation: 2.00 hectares

Overview:

Abhishek Ingole, a progressive farmer from Pimpri Durg, Yavatmal, cultivated crops like cotton, pigeon peas, and soybeans on his 25-acre farm during the Kharif season of 2020. In the Rabi season of 2020-21 and 2021-22, he dedicated two acres for watermelon cultivation, specifically the Kundan, Vishal, Arohi, Saraswati, and Mannat varieties.

Challenges Faced:

Due to the COVID-19 lockdown, selling the produced watermelons became challenging, leading to potential losses in farm income.

Initiatives Taken:

Under the guidance of the Maharashtra government's Agriculture Department and Agricultural Technology Management Agency (ATMA), Abhishek Ingole participated in the "Vikel to Pikel" campaign. He directly marketed his watermelons to consumers, starting from April 2021. Initially, the sales were conducted in Jalgaon and Pimpri Durg, with prices ranging from Rs. 2,000 to Rs. 5,000 per day.

Outcome:

With consistent efforts, Abhishek expanded his sales to the weekly markets in Ralegaon and Pimpri Durg. The introduction of a sales stall at these locations further boosted direct consumer engagement, resulting in daily sales. By reaching out to consumers directly, he earned a substantial profit, with daily earnings ranging from Rs. 1,40,000 to Rs. 1,50,000.

Conclusion:

Abhishek Ingole's proactive approach in marketing and adapting to the changing circumstances, especially during the pandemic, not only helped him recover potential losses but also led to significant profits.

राळेगावचे उत्पादन : काही वरुन हिरवे आतून पिवळे, तर काही पिवळे आतमध्ये लाल

शेतकऱ्यांनी उत्पादित केलेले टरबूज 'एक्सपोर्ट'च्या वाटेवर

रूपेश उत्तरवार
लोकमत न्यूज नेटवर्क

यवतमाळ : टरबूज उत्पादनात यवतमाळ जिल्ह्यातील शेतकऱ्यांनी पाऊल ठेवताच यशाचे नवे दालन खुले झाले. जिल्ह्यातील काही शेतकऱ्यांनी उत्तम गुणवत्तेचे आणि विविध रंगाचे टरबूज उत्पादित करून बाजारात आणले आहे. एक्सपोर्ट गुणवत्तेचे हे टरबूज लॉकडाऊनमुळे अडचणीत आहे. या स्थितीतही न डगमगता शेतकऱ्याने आपले टरबूज थेट ग्राहकापर्यंत विक्रीसाठी आणले आहे. उत्तम गुणवत्तेचे टरबूज सर्वसामान्य ग्राहकाला सर्वसामान्य ग्राहकाला सहज उपलब्ध झाले आहे.

राळेगाव तालुक्यातील पिंपरी दुर्गाचे शेतकरी अभिजीत इंगोले यांनी तायवानचे एका खासगी कंपनीचे बियाणे आपल्या शेतात लावले आहे. या उत्पादनाचे खास वैशिष्ट्य आहे. हे टरबूज इतर टरबूजापेक्षा हटके आहे. लांब आकाराचे, कोवळ्यासारख्या गोल आकाराचे, आतमधून विविध रंगामध्ये हे टरबूज पाहायला मिळत आहे.

आपण साधारणत: आत लाल रंगाचे टरबूज पाहिले आहे. शेतकऱ्यांनी

इंगोले यांच्या शेतात उत्पादित झालेले पिवळ्या रंगाचे अनोखे टरबूज.

एकरी ३२ टन उत्पादन

अभिजीत इंगोले टरबूज उत्पादनात एकरी ३२ टन उत्पादन घेण्यात यशस्वी झाले आहे. यासाठी त्यांनी एकरी ७५ ते ८० हजार खर्च आला. या दौड ते दोन लाखाचे उत्पन्न झाले. त्याकरिता सुक्ष्म सिंचन आणि सुरक्षेची व्यवस्था त्यांनी केली. टरबूज पिकाला विशेष खते, अमृतपाणी दिल्याने उत्तम प्रतीचे उत्पादन मिळाल्याचे मनोगत त्यांनी 'लोकमत'कडे व्यक्त केले.

उत्पादित केलेले हे टरबूज लाल आणि पिवळ्या रंगाचे आहे.

याचा पाठपुरावा पालक आहे. आतमध्ये गर मोठ्या प्रमाणात आहे. रेखाळ स्वरूपाचे गोड टरबूज आहे. काही टरबूज वरून पिवळे आतमध्ये लाल रंगाचे आहे. तर काही टरबूज वरून हिरवे आतमध्ये पिवळ्या स्वरूपाचे आहे. तर काही टरबूज कोवळ्याप्रमाणे सारखे गोल आणि आतमध्ये रेखाळ स्वरूपाचे मधुर टरबूज आहेत. विशेष म्हणजे या टरबूजाला काही गाठे आहेत. सरस्वती, मन्नत, आरोही, विशाला अशा विविध प्रकारची ही टरबूज सध्या ग्राहकांचे लक्ष वेधत आहे. लॉकडाऊनमुळे शेतकऱ्यांनी आपला माल स्वतंत्र विक्रीचा निर्णय घेतला आहे. शहरात विविध ठिकाणी शेतकऱ्याने थेट विक्रीसाठी दुकाने लावले आहे. यामुळे शेतकरी ते ग्राहक अशी थेट विक्री पद्धतीचा मिळत आहे. ग्राहकाला थेट उत्तम गुणवत्तेचे टरबूज सहज उपलब्ध झाले आहे.

3) SUCCESS STORY

Farmer's Name: Shri Suresh Anna Agalawe
Village: Ramtirth
Address: At/Po Ramtirth, Ta. Ralegaon, Dist. Yavatmal
Total Farm Area: 5.00 acres
Farming Method: Organic Farming

Irrigation Method: (Drip): 0.40 hectares.
Over the past 4 to 5 years, I've had the privilege to witness his commitment to the principles of natural and spiritual farming, transforming an 11-acre plot into a haven of sustainable agriculture.
Farming Practices:

Suresh Anna employs a diverse range of crops, including soybean, pigeon pea, green gram, black gram, chickpea, wheat, and various seasonal vegetables. What makes his farm stand out is the adoption of holistic techniques such as beejamrut, jeevamrut, ghanjeevamrut, Dashparni Ark, Agni Astra, Gandulpani, compost, organic fertilizers, and natural pest control methods. The farm is a living testament to the efficacy of these practices, fostering a harmonious relationship between the land and its cultivator.

Influence and Leadership:

Beyond his own fields, Suresh Anna is a beacon of knowledge in his community. Under the guidance of Dr. Panjabrao Deshmukh Agriculture University, he played a pivotal role in establishing a collective of 25 farmers who share his vision. Together, they are not only cultivating crops but cultivating change, with the goal of creating a self-sufficient organic produce market in their taluka.

Success:

Last year, Suresh Anna ventured into turmeric cultivation, dedicating four acres to this golden spice. The venture was not just successful; it became a model for others to follow. The sale of turmeric products generated a profit of 75,000 rupees, underscoring the economic viability of natural farming.

Model Farming:

The true testament to his success lies not just in financial gains but in the creation of a model farm. Suresh Anna opened his farm to the community, inviting them to witness firsthand the benefits of pesticide-free, organic vegetables. Every week, consumers flock to his farm, not just as customers but as friends seeking healthy produce.

Philosophy of Farming:

In Suresh Anna's view, a real provider of food is one who prioritizes the well-being of living beings over profits. His commitment to natural and spiritual farming isn't just about agriculture; it's a philosophy that places the health of consumers and the earth at its core.

Conclusion:

In conclusion, Suresh Anna Agalawe isn't just a farmer; he is a steward of the land, a leader in his community, and an advocate for sustainable, spiritual farming practices. His story is not just about cultivating crops; it's about cultivating a better, healthier future for all.

1) Preparation of beejamrut, jeevamrut, ghanjeevamrut, Dashparni Ark, Agni Astra, Gandulpani, compost, organic fertilizers, and natural pest control methods.
2) The impact of these substances on soil and plants is generally positive when used appropriately. Organic and natural methods tend to promote sustainable agriculture by improving soil health, enhancing plant growth, and minimizing environmental impact.
3) Improve soil structure:Organic fertilizers, such as compost, can improve soil structure by enhancing its ability to retain water and nutrients.
4) Organic fertilizers contribute to the buildup of organic matter in the soil. This organic matter serves as a reservoir of nutrients, enhances water retention, and supports microbial activity, promoting overall soil health.
5) ph regulation : compost can help regulate soil pH, making it more suitable for plant growth.
6) Organic fertilizers are often derived from natural sources, reducing the risk of environmental pollution compared to some synthetic fertilizers. They typically have lower energy requirements for production and application.

Area under CRT								
		YEAR	2020			2023		
Sr.No	Sub-Division	Activity	Total Villages.No	Proposed Area(Ha)	Actual Area (Ha)	Total Villages.No	Proposed Area(Ha)	Actual Area (Ha)
1	YAVATMAL	BBF	110	190	75	110	125	336
2	DARWHA		69	175	56	69	710	455
3	PUSAD		21	220	152	48	3295	1885
4	PANDHARKAWADA		55	54	27	55	55	49
Yavatmal		TOTAL	255	639	310	282	4185	2725
		YEAR	2020			2023		
Sr.No	Sub-Division	Activity	Total Villages.No	Proposed Area(Ha)	Actual Area (Ha)	Total Villages.No	Proposed Area(Ha)	Actual Area (Ha)
1	YAVATMAL	ZERO TILLAGE	110	140	0	110	365	261
2	DARWHA		69	102	0	69	725	86
3	PUSAD		0	0	0	16	95	80
4	PANDHARKAWADA		55	28	5	55	36	25
Yavatmal		TOTAL	234	270	5	250	1221	452
		YEAR	2020			2023		
Sr.No	Sub-Division	Activity	Total Villages.No	Proposed Area(Ha)	Actual Area (Ha)	Total Villages.No	Proposed Area(Ha)	Actual Area (Ha)
1	YAVATMAL	NEEM BASED EXTRACT	110	480	373	110	773	675
2	DARWHA		69	462	270	69	782	619
3	PUSAD		20	1170	875	45	8725	6750

4	PANDHARKAWADA		55	9	9	55	55	55
Yavatmal		TOTAL	254	2121	1527	279	10335	8099
		YEAR	2020			2023		
Sr.No	Sub-Division	Activity	Total Villages.No	Proposed Area(Ha)	Actual Area (Ha)	Total Villages.No	Proposed Area(Ha)	Actual Area (Ha)
1	YAVATMAL	BIO FERTILIZERS	110	158	30	110	336	78
2	DARWHA		69	79	19	69	277	126
3	PUSAD		24	310	327	43	675	730
4	PANDHARKAWADA		0	0	0	0	0	0
Yavat mal		TOTAL	203	547	376	222	1288	934
Total								
		YEAR	2020			2023		
Sr.No	Sub-Division	Activity	Total Villages.No	Proposed Area(Ha)	Actual Area (Ha)	Total Villages.No	Proposed Area(Ha)	Actual Area (Ha)
1	(Yavatmal, darwha, pusad, pandharkawada)	BBF	255	639	310	282	4185	2725
2		ZERO TILLAGE	234	270	5	250	1221	452
3		NEEM BASED EXTRACT	254	2121	1527	279	10335	899
4		BIO FERTILIZERS	203	547	376	222	1288	934

(Source - ndksp field staff.)

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

6.1 CRTs Interventions

Climate Resilient Technologies promoted under PoCRA			
Technology	**Resilience Feature**	**Benefits**	**Suitable Crops**
1. Cultivation by broad bed furrow (BBF) method	Resilience to moisture stress, poor soil drainage, nutrient (fertilizer) loss	Ensures optimum moisture and aeration at root level, helps drain out water in excess rainy condition, saves seed, ensures proper fertilizer placement in root zone, helps develop optimum microclimate under crop canopy, helps in proper intercultural operations, reduces cost of cultivation.	All field crops both in Kharif and rabbi 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 CRT on crop yield based on FFS data.

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

Year wise crop yield (Kg/ha)

Year	Soybean		Cotton		Pigeon Pea		Gram	
	FFS Plot	Control Plot	FFS Plot	Control Plot	FFS Plot	Control Plot	FFS Plot	Control Plot
2019	1600	1550	-	-	-	-	-	-
2020	1105	948	1255	1076	903	787	1789	1585
2021	2023	1761	1637	1360	1099	912	2137	1851
2022	869	582	1495	991	1466	1032	1941	1338
Average	**1399.25**	**1210.25**	**1462.33**	**1142.33**	**1156.00**	**910.33**	**1955.67**	**1591.33**

The FFS plot for soybean crops benefited from various CRT interventions, including seed treatment with fungicide and biofertilizer, sowing using the BBF method, intercropping, protective irrigation during dry spells and foliar spray of Neem seed kernel extract (NSKE). As a result, the yield of the FFS plot increased by 15.62% compared to the control plot.

The FFS plot for cotton crops benefited from various CRT interventions, including seed treatment with biofertilizer, intercropping, protective irrigation during dry spells, foliar spray of Neem seed kernel extract (NSKE), nipping of bud and use of traps (pheromone traps, sticky traps). As a result, the yield of the FFS plot increased by 28.01% compared to the control plot.

The FFS plot for Pigeon pea crops benefited from various CRT interventions, including as Seed treatment with fungicide and biofertilizer, protective irrigation in dry spell, foliar spray of Neem seed kernel extract (NSKE), topping. As a result, the yield of the FFS plot increased by 26.99% compared to the control plot.

The FFS plot for Gram crops benefited from various CRT interventions, including as Seed treatment with fungicide and biofertilizer, sowing by BBF method, protective irrigation, NSKE, and use of pheromone traps. As a result, the yield of the FFS plot increased by 22.89% compared to the control plot.

BBF TECHNOLOGY

A field visit to a Broad Bed Furrow (BBF) technology farm included a comprehensive discussion and guidance session with the farmer. Practical insights were shared to empower the farmer in implementing BBF methods effectively. This engagement aimed to enhance understanding and utilization of sustainable agricultural practices, emphasizing the benefits of the innovative Broad Bed Furrow technology in the field.

Objectives :-

1) To enable farmers to cope with water stress and carry excess water off the field in both heavy rainfall and extreme rainfall conditions.
2) Increasing output by saving inputs as well as using less labor.
3) Abolition of soybean fields and rains to adopt zero tillage system.
4) Providing a proper amount of air and sunlight to the crop.

Advantages :-

1) Air and sunlight are available to the crop as required.
2) Crop yield is not affected by excessive rainfall or heavy rainfall.
3) Saves seeds and other inputs.
4) 30 to 40% increase in productivity. 5) Savings in production cost. 6)Weed infestation is reduced

Bio- Fertilizer Technology

Objectives :-

Bio-fertilizers are the substances of biological origin (microorganisms), which when added to the soil enhances its fertility and promotes plant growth. Broadly, bio-fertilizer constitutes of living organisms which include mycorrhizal fungi, blue-green algae, and bacteria. Bio-fertilizers simply consists of specific strains of microorganisms like bacteria, fungi, algae or their combinations. They also produces capsular polysaccharides to prevent soil erosion soil ready for plant to absorb in series of reaction is termed as nitrogen fixation. And the bacteria can be nitrogen fixers or phosphate solubilizere. They convert insoluble forms of soil phosphorus into soluble forms. As a result, phosphorus will be available for plant. Bio-fertilizers are economical, effective, and renewable sources of plant nutrients.

Advantages :-

The bio-fertilizers has special contribution to agriculture due to the following advantages:

- Bio-fertilizers act as supplements to chemical fertilisers.
- Bio-fertilizers are cost-friendly and can aid to decrease consumption of such fertilizers.
- Microbes in bio-fertilizers provide atmospheric nitrogen directly to plants.
- They aid in solubilisation and mineralisation of other plant nutrients like phosphates.

Better synthesis and availability of hormones, vitamins, auxins and other growth-promoting substances improves plant

Neem Extract Technology.

Objectives :-

1) Cost effective pest management.
2) To increase environmental balance and conservation by reducing chemical usage.
3) Biodiversity and conservation of friendly insects.

Advantages :-

1) Manufacturing cost is greatly reduced.
2) No pollution due to natural and organic methods.
3) Lemon extract is easy to make, handle and use.
4) Although it repels insects, friendly insects are not enemies.
5) It is possible to maintain the balance of the environment by avoiding the side effects caused by chemical pesticides.
6) Pest control, improves yield and quality.

SRT Technology

Objective :-

- To promote widespread of zero tillage technology.
- To enable farmers to adapt to climate change.
- To increase the soil fertility by increasing the amount of organic carbon in the soil.
- By increasing the use of zero tillage technology system and reducing the production cost of farmers Increase productivity.
- To enable farmers to cope with water stress and drain excess water in both monsoon and excess rainfall conditions.

Advantages :-

- Enhances soil health by increasing biological diversity in the soil.
- Increase in soil organic matter saves chemical fertilizers.
- In excess of earthworms circulation starts in the soil.
- Soil temperature remains controlled.
- Increases in crop productivity.
- There is saving in manpower required for cultivation.

Improves the structure of soil particles.

(Source -NDKSP field staff.)

Cost of Production

Sr. No	farm operation	sub-topic	Cotton		Regular Practice	CRT	Regular Practice	CRT
			Regular Practice	CRT	soybean-tur	soybean-tur	chana	Bengal gram (chana)
			charges in Rs./ha					
1	Pre-cultivation (land preparation)	tractor charges	3400	3700	7575	6000	4125	0
		labor charges	1500	1700	2100	2500	0	2000
2	Sowing	seed	5600	4500	10000	8025	7000	2500
		Seed treatment	0	0	800	1000	1500	1800
		Fertilizer (while sowing) base dose	4500	4200	3750	3200	3750	2000
		Fertilizer (after sowing) secondarydoze	6000	3500	0	0	0	
		labor charges	3600	3500	1000	0	0	2500
3	Plant protection	weedicide	1000	6500	0	1800	0	1000
		fungicide	650	700	750	650	2000	900
		plant growth /water soluble/micronutrient.	2000	2000	1800	1500	1500	1000
		insecticide	7500	450 (use neem extract)	5500	3500 (use neem extract / dashparni)	4800	2200 (use neem extract/ dashparni extract)
		spraying thought tractor	0	0	0	0	0	0
		labor charges	2800	3500	4000	4500	3000	3500
4	Interculture operation (weeding/harrowing)	labor charges	12000	2000 (weeding	7500	0	9500	0
		oxen	6000	2000	2100		2100	1000
5	HARVESTING (Cutting/ handpicking/ threshing)	labor charges	20000	21000	10300	9500	7500	5000
		harvester	0	0	5500	5000	4000	4500
6	Post harvest management	gunny bag/ storage	2400	2400	2000	1800	1300	1500
7	A) TOTAL COST (Cost of cultivation)		78950	65700	62825	48975	52075	31400
8	TOTAL YIELD		18 Qt	20 Qt	1) soya-13Qt 2) tur - 07 Qt	1) soya-16 Qt 2) tur - 08 Qt	20 Qt	22 Qt

9	commodity sale	126000	140000	1) soya-54600 2) tur-63000	1) soya-67200, 2) tur-72000	104,000	114400
10	B) Total sale	126000	140000	117600	139200	104000	114400
	C) PROFIT = B-A	47050	74300	54775	90225	51925	83000
11	CRT REDUCE COST OF PRODUCTION (IN Rs)		13250		13850		20675
12	CRT IMPACT ON PRODUCTION (INCREASE IN Qt)		2 Qt		1) soyabean-3 Qt. 2)Tur-1 Qt		2 Qt
13	CRT IMPACT ON AFTER SALE (profit in Rs) comparison to old practice sale		14000		21600		10400

(Source - ndksp field staff.)

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

	Shallow black soils	Soybean	No change	Normal recommended Package of Practices by Dr. PDKV, Akola (Test GP% Use seed rate @ 75-80kg/ha Seed Treatment with *Rhizobium*+ PSB (250gm each /10Kg seed + Thiram 3 gm+ Carbendazim 1gm+*Trichoderma* 4 gm/Kg of seed	
		Green gram	No Change	Normal recommended Package of Practices by Dr. PDKV, Akola Seed Treatment with *Rhizobium*+ PSB (250gm each /10Kg seed + Thiram 3 gm+ Carbendazim 1 gm + *Trichoderma* 4 gm/Kg of seed	
		Black gram	-		

- Farmers do cultivate cotton in shallow black soils also, However, the productivity is low

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

		Sorghum (Kh. Jowar)	Replace sorghum by soybean Varieties JS-335, JS-93 -05 or Pigeon pea variety AKT 8811, Vipula, PKV- Tara, BSMR-736	Follow Normal Recommended Package of Practices	
	Shallow black soils	Soybean	No change in var.	Normal recommended Package of Practices by Dr. PDKV, Akola (Test GP% Use seed rate @ 75-80kg/ha Seed Treatment with *Rhizobium*+ PSB (250gm each /10Kg seed + Thiram 3 gm+ Carbendazim 1gm+*Trichoderma* 4 gm/Kg of seed	
		Green gram	Replace Green gram & Black gram by Soybean Varieties JS-335, JS-93 -05	Follow Normal Recommended Package of Practices Seed Treatment with *Rhizobium*+ PSB (250gm each /10Kg seed + Thiram 3 gm+ Carbendazim 1 gm + *Trichoderma* 4 gm/Kg of seed	
		Black gram	-	-	

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

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

7.1.1.2. Early season drought (Normal onset)

Condition			Suggested Contingency measures		
Early season drought (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 leading to poor germination/crop stand etc.	Deep to Medium deep black soils	Bt Cotton	Weeding Intercultivation to create soil mulch to conserve moisture. Protective irrigation if possible.	Avoid applying fertilizer till there is sufficient moisture in the soil. Opening of alternate furrows.	
		Cotton +Tur Intercropping	Give protective irrigation wherever possible. Raise cotton seedlings in nursery & transplant at sufficient soil moisture or Gap filling to be done by pot watering 7-10 days after sowing when crop stand is less than 80%	Avoid applying fertilizer till sufficient moisture in soil.	Sowing on BBF

		Soybean	Give protective irrigation wherever possible. Gap filling with maize and Sesame. If germination is less than 50% resowing immediately after receipt of rains.	One hoeing	Rain water harvesting & recycling to be strengthened
		Pigeon pea	Gap filling either by Sesame or maize. Provide protective irrigation, wherever is possible	-do-	
		Sorghum (Kh. Jowar)	Follow thinning to maintain optimum plant population.	One hoeing. Fertilizer application at sufficient moisture	
	Shallow black soils	Green gram Black gram	Protective irrigation if possible.	One hoeing is to be done for conservation of soilmoisture.	-

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At vegetative stage	Deep to Medium deep black soils	Bt Cotton	Protective irrigation if possible.	Spraying of 2 % urea orDAP.	
		Cotton +Tur Intercropping	weeding Intercultivation to createsoil mulch to conserve moisture. Protective irrigation if possible.	Avoid applying fertilizer till there is sufficient moisture in thesoil. Opening of alternatefurrows.	With limited water availability prefer micro irrigation system Intercultivation implements/ machineries to be popularized through Govt. schemes.
		Soybean		Opening of alternate furrows.	
		Pigeon pea			
		Sorghum (Kh. Jowar)			
	Shallow black soils	Soybean		Opening of alternatefurrows. Spraying of 2 % urea orDAP.	
		Green gram		Spraying of 2 % urea orDAP.	
		Black gram			

7.1.1.3. Mid-season drought (long dry spell)

Condition	Major Farming situation	Normal Crop/croppingsystem	Suggested Contingency measures		
Mid-season drought (long dryspell)			**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At flowering/ fruiting stage	Deep to Medium deep black soils	Bt Cotton	Giving life saving supplemental irrigation, if available or taking up harvest at physiological maturity with some realizable yield.	-	-
		Cotton + Pigeon peaIntercropping	Protective irrigation if possible.	Spraying of 2 % urea or DAP.	
		Soybean			
		Pigeon pea			
		Sorghum (Kh. Jowar)			
	Shallow black soils	Soybean			
		Green gram			
		Black gram			

Condition			Suggested Contingency measures		
Terminal drought (Early withdrawal of monsoon)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Rabi Crop planning**	**Remarks on Implementation**
	Deep to Medium deep black soils	Cotton + Pigeon peaIntercropping	Giving life saving supplemental irrigation, if available or taking up harvest at physiological maturity with some realizable yield.	-	-
		Soybean		Plan for *rabbi* season	-
		Pigeon pea		-	-
		Sorghum (Kh. Jowar)		Plan for *rabbi* season	
	Shallow black soils	Soybean		-	-
		Green gram Black gram	Giving supplemental irrigation,if available or taking up harvest at physiological maturity with some realizable yield	Prepare for *rabbi* sowing Provided irrigation is available	-

7.1.2. Irrigated situation

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

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

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

Acid Lime and orange	Opening of field channels to remove surface ponding,	Mrig bahar not affected For Ambe bahar opening of field channels to remove surface ponding, Nutrient spray of NAA 10 ppm + 1% urea to prevent flowers drop	Timely harvest to avoid losses	Fungal removal followed by Washing & waxing
Heavy rainfall with high speed winds in a short span				
Cotton	Opening of field channels to remove surface ponding. Improved drainage and drenching with copper oxy chloride to avoid wilting incidence.	Opening of field channels to remove surface ponding, Improved drainage and drenching with copper oxy chloride by opening of the nozzle of spray pump to avoid wilting incidence. Occurrence of grey mildew- control by sulphur spray @ 25 g/10 lit.	Occurrence of grey mildew- control by sulphur spray @ 25 g/10 lit.	Shifting to safer place for drying
Soybean Green gram Black gram Pigeon pea	Opening of field channels to remove surface ponding	Opening of field channels to remove surface ponding		Shifting to safer place for drying
Horticulture				
Nagpur Mandarin Acid lime and sweet orange	Support by bamboo if < 3 years plants.	Support by bamboo if < 3 years plants. Opening of field channels to remove surface ponding,	Opening of field channels to remove surface ponding,	Fungal removal followed by Washing & waxing
Outbreak of pests and diseases due to unseasonablerains				
Cotton	To control Jassids and Thrips spray withAcetamiprid 20 SP @ 1.5 g/ 10 lit.		-	-
Soybean	To control semi-looper spray NSKE 5% or quinalphos 25 EC 20 ml/10 lit.		-	-
Green gram	To control Powdery mildew penconozol 5 ml or dinocap 10 ml or triademorph 5 ml or sulphur spray@ 30 g/10 lit. of water.		-	-
Black gram	-do-		-	-
Pigeon pea	Improved drainage and drenching with copper oxy chloride @25g/10 lit of water to avoid incidence of wilt and root rot		-	-

Horticulture				
Mandarin Orange	To control Citrus *psylla* Malathion 50EC 10ml Or Quinolphos 25EC 10ml Or Cypermethrin 25 EC 4 ml/10 lit	To control Citrus *psylla* Malathion 50EC 10ml Or Quinolphos 25EC 10ml Or Cypermethrin 25 EC 4 ml/10 lit	Immediate harvesting	-
Sweet Orange	-do-	-do-	-do-	-

Note: - Field bunds on slopy area to be strengthened

7.3 Extreme events: Heat wave / Cold wave/Hailstorm

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

Chapter 8: Agro meteorological Advisory

8.1 Agro-meteorogical advisory

8.1.1 Importance/ Need of Agromet advisory

Indian agriculture has been dependent on weather from the last century, but since the last few years the uncertainty of weather is becoming dangerous for agriculture business in the country. Due to climate change, farmers have to face many calamities such as heavy rainfall, cyclonic storms, extreme cold, extreme temperatures, hail and drought. All these factors are having an adverse effect on crop production. Our farmers eagerly await the southwest monsoon before the Kharif season. The use of weather forecasting is not limited to sowing but it is useful in every operation from harvesting to storage of the crop. In short, right from plowing the field to the time the produce/commodity reaches the market. The Meteorological Department under the Ministry of Earth Science (MoES), is doing its best under the Gramin Krishi Mausam Seva Scheme to reduce the losses of the farmers by collecting and organizing climate/weather, soil and crop information and to amalgamate them with weather forecast to assist farmer.

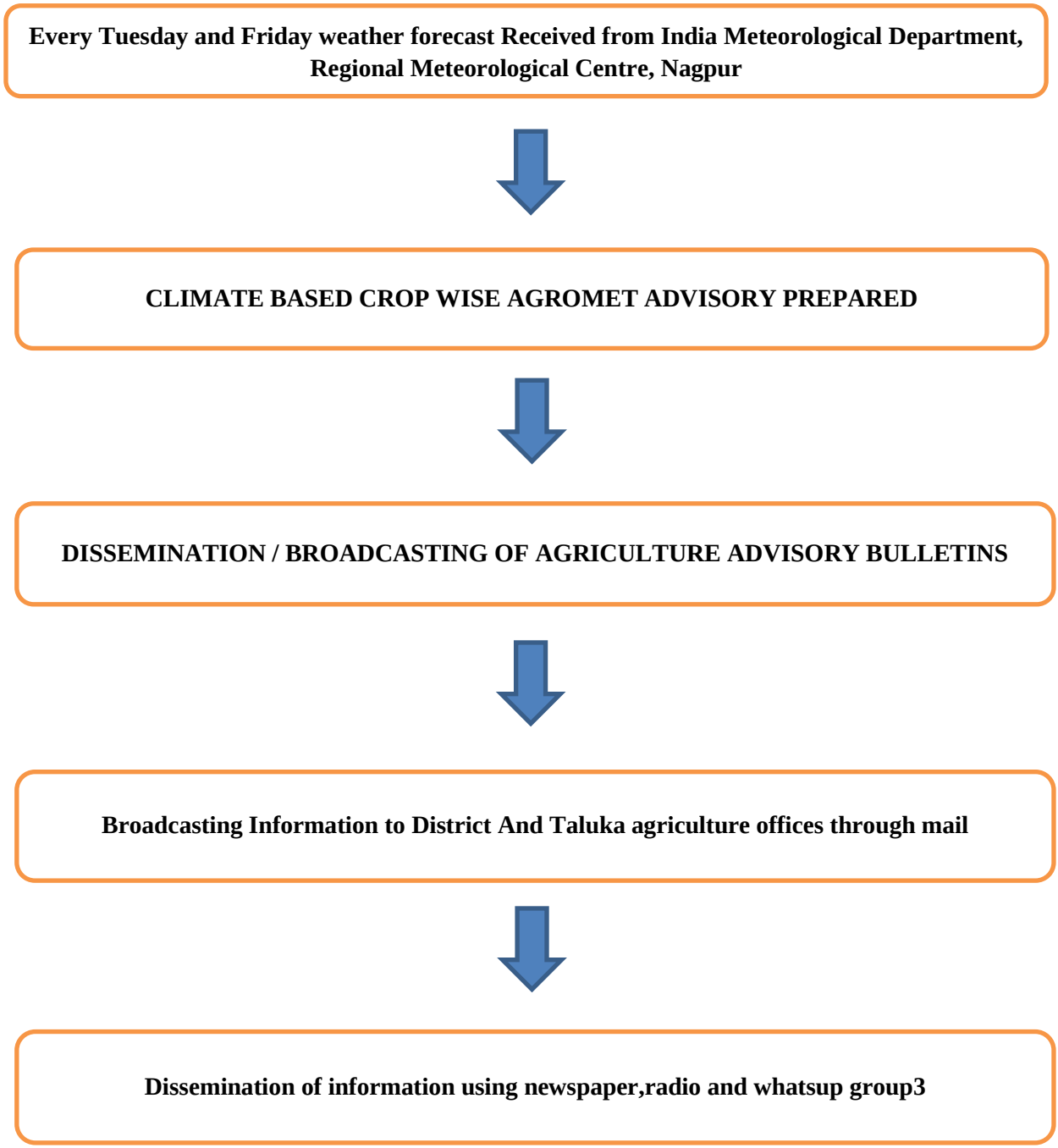
8.1.2 Forecasts or advisories generated at district level

Skymet Pvt.Ltd setup AMU throughout the district .They collect data from the units and provide generated data to the district. Also forecasts or advisories generated from Dr. Panjabrao Deshmukh Krushi Vidyapith Akola, and district follows that.

8.1.3 Forcast or Advisories generated at district level and other sources District and Block Wise process of Agromet Advisory Generation

Source of Agro-Met Advisory

1) NDKSP, 2) KVK, 3) PDKV AKOLA



(Source - CROPSAP*)*

8.1.4 Different apps/dashboard/channels/stations/means used to disseminate the information:

There are two apps for forecasting which are Meghdoot and Damini. This is the sample advisory provided. ('Meghdoot' application, AMD Website, newspaper & news channels are used for agro met advisory)

Gramin Krishi Mausam Sewa, AMFU, Bulletin District Yavatmal.
(Issued jointly by GKMS, Akola, Dr Panjabrao Deshmukh Krishi Vidyapeeth, Akola &
(India Meteorology Department) Email: gkmsakola@yahoo.com.

Yavatmal District Agromet Advisory Bulletin No. 30 / 2023-24 **Day & Date : Tuesday 23.10.2023**

Weather Parameters	Weather Forecast (Valid for 24th October To 28th October 2023)				
Date	24/10	25/10	26/10	27/10	28/10
Rainfall (mm)	0	0	0	0	0
Tmax (0C)	34.1	33.9	34	34.2	34.1
Tmin (0C)	19.9	19.5	19.2	18.8	18.7
RH-I (%)	77	75	71	68	70
RH-II (%)	50	48	44	42	40
Wind Speed (km/hr)	5	4	5	6	5
PM Wind Direction	96	114	178	67	93
Cloud cover	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy

Crop	Stage	Weather Based Agro Advisory
Forecast	-	• Today's forecast for the district indicates dry weather very likely during 23 - 27 October.
General	-	• Complete the sowing irrigated sorghum, safflower upto last week of October. • Farmers should monitor the crops for pests and diseases regularly and undertake timely plant protection measures.
Soybean	Harvesting / Maturity	▪ Complete the harvesting of matured soybean crop, ensure safe storage of harvested produce. ▪ For likely use of soybean for seed purpose in the next season, it is advised to thresh the soybean at 13 to 15% seed moisture content and at 350 to 400 RPM thresher to avoid the loss of seed germination.For storage soybean seed moisture should be 12% or less.
Cotton	Squaring / Flowering/ Boll formation	▪ Foliar spray of 2% DAP at boll development stage is advisable for better productivity. ▪ Foliar spray of 1% urea and 1% Magnesium sulphate in boll development stage is advisable to avoid reddening of cotton in later crop stage. ▪ Monitor for presence of pink boll worm larvae within flowers/ buds. Collect and destroy rosette flowers/ buds. If infestation is more than 10% (ETL) spray of Profenofos 50% EC @ 20 ml OR chlorpyriphos 50% EC @ 20 ml per 10 liters of water is advisable. Use trichocard 3 / acre as parasitoid to kill the pest in egg stage. ▪ To control above ETL infestation of aphids, jassids, thrips, white fly(10 aphids, 2-3 jassid,10 thrips10 whitefly per leaf), undertake spray of Imidacloprid 17.8% SL 2.5 ml OR Buprofezin 25% EC @ 20 ml per 10 liters of water.
Pigeon pea	Branching	• Install pheromone traps @ 5/ha for monitoring of Helicoverpa. Monitor for presence of eggs & small larvae. Monitor for the presence of eggs and small larvae. Erect bird perches randomly in the field to encourage predation by insectivorous birds. ▪ For leaf folder remove the webbed leaves along with larvae and destroy them.
Rabi Sorghum	Sowing	• Irrigated sorghum (PKV Kranti) can normally be sown by October end. • Undertake seed treatment with Azatobacter + PSB (each 25 g / kg seed) and biofungicide Trichoderma @ 4 g per kg seed is advisable. • Recommended fertilization for irrigated sole crop is @ 80:40:40 kg NPK/ha with N in 2 splits.
Safflower	Sowing	• Complete the sowing irrigated safflower upto last week of October. • Undertake seed treatment with Azatobacter+ PSB (each 25 g / kg seed) and biofungicide Trichoderma @ 4 g per kg seed is advisable.
Linseed	Sowing	• Irrigated linseed (PKV-NL-260, NL-97) can normally be sown by first week of November. • Feasible intercropping systems include linseed+chickpea (4:2) or linseed+safflower(4:2). • Seed treatment with Azatobacter+ PSB (each 25 g / kg seed) and biofungicide Trichoderma @ 4 g per kg seed is advisable.
Chickpea	Sowing	• Irrigated chickpea (Jaki 9218, PDKV Kanchan, Vijay, Vishal, ICCV-2, and ICCV-10) can normally be sown by October end or latest by 10 November. Wilt resistant varieties include JAKI 9218, Vishal, ICCV-2, ICCV-10 etc. Maintain sowing depth of 5 cm under irrigated condition. • Seed treatment with Rhizobium + PSB (each 25 g / kg seed) and biofungicide Trichoderma @ 4 g per kg seed is advisable. Recommended fertilization for irrigated sole crop is @ 25:50:30 kg NPK/ha at sowing. • Feasible intercropping system includes chickpea+*rabi* sorghum (6:2).
Fruit crops	-	• Make tree basins of fruit crops weed free followed by recommended manuring / fertilization. • For management of hasta bahar in acid lime undertake spray of potassium nitrate 2% at release of moisture stress. Undertake recommended manuring / fertilization as per age of orchard trees.
Vegetable	-	▪ Undertake nursery sowing of onion (white onion varieties: Akola safed , Phule safed, Yashoda, Bhima Shweta; Red onion varieties:Pusa Red, Niphad 53, Agrifound light red, N 2-4-1, Arka Pragti). ▪ Undertake nursery sowing of tomato, brinjal, cabbage, cauliflower and sowing of spinach, fenugreek, radish, and carrot, dolichos bean and ivy gourd.
Livestock	-	• Screening of farm livestock, draught/milch animals for diseases be considered and they be vaccinated.for foot and mouth disease (FMD). • Ensure the milking cow/buffalo has adequate constant access to clean drinking water and green fodder/feed daily.

This Agro Advisory Bulletin (AAB) is prepared & published with the consultation and recommendation of SMS committee of "Gramin Krishi Mausam Sewa" (GKMS) Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. 444005 (MS).

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(source -mausam.imd.gov.in)

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

Farmers Awareness programme based on weather forecasting:

Keeping in mind the main objective to reduce the incidence of occurrence, the importance of weather forecasting in agribusiness is conveyed to the farmers by organizing farmer public awareness programs at village level through the leading agro meteorological specialists and other agricultural specialists at the Agricultural Science Centre (KVK) Yavatmal, as well as the importance of weather forecasting in the farmers' fields. Crop problems are directly communicated. Under the Farmer Awareness Program, farmers are registered with their mobile numbers and added to WhatsApp groups of their respective talukas, so that they can get weather information at home. So far, more than 350 agricultural weather advisory leaflets have been sent to the farmers of Yavatmal district through WhatsApp groups to villages in all 16 talukas of the district. Also, more than 65000 farmers benefited from the agricultural climate advisory leaflet. Every week feedback is taken from the farmers regarding the agricultural advisory leaflets on climate. .

Mode of Dissemination: Also to the Agriculture Department, District Officer's Office, Animal Husbandry Department, Akashvani Kendra NewsPaper and various agriculture related social organizations working for the farmers in the district, weather based agricultural advisory pamphlets are disseminated.

8.2 Advisory Base on Pest Surveillances Agriculture activity:

8.2.1 Implementation Status of *CROPSAP*:

CROPSAP in district level general Pest disease management is also recommended on a regular basis. All adversaries circulate at time of crop management for each and every crop. Cropsap Scheme implemented in Yavatmal district from 2008-09 up to 2019 in this scheme survey done by agriculture staff, during kharif season survey regarding pest and disease conducted by field staff, survey conducted on crops such as cotton, soybean, jawar & tur crop. Survey started in the month of July. Identification of pest and disease and collection of data related to survey verified by (sr. agri assistance, Dsao, Tao, Sdao)

Basic concept of this scheme is to keep control on pest populations below ETL Level by providing guidance to farmers at various stages of crop.

CROP WISE SURVEY DURATION				
Sr. No.	Crop	Survey duration (MONTH)	Date	
1	Soyabean	3	01-Jul	01-Oct
2	Karip Jawar	3	01-Jul	01-Oct
3	cotton	6	01-Jul	30-Dec
4	Tur	3	03-Oct	30-Dec
5	Bengal gram	3	18-Nov	16-Feb

CROP WISE SURVEY structure			
Sr. No	Position	Total no. of position (regional)	Survey method
1	Agriculture assistant	420	Selected plot visit survey
2	Agriculture supervisor	70	Randomly survey through mobile app
3	Board agriculture officer	35	Randomly survey through mobile app
4	Taluka agriculture officer	16	Randomly survey through mobile app
5	Sub-divisional agriculture officer	4	Randomly survey through mobile app
6	District superintendent agriculture officer	1	Randomly survey through mobile app

Implementation done by field staff of agriculture department. surveillance of insect-pest & disease in fixed plot done by agriculture assistant. While random surveillance done by agriculture supervisor . CROPSAP provided a larger canvas for pest management implementation in terms of technological use, number of stakeholders, number of crops, area covered, skill imparted and employment generated. The pest affected areas across soybean, cotton, Tur, Grams are implemented with scientifically based pest management practices across Maharashtra.

8.2.2 Impact on Crop pests and diseases management:

1. Early Detection and Intervention: By conducting surveys during the early stages of the crop season, CROPSAP may contribute to the early detection of pests and diseases. Early intervention can help farmers take timely and targeted measures to control and manage these issues.
2. Guidance to Farmers: Providing guidance to farmers based on survey data is a key component of CROPSAP. This guidance likely includes recommendations for pest and disease control measures, helping farmers adopt effective strategies to protect their crops.
3. Reduced Economic Losses: Timely and targeted pest and disease management can contribute to reducing economic losses for farmers. By controlling pest populations below Economic Threshold Levels (ETL), the program aims to minimize the impact on crop yields and overall agricultural productivity.
4. Sustainable Practices: CROPSAP may encourage the adoption of sustainable agricultural practices by promoting integrated pest management (IPM) approaches. This could include the use of biological control methods, crop rotation, and other environmentally friendly measures.
5. Empowerment of Farmers: By providing information and guidance, the program empowers farmers with knowledge and tools to make informed decisions about pest and disease management. This knowledge transfer can lead to more resilient and self-sufficient farming practices.
6. Data-Driven Decision-Making: The validation of survey data by agricultural authorities adds credibility to the information collected. This data-driven approach can support evidence-based decision-making at both the local and district levels.

1,60,000 beneficiaries (farmer) received messages /sms from cropsap about crop wise pest & disease management in all over Yavatmal district.

Sample of advisory from CROPSAP.

महाराष्ट्र शासन

कृषि विभाग

सुस्वागतम

पिकावरील कीड रोग सर्वेक्षण व सल्ला प्रकल्प

(CROPSAP) सन २०२३-२४

पिकनिहाय सर्वेक्षण करावयाचे कीड रोग

या प्रकल्पात पुढील प्रमाणे पिकनिहाय प्रमुख किड रोगांचे सर्वेक्षण व सनियंत्रण करावयाचे आहे.

सोयाबीन -तंबाखू वरील पाने खाणारी अळी (स्पोडोप्टेरा लिट्यूरा), हेलिकोव्हर्पा ,उंटअळी, चक्रीभुंगा व खोडमाशी

कापूस - तंबाखू वरील पाने खाणारी अळी, तुडतुडे ,पांढरी माशी, फुल किडे गुलाबी /शेंद्री बोंडअळी, अमेरिकन/हिरवी बोंड अळी व ठिपक्याची बोंड अळी

तूर- शेंगा पोखरणारी अळी, शेंगमाशी व पाने व फुलांची जाळी करणारी अळी व मर रोग.

पीक संरक्षण

सोयाबीनवरील किडी



२) चक्रीभुंगा :

चक्री भुंगे/ करगोटा भुंगे (Sci. Name: *Obereopsis brevis)*:

ओळख:

- सोयाबीनचे उत्पादन घेणा-या प्रमुख राज्यांमध्ये ही मुख्य हानिकारक किडींपैकी एक किड आहे.
- प्रौढ किड नारंगी रंगाची असून तिच्या पंखांचा खालचा भाग काळा असतो. अँटेना शरीराच्या लांबी एवढ्याच व मागे वळलेल्या असतात.
- या किडीची अळी पाय विरहित व पिवळ्या रंगाची असते. पूर्ण विकसित अळी साधारणत: २ सें.मी. लांबीची असते.
- भुंगे गर्द भुरकट काळ्या पंखामुळे सहज ओळखता येतात.


उपाययोजना :

- पेरणीपूर्वी बियाण्यास थायोमिथाक्झाम ३०% एफएस १० मि.ली./ किलो बियाणे या प्रमाणात बीजप्रक्रिया करावी.
- ज्या ठिकाणी दरवर्षी मोठ्या प्रमाणात खोडमाशीचा प्रादुर्भाव होत असेल त्या ठिकाणी १०% दाणेदार फोरेट हेक्टरी १० किलो या प्रमाणात पेरणीपूर्वी द्यावे.
- खालीलप्रमाणे एका रासायनिक किटकनाशकाची फवारणी करावी-

अ.क्र.	किटकनाशकाचे रासायनिक नाव	प्रमाण/१० लिटर पाणी (साधा पंप)
१	क्लोरँट्रानिलीप्रोल १८.५ एस सी	३ मि.ली.
२	इथिऑन ५० ई सी	३० मि.ली.
३	इंडोक्झाकार्ब १५.८ ई सी	६.६६ मि.ली.
४	लँबडा सायहॅलोथ्रीन ४.९ सी एस	६. मि.ली.
५	थायामिथोक्झाम १२.६०% + लँबडा सायहॅलोथ्रीन ९.५०% झेडसी	२.५ मि.ली.

कृषी विभाग, महाराष्ट्र शासन

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

9.1 Existing marketing scenario in the district

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1. **Cotton Market:**
- Prominence: Cotton is a significant and dominant crop in the district, with APMCs like Yavatmal, Ralegaon, Ghatanji, and Maregaon showing substantial production.
- Market Rates: Cotton commands high rates, particularly in APMCs where it is a major focus.

2. **Soybean Market:**
- Significance: Soybean is a key crop, with APMCs like Kalamb, Babulgaon, Wani, Zari, Darwha, and Ner contributing significantly to its production.
- Market Rates: Soybean rates vary, and its importance is reflected in both production and market rates.

3. **Diverse Crops:**
- Crop Diversity: The district has a diverse range of crops, including tur/red gram, Bengal gram, jowar, black gram/udid, green gram/mung, and wheat.
- Production Variability: Different APMCs specialize in diverse crops, indicating a balanced approach to agriculture.

4. **APMC-Specific Highlights:**
- Ralegaon (Cotton Focus): Predominantly a cotton market with the highest rate in the district.
- Pandharkawada (Diverse Production): APMC with diverse production in various crops, including soybean, tur/red gram, Bengal gram and others.

5. **Suggested Strategies:**
- Crop Optimization: Farmers might optimize cotton cultivation in APMCs where it is dominant, considering high market rates.
- Soybean Enhancement: Given the significance of soybean, farmers can explore strategies to enhance soybean production and market access.
- Market Rate Monitoring: Continuous monitoring of market rates is crucial for making informed decisions on crop selection and cultivation.

6. **Rate Ranges:**
- Cotton: ₹8,000 to ₹8,200 per quintal
- Soybean: ₹5,415 to ₹5,620 per quintal
- Tur/Red Gram: ₹6,500 to ₹6,760 per quintal
- Bengal gram: ₹4,180 to ₹4,360 per quintal
- jowar : ₹1,605 to ₹1,800 per quintal
- Black Gram/Udid:₹3,800 to ₹4,000per quintal
- Green Gram/Mung: ₹4,770 to ₹4,950 per quintal
- Wheat: ₹ 2,125 to ₹ 2,315 per quintal
- Groundnut: ₹5,300 to ₹5,550 per quintal

(sources:DDR Office data)

Agriculture produce market committee (APMC) Agri-produce inflow information. Dist- Yavatmal Year 2022-23

Sr. No.	(APMC)	AGRICULTURAL PRODUCE																	
		Cotton		Soybean		Tur/red gram		Bengal gram/ gram		Jowar		Black gram/ Udid		Green gram/mung		Wheat		Ground nut	
		Quintal	Rate	Quintal	Rate	Quintal	Rate	Quintal	Rate	Quintal	Rate	Quintal	Rate	Quintal	Rate	Quintal	Rate	Quintal	Rate
1	Yavatmal	7219	24260.00	12188	6617.00	72244	4657	66759	2928.00	133	2.00			284	14.00	19530	422.00	3599	210.00
2	Kalamb	0	0.00	9284	507.00	7279	430	7138	323.00							685	16.00		
3	Babulgaon	0	0.00	99518	5057.00	53689	3489	40916	1759.00							5492	120.00		
4	Ralegaon	494379	39753.37	717	34.39	8746	601.17	3706	16.53										
5	Ghatanji	225201	16890.00	15984	8.14	18307	12.26	9720	4.22										
6	Pandharkawada	0	0.00	9910	516.20	17458	1192.43	5757	246.05	498	8.39			368	19.88	340	6.30	211	10.07
7	Maregaon	52024	4181.93	0	0.00	0	0	0	0.00	0	0.00	0	0	0	0.00	0	0.00	0	0.00
8	Wani	7410	616.54	81500	4235.80	26928	1698.32	28541	1256.49										
9	Zari	20000	1479.58	2955	153.20	503	34.19	432	23.30					30	2.19				
10	Darwha	1505	118.79	611	31.30	315	20.3	173	7.25										
11	Ner	0	0.00	115548	6137.74	28386	1764.22	26030	1077.49										
12	Arni			95554	4299.93	47696	3815.68	40590	1826.55	760	15.20			12	0.60	5632	112.64	1010	55.55
13	Digras	2998	159.65	30581	948.01	18066	686.50	14458	484.34	248	2.97	295	0.11	12	0.54	2626	45.95		
14	Pusad																		

15	Mahagaon	5750	402.50	10870	467.40	2175	152.25	2030	87.29							1875	41.25		
16	Umarkhed	0	0.00	89770	4662.00	7440	418	70170	2822.00	1190	23.00					3390	68.00	330	15.00
TOTAL		816486	87862.36	574990	33675.11	309232	18971.32	316420	12861.51	2829	51.56	295	0.11	706	37.21	395770	832.14	5150	290.62
		min. rate	max. rate	min. rate	max. rate	min. rate	max. rate	min. rate	max. rate	min. rate	max. rate	min. rate	max. rate	min. rate	max. rate	min. rate	max. rate	min. rate	max. rate
CROP PRICES		8000	8200	5415	5620	6500	6760	4180	4360	1605	1800	3800	4000	4770	4950	2125	2315	5300	5550

(Source: DDR, Office data)

Markets available in the District with commodities handled (Kharedi Vikri Sangh)

(Year 2018-19 to 2022-23)

Sr. No.	District	Name and address of buying and selling team	Email Id	Name of manager	Business done in buying and selling team and their annual turnover				
					2018-19	2019-2020	2020-2021	2021-2022	2022-2023
1	Yavatmal	Cooperative Farmers Purchase Sales Committee Marya.Vani Sai Mandir Chowk, Yavatmal Road, Vani	sskvsamitywani@gmail.com	Mr. Prakash B. Pachare	2.02	1.74	1.70	0.82	0.75
		Business of the organization - 1) Purchase and sale of agricultural produce 2) Purchase and sale of grain at fair price 3) Purchase of government grain free of charge 4) Rent income from shop gale and Godavon							
2		Ner Taluka Cooperative Farmers Purchase and Sale Union	nersalepurchase101@gmail.com	Mr. Arvind Bh. Deshmukh	Nafed Godown	Nafed Godown	Nafed Godown	Godown	Godown
3		Arni Taluka Farmers Cooperative Purchase and Sale Union Marya. Arni R.No.129	sachindeshmukh522@gmail.com	Mr. H.R. Shete	41.10 lakhs	28.33 lakhs	63.77 lakhs	78.83 lakhs	64.27 lakhs
4		Yavatmal Cooperative Farmers Purchase and Sale Committee Ltd. Yavatmal	kvsYavatmal4@gmail.com	Mr. Gajanan Madamwar	21.12	5.19	7.07	11.24	4.19

5		Cooperative buying and selling team limits. Taluka Kalamb R.No.302, Dutt Road, Kalamb	kharedivikrisanghkalamb@gmail.com	Mr. Pravin K. Next	1103777	3218569	1269786	1680780	1062194
6		Ralegaon Taluka S.Purchasing Sales Association Marya.R.No.304	apekonkar07@gmail.com	Mr.Sanjay Madhav Jumd	2039558	1865686	1487792	1452777	1176444
7		Babhulgaon Taluka Cooperative Buying and Selling Sangh Marya. Babhulgaon R.No.301	babhulgaonkvs@gmail.com	Shri.W.N. Thombare	45.46	33.48	34.88	72.33	1.75
8		Umarkhed Taluka Cooperative Farmers Purchase and Sale Committee M.Umarkhed R.No.903	kvsumarkhed@gmail.com	Mr. Vijay Q.Mane	4.80	3.34	1.10	0.63	0.54
9		Maregaon Taluka Cooperative Buying and Selling Union M.Maregaon R.No.303	ganeshdakhare2@gmail.com	Mr. Ganesh Vijay Dakhre	-	-	-	-	-
10		Darwa Taluka Farmers Buying and Selling Co-operative Society Marya. when	suraj07chavhan31@gmail.com	Mr. Laxman Thawra Chavan	-	-	-	-	-
11		Taluka Farmers Purchase and Sale Co-operative Society M.Jari	zaritaluka.kvsmukutban@gmail.com	Mr. Prakash Lee. Gongalwar	1697604	1692732	1618121	1750685	2036398
12		Pusad Cooperative Farmers Buying and Selling Committee Pusad	pusadkvs1944@gmail.com	Mr. Sachin Ganpat Harimkar	3683938.00	3400039.00	3039425.00	2549034.00	2206333.00
13		Digras Taluka Buying and Selling Cooperative Society M.Digras R.No.129	pankajghawat123@gmail.com	Mr. Pradeep Narayanarao Raut	Purchase of grains under Aadhaar purchase sale			-	-
14		Mahagaon Taluka Cooperative Buying and Selling Sangh Marya. Mahagaon	kvsmahagaon305@gmail.com	Shri.K.M. Mishra and	-	-	-	-	-

				Shri.S.V.Bhise					
15		Ghatanji Taluka Cooperative Buying and Selling Sangha Marya. Ghatanji R.No.102	kvsghatanji102@gmail.com	Mr. U. D. Waghmare	-	4800 for sale of tea leaves	-	-	-
16		Pandharkawada Cooperative Purchase and Sale Committee Marya. Pandharkawada, Opposite Bus Stand, Pandharkawada	kharedivikri989@gmail.com	Mr. Mahesh P. Akkewar	21160441.31	21698931.84	19492857.2	9221745.73	15941041.57
				Business - 1) Fertilizer Sales 2) Seed Sales 3) Pesticides Sales 4) Spray Pump Sales 5) Nafed Tea Leaf Sales 6) Water ATM Plant 7) Soil Testing Lab					

(Source: DDR, Office data

9.2 Constraints in existing value chain

1) Lack of well-developed storage facilities.
2) Lack of well-developed processing facilities.
3) Lack of awareness about grading and packaging.
4) High cost of labor, and price fluctuation every year were the major constraints faced by the members as well as non-member farmers of FPO.
5) Lack of knowledge about commodity price fluctuation, its quality and demand of market-supply.
6) Lack of post-harvest management.
7) Difficulty in implementing suggested procedures, High prevalence of pests and diseases, crop destruction.
8) Labour shortages during harvesting.
9) Insufficient training for workers in the technical aspects of harvesting and processing.
10) High labor costs Inadequate financial means.
11) Lack of knowledge regarding credit facilities
12) Government's absence of a pricing policy.
13) Absence of updated market information.
14) Reduced prices for products and a distress sale.
15) Distant market and heavy transportation costs.
16) Exploitation by intermediaries.
17) The perishability of commodities.
18) Overdue payment.

9.3 Potential for strengthening of commodity wise value chains

Strengthening is going on using SMART. NDKSP AND MAGNET. The project will focus on strengthening the traditional agricultural system to make it more market-oriented and broadening the participation of the private sector in the value chain. The project has the following three major components.

1. Strengthening of institutional arrangements for agribusiness reforms: Under this component, strengthening of agriculture and marketing department, capacity building (training) of employees/officers in this department, establishment of crop value chain

development interest promotion councils, establishment of technical room for policy changes etc. Items included.

2. Setting up a risk mitigation system: Warehouse based Sub Projects are risk mitigation. These sub-projects will be to provide godown and grain storage facility for farmers at village level in a decentralized manner. These projects were mainly implemented through various executive Primary Agriculture Cooperative Society PACS. will go
3. Registered Community Based Organization (CBO) By making FPCs, Primary Agricultural Cooperative Society (PACS), Divisional Federation (CLF), (CMRC)

- **Commodity wise value chain:-**

1. Cotton: Smart cotton programme is undergoing in Yavatmal district through SMART Project. Implementation from 2021-2022, total 04 tehsil has been selected for this project.
   A) Kalamb- 12 village
   B) Pusad – 10 village
   C) Yavatmal -12 village
   D) Arni- 12 village

   Each village has a specific target 100 acre for 100 farmer

   Total village – 46

   Project target yield from each village is 550 quintal Bales. Yield must be properly clean with good handling.

   Market linkage: online cotton market (MAHA-COT)

   SMART Project Are Providing: agri training for production development.

   Also providing market linkage support.

   Currently this project is ongoing in the district. 3 agri.training / village done.

   Online registration ongoing through SMART PROJECT website.

   Potential: quality cotton bales can be available at district level.

   Development of godown infrastructure.

   Cotton based manufacturing industries can lift up.

1) <u>Soybean:</u>

   1) Soybean refinery 2) Soya bean food product based technology viz.

- Tofu
- Soya milk
- Soy nuts
- Soy chakli
- Soy snacks
- Seed production speciality food grade soybean

2) Tur/red gram : storage facility, cleaning grading unit , dal mill for quality package tur daal. Organic tur dal has high demand in the market.
3) Bengal gram/gram: dal mill for chana daal, chana flour, chana snacks, chana sattu, polished chana daal, chana dry fruit barfi, chana jor snacks,chana jaggery laddu, have good opportunities for such business. Cleaning-grading unit, packaging also have potential for development
4) Horticulture: potential to develop packaging of food like fruit juice, pulp product, squash, jam, butter, chocolate, jelly, candy, powder, essences ,peel oil, ice cream, nectar, medicine product development

9.4 FPCs' contribution in value chain development

9.4.1 Status of FPCs in the district

Total FPCs in district -146

9.4.2 Assessment of FPCs in the district

9.4.2.1. Objectives of Evaluation

- The study is an attempt to assess the Farmer Producer Companies of project area and find whether these companies are performing and earning sufficient returns to sustain business. The report has also proposed a rating method to measure the performance of FPCs considering different 8 parameters. The reports analysed 84 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.

Scoring Method of Evaluation

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

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

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

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

9.4.2.2 Output of evaluation.

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

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

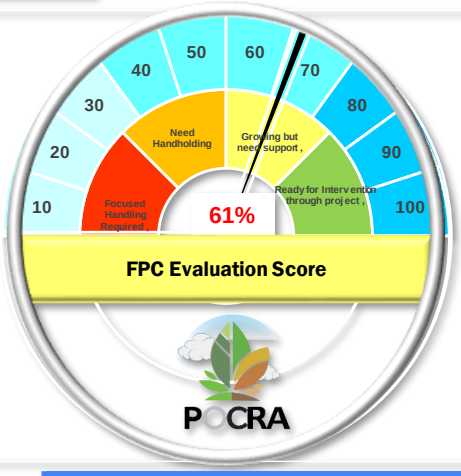
Customized Evaluation Report

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

Jiavanonnati Mahila Fpc Ltd

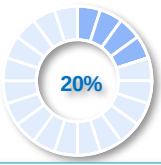
Address

Gala No.27,Near Trimurti Mangalam
Wadki Road,Ralegaon, Dist-Yavatmal,
Pincode- 445402

Score Report

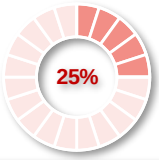
Criteria	Max. Score	Score Obtained
Organization & Adminstration (Core Foundation Strength)	21	17
Governance (Control Systems in Place)	11	10
Management (Decision making processes)	8	7
Infrastructure (Assets and resources)	5	1
Finance (Financial base and health)	25	11
Business & Market Linkages (Resource quality)	21	12
Capacity Building (Resource quality)	5	2
Climate Resilience (Adaptability to climate risk)	4	1
Final Score	100	61

What could improve your FPC?



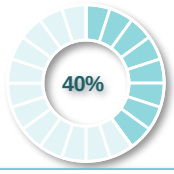
Infrastructure

Better Financial Management can help in improving available infrastructure



Climate Resilience

The FPC should promote various climate resilient agricultural technologies.



Capacity Building

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

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

9.4.3 Information about FPCs Supported by SMART/ NDKSP

Currently there are no FPCs that get financial support from the SMART project. 12 DPR are sanctioned. Work under process.

Sr.No	FPCs Name	Project Name	Project proposal amount	status/DESK
1	Super agro star fpc	cleaning-grading & godown	300 lac	PIU,PUNE
2	Sai Yavatmal fpc	oil mill, cleaning-grading unit, godown.	145 lac	PIU,PUNE
3	Krushakraj jaivik sheti mission	dal mill,cleaning-grading, flour unit, godown	178 lac	PIU,PUNE
4	BHAMBRAJA FPC	soy milk and godown	-	DIU Desk
5	YASHODHARA FPC	cotton ginning and press	-	DIU Desk
6	Balaji agro fpc	cleaning-grading & godown	-	RIU DESK
7	Sanidhya fpc	cleaning-grading & godown	-	RIU DESK
8	Dreamcrop fpc	flour mill,godown,shed	-	RIU DESK
9	Vidul fpc	cleaning-grading & godown	-	RIU DESK

(Source:-NDKSP, District Data)

Information About FPCs Supported by NDKSP

Total 09 FPCs got Financial support from NDKSP.

Sr. No	FPCs Name	Project Name
1	Joyous Agri Vision Producer Company Limited	Establishment of Custom Hiring Centers
2	Star Farmer Producer Company Limited Malegaon	Establishment of Custom Hiring Centers
3	The Mahagaon Taluka Farmers Producer Company Limited	Establishment of Custom Hiring Centers
4	Krushidhan Agro Producer Company Limited	Other Agribusiness Activity AUCTION SHED
5	Rangnathswami Farmers Producer Company Limited	Establishment of Custom Hiring Centers
6	Vidarbha Farms Agro Producer Company Ltd	Medicinal/Aromatic Plants Processing Unit
7	Goldenpro Farmer Producer Company Limited	Establishment of Custom Hiring Centers
8	Cottongold Farmer Producer Company Limited	Establishment of Custom Hiring Centers
9	Bhai Namdevrao Farmer Producer Company Limited	Establishment of Custom Hiring Centers

(Source: ATMA, Office data)

9.4.4 Details of Commodity Transaction by FPC's

Sr. No	Commodity/ Crop	Name of FPC's
1	Soybean	Soyagold Farmer Producer Company Limited.
		Krushak kranti JSM Farmer Producer Company Limited.
		Mrugzari Farmer Producer Company Limited.
2	Red gram	Ghatanji Krushi Vikas Adiwasi Farmer Producer Company Limited.
		Kalamb Krushi Vikas Adiwasi Farmer Producer Company Limited.
		Navjivan Agro Producer Company Limited.
3	Cotton	Cottongold Farmer Producer Company Limited.
		Sarvanath Waghadi Farmer Producer Company Limited.
		Laxminandan Krishi Farmer Producer Company Limited.
4	turmeric	Krushi Nirmiti Farmer Producer Company Limited.
		Vanprayag Farmer Producer Company Limited.

		Gold Gram Farmer Producer Company Limited.
5	Bengal gram, black gram, green gram	Ralegaon Manav Vikas Farmer Producer Company Limited.
		Laxminandan Krishi Farmer Producer Company Limited.
		Sarvanath Waghadi Farmer Producer Company Limited.
6	Vegetable	Sweekar Agro Producer Company Limited.
		Sant Tukdoji Producer Company Limited.
		Ghatanji Mahila Producer Company Limited.
7	Wheat	Jagdamba Mahila Shetkari Utpadak Sangh Producer Company Limited.
		Umarkhed Taluka Aditya Farmer Producer Company Limited.
		Balaji Agro Farmer Producer Company Limited.

(Source: ATMA, Office data)

9.4.5 Details of services provided by FPC's

Sro. No.	**Services and value chain development by FPC**	**FPC's**	
1	Custom hiring center	Goldenpro farmer producer company limited. sakhara,umarkhed , Yavatmal, maharashtra.	Cottongold farmer producer company limited, Ghatnji, Yavatmal, Maharashtra.
2	Agriculture services center	Sangharsh Agro producer company limited. Apati (Rampur), Tq. Ralegaon, Yavatmal, maharashtra.	Sweekar Agro producer company limited, Kalamb, Yavatmal, Maharashtra.
3	Cleaning and grading unit	Bhumiputra self-reliant farmer producer company limited. At. wadhona, po. Jodhmoha, kalamb, Yavatmal, Maharashtra.	Divya spandan agro producer company limited, Ghatanji, Yavatmal, Maharashtra.
4	Trading (soybean, tur, cotton, chana) trading (vegetables) etc.	Kalamb krushi vikas adiwasi farmer producer company limited. potgavhan , Ralegaon, Yavatmal, Maharashtra.	Ghatanji krushi vikas adiwasi farmer producer company limited, Ghatanji, Yavatmal, Maharashtra.
5	Dal milling (pulses)	Tulsi farmer producer company limited. Lohara, Yavatmal, Maharashtra.	Harit jivan farmer producer company limited, Yavatmal, Maharashtra.
6	Dairy business (milk collection center)	INDUJAA mahila milk producer company limited Yavatmal, Maharashtra.	Yavatma jilha dugdh producer company limited. TQ Pusad, Yavatmal, Maharashtra.

7	Nursery	Vidarbha farms agro producer company limited. Umarkhed, Yavatmal, Maharashtra.
8	Medicinal/Aromatic Plants Processing Unit	Vidarbha farms agro producer company limited. Yavatmal, Maharashtra.
9	Seed Production	Amrut Pattern agrotech farmer producer company limited. Amboda, Taluka-Mahagaon, Amboda, Yavatmal, Maharashtra.
10	Poultry and management	Sahayta woman Poultry farmer producer company limited. NER, Yavatmal, Maharashtra.
11	Goat rearing and management	Tatvamasi kisan farmer producer company limited. At Wai (Ijara), Tah- Ner, Yavatmal, Maharashtra.
12	Sericulture based business (trading of cocoon, input services)	Reshim gold farmer producer company ltd., Tq. Digras, Yavatmal, Maharashtra.
13	Bamboo cultivation	Sai Yavatmal farmer producer company limited., Digras, Yavatmal, Maharashtra.

(Source: ATMA, Office data)

Chapter 10: Extension strategies for adaptation to climate change

I) Preparation of Village Adaptation Plan

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

❖ **Planning for water security**

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

❖ **Planning for soil health**

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

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

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

❖ **Planning for Carbon sequestration**

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

❖ **Planning for reduction of production cost**

a. Reducing cost on labour intensive operations (by mechanization)
b. Reducing use of chemical fertilizers (by enhancing use of bio/ organic fertilizers)
c. Reducing use of chemical pesticides (by enhancing use of bio/ natural pesticides)

d. Reducing tillage operations (by conservation agriculture)

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

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

a. Identification of CRV.

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

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

❖ **Adoption of climate resilient technologies**

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

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

c. Most prominently adopted technologies and their impact

d. Innovative technologies adopted

e. Validation of technologies developed by Progressive farmers

❖ **Integrated Pest Management Plan**

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

b. Plan of IPM technologies to be adopted

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

d. Skill training to reduce pesticide hazard

❖ **Integrated farming systems**

a. Potential for crop based and other livelihood activities

b. Households to be engaged in IFS

c. Plan for market linkage for IFS produce

❖ **Preparation of contingency plan**

a. Village level weather forecast mechanism

b. Preparedness for contingencies

c. Crop insurance promotion and status

d. Monitoring of contingencies

e. Assessment of losses due to natural calamities if any

❖ **Strengthening of commodity value chains**

a. Assessing existing commodity value chains

b. Identification of gaps in existing value chains

c. Assessing volume of commodity to be marketed

d. Assessing warehouse availability and available capacity

e. Assessing transportation facilities

f. Plan for infrastructure

g. Plan for market linkage of major commodities

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

II. Convergence of Govt. Programs with Extension Plan

- **Ranbhaji Mahotsav**: - District Level Ranbhaji Mahotsav on behalf of Maharashtra State, Department of Agriculture on 15/08/2023 Late. Vasantrao Naik Shetkari Swawlamban Kendra, Old Bus Stand Chowk, Yavatmal was organised. Which was inaugurated by Hon. Guardian Minister Hon. Mr. Sanjay Rathod. According to the suggestion of the Commissioner of Agriculture, according to the natural availability of wild vegetables at district level and taluka level. Ranbhaji Mahotsav was organized from 09 to 15 August 2023. In this, 2103 farmers participated in the vegetable festival organized at district and taluka level. At this time 83 wild vegetables were available for sale. And there was a turnover of Rs.3.46 lakhs.
- **Krushi Sanjeevani Saptah** - from 25 th. June to 1st July 2023, meetings were organized in 805 villages with the participation of 20937 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.
- **Pradhan Mantri Pik Bima Yojana**- Under this scheme 4,14,817 farmers will be covered for kharif season 2022 with some injured of Rs. 1397 Cr. Out of which 340635 farmers received 239.45 Cr. Amount for a crop loss.
- **Pradhan Mantri Sukshma khadya Unnayan Yojana** – In 2020-21 to till date In this scheme, 35 percent subsidy is available for individual and group projects with upper limit of Rs. 10 lakhs. Accordingly, 1131 projects have been submitted to the bank out of which 312 proposals have been approved and 564 proposals have been rejected. 104 proposals are pending with the Bank level.
- **Distribution of fertilizer, seeds on the farm bund** - In the year 2021-22, a total of 4393 quintals of chemical fertilizers and 4101 quintals of seeds were delivered to the farmers' bunds through farmers' groups, agricultural centers and chemical fertilizer manufacturing companies in Amravati district.
- **Vikel Te Pikel** - In the year 2022-23, a total of 56 farmer groups / farmer producer companies are selling agricultural produce to bulk buyers / sellers / processors. In this, 56 farmer groups and 3451.63 quintals farmers producing companies of their produce have been sold.
- **Balasaheb Thackeray Agricultural Business and Rural Transformation Project (SMART)** - In Yavatmal District a physical target of 30 proposals was given under the project for the agriculture department. Total 30 proposals were submitted to PCMU for primary sanction out of 30 proposals 27 proposals received primary sanction and 3 proposals are in process at PCMU level. Out of 27 primary sanctioned proposals 12 FPP were submitted to PCMU and received sanction. Out of remaining 15 primary sanctioned proposals 7 FPP are submitted by the FPO's which are in process of scrutiny.
- **NDKSP**: Till date 44128 farmers of the district have been registered on the online portal DBT PoCRA and a total of 15146 individual benefit applications have been registered. Out of which till date 15146 farmers have been given subsidy amounting to Rs.43.43 cr. Also under the agribusiness component till date 44 farmer groups and farmer producer companies in the district have distributed subsidy amounting to Rs.2.97 cr.

III. Monitoring mechanism for village adaptation progress

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

IV. Strategy for revisiting the village adaptation plan

1. Strategy for revisiting of village adaptation plan:-
2. Revisiting a village adaptation plan is essential to ensure that it remains effective and relevant to the changing needs and circumstances of the communities it serves. Here's a strategy for revisiting and updating a village adaptation plan:
3. Stakeholder Engagement: Identify and engage with key stakeholders, including local government officials, community leaders, farmers, NGOs, and agricultural experts. Conduct meetings and workshops to gather input and feedback on the existing plan and to understand the evolving needs and challenges of the villages.
4. Assessment of Changing Climate Patterns: Consider the impact of changing climate patterns on agriculture and rural communities. Assess the need for climate-resilient strategies and adaptations.
5. Technology and Mechanization: Review the adoption of modern agricultural technologies and machinery in the villages. Evaluate the effectiveness of any support or subsidies provided for technology adoption.
6. Market and Value Chain Analysis: Analyze the local and regional markets for agricultural produce. Identify opportunities to strengthen value chains, improve market access, and increase farmers' income.
7. Resource Management: Evaluate the sustainable management of natural resources, including water, soil, and forests. Consider strategies for resource conservation and sustainable practices.

8. Climate-Smart Agriculture: Incorporate climate-smart agricultural practices and technologies to help farmers adapt to changing weather patterns. Promote techniques such as crop diversification and water management.
9. Capacity Building and Training: Review the effectiveness of training and capacity-building programs for farmers. Ensure that farmers have access to knowledge and skills needed for modern and sustainable farming practices.
10. Community Participation: Involve local communities in the planning and decision-making process. Encourage community-led initiatives and self-help groups.

Annexure I Sample Village Level Micro-Plan

गाव विकास आराखडा प्रपत्र

महाराष्ट्र शासन - कृषि विभाग
नानाजी देशमुख कृषि संजीवनी प्रकल्प

POCRA

गाव विकास आराखडा

गाव समुहाचा क्रमांक- 510_wrn-2_01

गावाचे नाव-	हातवंजारी	सेन्सस कोड-	543792
महसुल मंडळ-	Botini	तालुका-	मारेगाव
उपविभाग-	पांढरकवडा	जिल्हा-	यवतमाळ

गावसमुहातील इतर समाविष्ठ गावे

अ. क्र	गावाचे नाव	सेन्सस कोड	अ. क्र	गावाचे नाव	सेन्सस कोड
1	खडकी	543790	2	मेंढनी	543729
3	घोगुलदरा	543715	4	खाप्री	543791
5	शिवनळा	543714	6	घोडदरा	543712
7	धानपूर	543793	8	खेकडवाई	543713
9	सराटी	543722	10	खानदनी	543730
11	गोडबुरंदा	543709	12	चिंचोनी बोतोनी	543720

सुक्ष्मनियोजन प्रक्रिया कालावधी - ते

गाव विकास आराखडा तयार करणा-या कृषि सहाय्यकाचे नाव - Vinayak Dnyaneshwar Jumnake

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

ग्राम कृषि संजीवनी समिती मंजूरी ठराव क्रमांक व दिनांक - ठराव क्रमांक 2 दि. 16-02-2021

ग्रामसभा मंजूरी ठराव क्र व दिनांक - ठराव क्रमांक 2 दि. 16-02-2021

जिल्हास्तरीय समन्वय समितीकडील मंजूरीचा दिनांक - _____

जिल्हा अधिक्षक कृषि अधिकारी,यवतमाळ कार्यालय

Annexure II Sample Village Profile

https://mahapocra.gov.in/village-profile

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

अहवाल क्रमांक : **नादेकृसप्र/गामाप्र/543792/2023/344** दिनांक : 10/12/2023

ग्राम कृषी संजीवनी विकास दर्शिका

गावाचे नाव : हातवंजारी	गावाचा सांकेतांक : 543792	ग्रामपंचायत: Hatwanjari
गावाचा (प्रकल्प) टप्पा : 2	गाव खारपान मध्ये येते का ?: नाही	समूह कोड: 510_wrn-2_01
तालुका : मारेगाव	उपविभाग : पांढरकवडा	जिल्हा : यवतमाळ

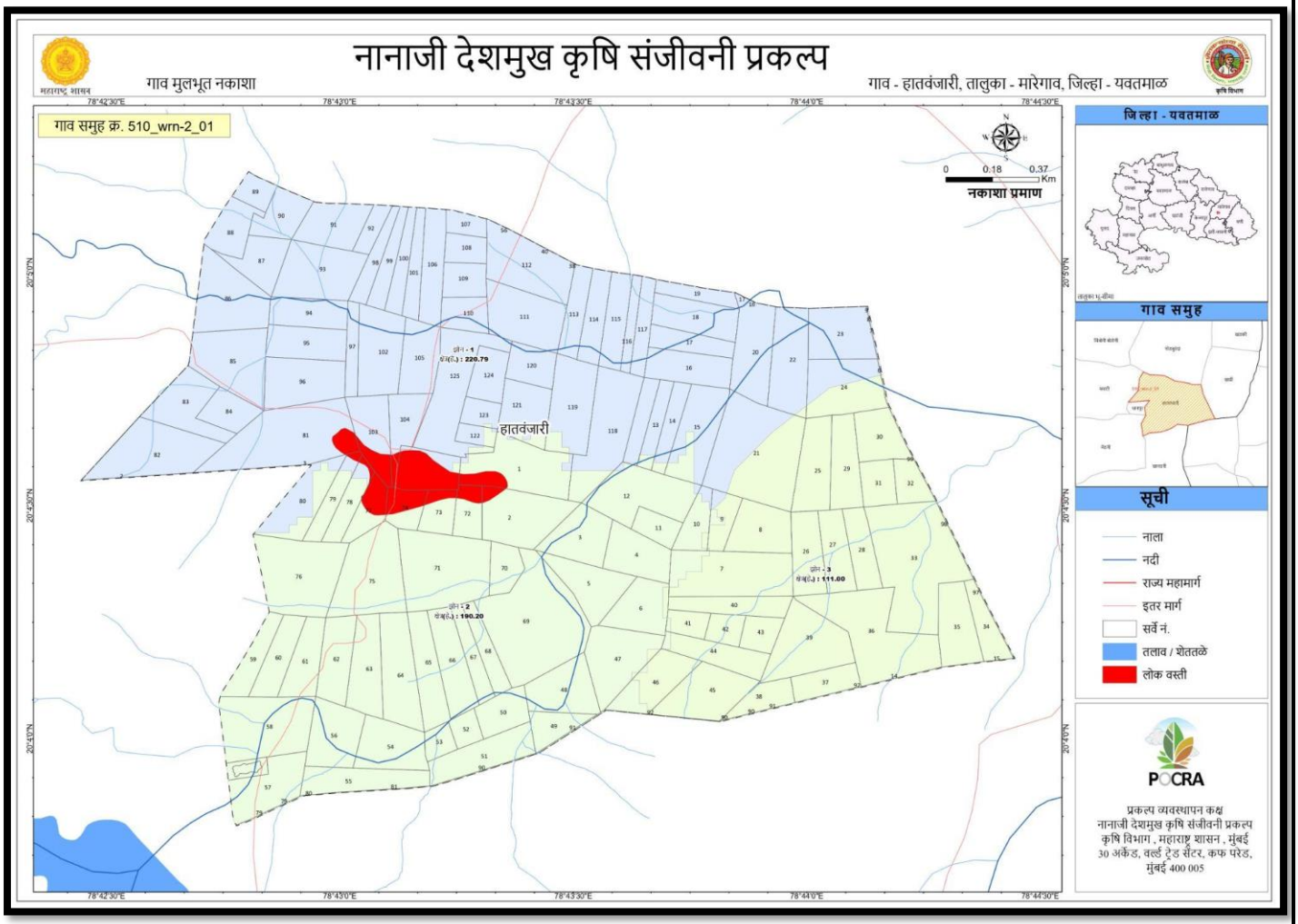
प्रकल्प कर्मचारी/अधिकारी

पदनाम	पूर्ण नाव	भ्रमणध्वनी क्रमांक
उपविभागीय कृषी अधिकारी	M P	8275051843
तालुका कृषी अधिकारी	Nikalje Sunil	9604148562
कृषी सहाय्यक	Jumnake Vinayak Dnyaneshwar	9922007054
समूह सहाय्यक	Jaisingpure Vaibhav Rameshrao	9359347628
शेतीशाळा प्रशिक्षक	NA	NA
कृषीमित्र	Danav Pravin Babarao	8975037978
कृषीताई	dhobe rekha jagdish	8766892972

ग्राम कृषी संजीवनी समिती

पदनाम	पूर्ण नाव	भ्रमणध्वनी क्रमांक
सरपंच	Kumare Nita Tukaram	9356257534
उपसरपंच	NA	NA
ग्रामपंचायत सदस्य	दानव काशीबाई विठ्ठल	NA
ग्रामपंचायत सदस्य	KUDMETE GANESH MAROTI	7795838376
प्रगतिशील शेतकरी	KUDMETE KUNDLIK ANANDRAO	9850240332
प्रगतिशील शेतकरी	JUNGARI BRAMADEV MAROTI	9370517900
महिला शेतकरी	NEHARE KAMLABAI PATRU	9529211027
महिला शेतकरी	सातपुते अंजनाबाई मधुकर	7798099889
महिला शेतकरी	KUDMETE VIMAL ABAJI	9637507003
शेतकरी उत्पादक कंपनी प्रतिनिधी	THAK SANJAY ANDRAO	9420848556
बचत गट महिला प्रतिनिधी	TEKAM KALABAI SHANKAR	8605745284
कृषि पूरक व्यावसायिक शेतकरी	HEPAT GOPAL KRUSHNAJI	9689370876
कृषि पूरक व्यावसायिक शेतकरी	KALEKAR VIJAY GIRIDHAR	9604368944

Annexure III Sample Village Map (गावाचा मुलभूत नकाशा)



Annexure IV Sample Agro-met Advisory
(तालुका निहाय हवामान अंदाज व कृषी सल्ला)