ICAR-National Agricultural Higher Education Project

Project Report (up to December 31, 2023)

Component 1b: Centres for Advanced Agricultural Science and Technology (CAAST)

<Name of the AU: Anand Agricultural University, Anand, Gujarat >

<Project Title: Centre for Agricultural Market Intelligence under NAHEP-CAAST, AAU, Anand >

Anand Agricultural University, Anand, Gujarat
nahepcaast@aau.in

Executive summary

Name of the AU: Anand Agricultural University, Anand, Gujarat

Project Title: Centre for Agricultural Market Intelligence under NAHEP-CAAST, AAU, Anand

Executive Summary:

(I) Research component

1. Ten commodity reports have been completed as a part of research.
2. Total 29 Price forecasting of six major crops namely wheat, groundnut, cotton, maize and cumin is a regular activity. The coverage through various source including Newspapers and response of the stake holder have been good.
3. 28 PG research studies consisting of 16 Masters and 12 Ph. D. have been finalized. (18 research studies including 12 Masters and 6 Ph. D. have been completed.)
4. NAHEP-CAAST AAUs website has been developed and is being updated and very well monitored (NAHEPCAASTAAU).

- **Innovative Research:**

1. Research study with ISRO, Ahmedabad on Developing Hybrid Model for Price Forecasting
2. Research study with Western Sydney University on Enhancing Agricultural Market Intelligence using Digital Ecosystem for generating primary data stream

(II) Capacity building Program

1. Total 122 Programs (consisting of 36 Guest lectures, 21 one day programmes, 19 two-day programmes, 24 three and more than three days programmes, 14 farmers programmes and 8 certificate courses have been conducted.
2. Following Six certificate courses have been approved and successfully organized.

1.	Data Analytics using Python	: Completed
2.	Statistical Analysis using R Software	: Completed
3.	Statistical Analysis using SPSS Software	: Completed
4.	e-Content Development using Multimedia	: Completed
5.	Agricultural Market Intelligence	: Completed
6.	Agricultural Insurance	: Completed

(III) Procurement & renovation

1. All procurement and renovation work have been completed.
2. All financial and account activities are very well in line with PFMS system (Total fund utilization is 100%).

(IV) Consultancy, MOUs & Foreign visits

1. Six MOU/MOAs have been signed.
2. Five consultants have been associated with different research studies.
3. Foreign Visit for Faculty and PG Students:
    - 21 faculty members and 40 PG students have completed international training in 15 premier institutions of 13 countries under NAHEP-CAAST, AAU, Anand.

Introduction

<<<<Background, introduction of the project, title and key objectives, intended benefits (restrict the highlights to 2-3 paragraphs-maximum 2-3 pages)>>>>

Background:

In the changing economic environment characterized by liberalization, privatization and globalization, market information and intelligence are crucial to enable farmers and other stakeholders to make informed decisions about what to grow, when and where to sell, how to sell and store. Though, the production technologies in agriculture play a vital role and need continuous improvement to help reduce the input costs, the market intelligence needs focused attention from all those concerning the agriculture to make it attractive and more paying proposition. This becomes far more important and crucial when more than 85 percent of the farmers in the country who are small and marginal and constitute core production system hardly understand the market dynamics beyond the precincts of their local markets. Further, with the increased marketed surplus and opening up of global trade, the importance of market intelligence has tremendously increased for all stake holders with particular focus on small and marginal farmers. The adverse impact of climate change, inter alia, on yield and income losses to the farmers can also be addressed substantially if the market intelligence pertaining to demand, supply and prices of input and output for different agricultural commodities is timely available. In India, the National Information Centre (NIC) of the Ministry of Information Technology - through initiatives such as the DISNIC-Agri"s Project and AGRISNET (a NIC-net based Agricultural Informatics and Communications Network) - seeks to reach all agricultural districts and blocks through its massive "Gateway Networks". However, its potential benefits is yet to be realized as market intelligence generated from the rigorous analysis of all issues including emerging ones is not adequately and timely available. The focus of agriculture market intelligence thus far has been limited to price forecast based on partial information. While the fact is that prices characterized by various factors including demand and supply situation, at national and international level, government policies. The need is to develop the price forecast based on adequate information on various possible factors with the help of rigorous analysis using modern tools and techniques. The need of the hour is to effectively and urgently address the marketing problems of the farmers with particular focus on market intelligence, which has not received adequate attention in the past.

Apart from price forecast, rigorous analysis of Producers Company, effective implementation of e-NAM, involvement of private sector, use of satellite data, and artificial intelligence & machine learning technique and enabling policy environment can go a long way in making agriculture market intelligence vital for various stakeholders with particular focus on small and marginal farmers.

Introduction:

Agricultural marketing in the country with particular focus on market intelligence has not received adequate attention. The wide fluctuation in prices for agricultural commodities is one of the major risk's farmers face. These fluctuations have some regular patterns: seasonal, cyclical and secular, but every year they depart from these patterns quite erratically. Most of the price forecasts do not cover all factors responsible for price fluctuations including those determining erratic behaviour.

The broad policy reforms in terms of modified APMC Act in 2003 and e-NAM in 2015 have yet to pay adequate attention on market intelligence. Furthermore, the market intelligence with specific focus on farmer producer organizations is still in nascent stage. Also, the potential benefits of Machine learning techniques, artificial intelligence, and satellite data has hardly been reaped.

In the changing world trade environment, generation and dissemination of trade related information and intelligence is sine-qua-none. However, the thrust on global market intelligence is inadequate. As far as the education and capacity building is concerned, in spite of mushroom growth of academic institutions in the country, there is felt need of some regular specialized human resource development in agriculture market intelligence with particular focus on involvement of PG students. Agricultural Market Intelligence centres which could take care of research, capacity building of faculty and PG students in the country. It is matter of satisfaction that based on performance and usefulness for the farmers and infrastructural facilities created, the State Government of Gujarat has accorded its approval to make the Centre for Agricultural Market Intelligence at AAU, Anand a permanent centre. Its truly a right step to save the, *inter alia*, marketing & trade centric problem of the farmers and help them in enhancing their income.

Title: Centre for Agricultural Market Intelligence under NAHEP-CAAST, AAU, Anand

Objectives:

II. To make demand, supply projections and price forecasting for major agricultural commodities

II. To assess the price behavior, futures market and export competitiveness for major fresh and value added agricultural and livestock commodities

III. Continuous evaluation of selected e-NAM linked APMCs and impact assessment of marketing institutions

IV. Capacity building and human resource development in the area of Agriculture Market Intelligence

Intended Benefit:

Project on agriculture market intelligence is comprehensive in nature and encompasses all important issues including demand-supply predictions and price forecasting apart from using satellite imageries for model building, farmer producer organizations for realizing better prices, continuous studying and monitoring of e-NAM linked APMCs, and private sector involvements with focus on PPP mode. Rigorous analysis of price forecasting, demand & supply projection, trade related aspects and prompt dissemination of the distilled information to the different stake holders, helps to the different stakeholder and policy makers in understanding the linkages between national and international markets, export potential & changing policy environment.

Capacity building programme for various stakeholders including students. Developing specialized human resource by way of certificate and diploma courses and involving PG students in Agri. Market intelligence through their project/thesis work apart from their exposure visits, lecture series and student exchange programme also helps in addressing the significance of Agriculture market intelligence in the changing economic Environment.

The international training component of the project enabled 40 PG students and 21 faculty members to get the exposure regarding new frontier areas in research. During foreign visit, all students and faculty members have done research work which would be helpful in sharpening their research skills and ultimately which apart from giving to great opportunity in career in the agriculture sector.

It may also help in getting collaborative projects from the host institutions from different 13 countries in the areas of agriculture research and education which would be helpful in making our institution, AAU, at par with the premier institutions in the field of agriculture education and research.

Under NAHEP-CAAST project, 28 PG students have undertaken their research work with financial and technical assistance. Their research work is related to intended objectives of the project and ultimately linked with farmers' income. Students have done research in the emerging areas of agriculture like, artificial intelligence, demand-supply projections, international trade and its competitiveness *etc*. and qualitative research publication from this work would be in line with thinking policy of the makers.

1. Key activities carried out under the project during the entire period

1.1. Interventions carried out by AU which helped to improved research effectiveness

Please provide the details about the interventions carried out to make AU reform ready and led to ICAR accreditation. Please write one paragraph for each interventions and/or activities.

Key interventions	*Remarks/Photographs*
1. One- Master degree course on Agri Analytics has been started by the university in collaboration	Based on our centre, one course on this degree programme has been designed and started on Agriculture Market Analytics
2. Total 40 PG students and 21 Faculty members visited international reputed institutions/university of 13 countries	• PG students and faculty members have got exposure to visit of various reputed institutions/university including CIMMYT- Mexico, IRRI-Philippines, McGill University-Canada etc. • Before starting of the visit, they have prepared synopsis of research work to be carried out during visit and discussed with mentor of host institution. They have carried out mini research work in line with enhancing farmers' income.
3. Total 122 webinar/ seminar/ online training under capacity building component have been conducted, which focused on agricultural market intelligence were organized. Total participants = 84836 Students: 45560 Faculties: 20641 Others: 18635	• PG Students and faculties learned the advanced and innovative ways on agricultural market intelligence. • Some students and faculties have shown deep interest and started using the knowledge in research and teaching. One student got best thesis award for doing research work on market integration on onion.
4. Total 28 research projects undertaken by PG students	Students doing research work in the broad area of market intelligences were enrolled in the project and they are getting stipend as well as technical assistance from NAHEP-CAAST, AAU centre.
5. Total 6 certificate courses have been organized	• PG students and staff members developed analytical skill for various statistical analysis. • PG Students and faculties developed the skill in using STATA, Python, R, SPSS etc. software for different statistical tools. • Research techniques are being used by Faculties and PG Students in their research work.

1.2. How the facilitative units helped to enhance learning outcomes

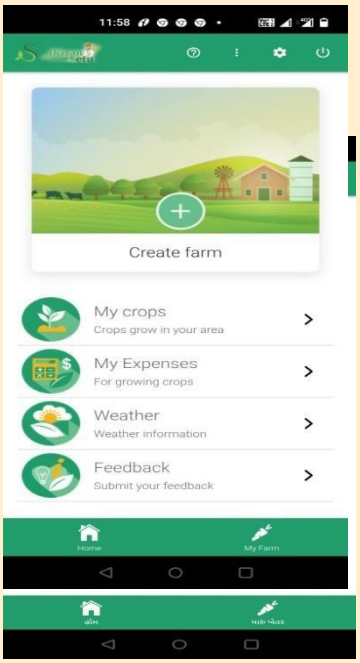
Please provide the details of the facilitative units which helped in enhancing learning outcomes of the students and/or faculties. Please note that we may not need to mention all facilitative units created in the AU here, but focus on those which are open for the students/faculties and other stakeholders.

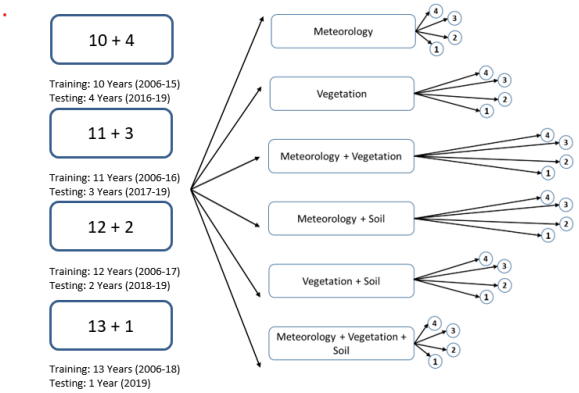
Facilitative unit	Activity/achievement	Remarks/Photographs
One Center established Under NAHEP-CAAST	1. Total 28 PG students enrolled in the project for financial and technical assistance in the broad area of Agricultural Market intelligence 2. Capacity building programme	• PG students related with the project objectives, doing research work in the broad area of price forecasting, demand and supply projections, impact assessment of market institutions etc. • 21 PG students have completed research work based on price forecast and market integration. Out of that, One PG student got best thesis award at university level. • Three PG students have undertaken research on Demand and Supply projection, they are equipped with knowledge of demand modelling including elasticities calculation.
	3. Number of Applications developments for dissemination	• One very useful application "i-Kisansetu" has been developed under one collaborative research with WSU. Under this application, several modules like package of practices, price forecast, market related information, weather information etc are very useful for the farming community for taking informed decision. 
	4. Research Collaboration with reputed institutions like ISRO, WSU-Australia	• Research on hybrid model development with ISRO based on satellite data will be helpful to make price forecast more robust. Extraction and procurement satellite data is one of the important activities and based on this activity and data available at centre, concerned PG students will carry out their research work in the area of artificial intelligence and model development.

		• Collaborative research work with WSU, Australia in the broad area of Digital Agriculture using application platform for dissemination of prepared information based on rigorous analysis and taking feedback from the participants. This will help in enhancing their decision making in taking informed decision.

1.3. Out-of-box initiatives undertaken by the AU

Please provide the details on out-of-box initiatives undertaken by the AU in one-two paragraph.

Out-of-box initiative	*Activity/achievement*	*Remarks/Photographs*
Research work on generating market intelligence through primary data stream (Collaborative research work with WSU, Sydney)	➢ For the **selected 08 agri-food value chains** for Cumin, Potato, Wheat (in Rabi season) and Onion, Maize, Cotton, Ground Nuts (in Kharif season) and Tomato (in both the seasons), **mapping the supply chain** from farmer to consumer and identify the important decisions that will be made at different points of exchange or markets and identify the information that is **required (market intelligence)** by different stakeholders **to make informed decisions**. ➢ Deploy the **mobile app (i-kisansetu)** connected to the **Digital Agri-food Ecosystem** among the selected group of farmers and **explore real-time data streams** that can be obtained to generate market intelligence.	

	➢ Research on approaches to **generate the required information based on secondary, primary and real-time data** sources based on availability, assess the level of accuracy on generated market intelligence for each data source. ➢ **Modify the mobile app to provide market intelligence** information and assess the changes in decision making. ➢ Prepare a report on enhancements that can be done to generating market intelligence by using a Digital Agrifood Ecosystem approach.	
Collaboration with ISRO	The advancements in computer technologies including data science provide the comprehensive multidimensional analysis of large data sets and help to develop models which are applicable for crop yield monitoring and estimation having economic impact for planning supply chain logistics. Machine learning is used to analyze the productivity and quality of the crops. Apart from that remote sensing technologies with multi-temporal, multi sensor, multispectral data plays	 (figure: Model and variables details for area and yield prediction using satellite data)

	a vital role as accurate input for machine learning which ultimately serves the purpose of real time monitoring of crops and weather providing the platform for application based agricultural research for improving economic impact of technology. Hybrid model development through machine learning by using secondary and satellite data for making more robust price forecasting.	

1.4. Collaborations with industry and other HEIs for bringing relevancy

Please provide the details on relevant collaboration with industry for bringing relevancy and improving research effectiveness in the AU in one-two paragraph.

Collaborations	*Activity/achievement/purpose*	*Remarks/Photographs*
DIGITAL AGRIMEDIA, GANDHINAGAR ***(MoU)***	Technical Support in Research, Capacity Building and dissemination of market intelligence	Technical Support in Research, Capacity Building and dissemination of market intelligence
MAYANK AQUACULTURE PRIVATE LTD., SURAT ***(MoU)***	Technical Support in Research and Capacity Building	Quality improvement in teaching and research of faculties and PG students Dissemination of Market intelligence helps fisherman and entrepreneurs in taking timely decision
NATIONAL COOPERATIVE DAIRY FEDERATION OF INDIA, ANAND ***(MoU)***	Technical Support in Research and Capacity Building	Quality improvement in teaching and research of faculties and PG students Dissemination of Market intelligence helps farmers in taking timely decision
INSTITUTE OF RURAL MANAGEMENT ANAND (IRMA) ***(MoU)***	Technical Support in Research and Capacity Building	Quality improvement in teaching and research of faculties and PG students
WESTERN SYDNEY UNIVERSITY, AUSTRALIA ***(MoU)*** **(Collaborative research work)**	• One research study on "Enhancing Agricultural Market Intelligence using Digital Agri Ecosystem through generating Primary Data	Innovative research work in the field of Digital Agriculture.

	Streams" in the collaboration with WSU has been undertaken. • Developed one APP 'i-Kisansetu'. • Developed Package of Practices for 8 crops.	Dissemination of prepared information based on analysis and feedback from participants.
ISRO ***(MoU)* (Collaborative research work)**	• Prediction for area and production and development of hybrid model for price forecasting with the help of satellite data in collaboration with ISRO	Prediction for area and production has been completed and second part for developing hybrid model for price forecasting with the help of satellite data in collaboration with ISRO is under way.

2. Achievements made through CAAST under NAHEP

2.1. Output-outcome monitoring

S. N.	Particulars	Apr'2018 to Dec'2023	
		Target	Achievement
1.	% increase in number of technologies commercialized		40
2.	% increase in faculty research effectiveness		5.40
3.	Number of direct beneficiaries of the project		84836
4.	Number of female beneficiaries		24507
5.	% increase in JRF / SRF / ARS		8.00
6.	% increase in number of students who were admitted in foreign universities		23.00
7.	% increase in PG student placements		33.60
8.	Number of industry- sponsored projects and positions in cutting-edge areas of agri-science		46.33
9.	Number of faculty training programmes (national) undertaken by AU		122
10.	Number of faculty training programmes (international) undertaken by AU		21
11.	Number of student training programmes (national) undertaken by AU		122
12.	Number of student training programmes (international) undertaken by AU		40

Observation

Research: Total 18 research studies are undertaken in the project. PG students of concerned department are enrolled in the project with technical and financial assistance. Students undertook their research based in line with objectives of the project and they have learned new research techniques and they have applied in their research work. One student has already awarded with best research work in the university.

Capacity Building Programmes: The programmes were conducted in line with new advancement in the field of agriculture education and students as well as faculty members have learned new advanced techniques and they are using in their research work and qualitative research publication will come out from the students and faculties.

The international training component of the project enable 40 PG students and 21 faculty members to get the exposure regarding new frontier areas in research. During foreign visit, all students and faculty members have done research work which would be helpful in sharpening their research skills and ultimately which led to great opportunity in career in the agriculture sector. It also helps in getting collaborative proposal from the host institutions from different 13 countries in the areas of agriculture research and education which would be helpful in making our institution, AAU, at par with the premier institutions in the field of agriculture education and research.

2.2. Knowledge Management Collaterals

I. Knowledge Collaterals	Apr'2018 to Dec'2023
1. Publications	06
2. Research Articles	15
3. Annual Reports	01
4. Books/Book Chapter	18
5. Success Stories	1
6. Newsletter	-
7. Magazines	-
8. Blogs	-
Annexure-I Details of Knowledge collaterals	

II. Mobile and Web Applications	Apr'2018 to Dec'2023
1. Mobile Applications Developed	03
2. Web Applications Developed	01
Annexure-II Details of mobile and web applications	

III. Number of IPR (Intellectual Property Rights) Registered/Obtained	Apr'2018 to Dec'2023
1. Copyrights	-
2. Patents	-
3. Others	-

Annexure: III

<Please provide the details of the Knowledge Management Collaterals with List of documents, authors, publication period in Annexure>

IV. Dissemination and Outreach	Apr'2018 to Dec'2023
1. No. of Posts on Social Media	494
2. No. of Posts on Newspaper	194
3. No. of Posts on Magazines	-
4. No. of Unique Promotional or Outreach Collaterals	-
Annexure: IV- DETAILS	

2.3. Capacity building programs to improve the research effectiveness

1. International trainings for students and faculties

Number	*Host institutes, period of training*	*Output of the training*
Students		
2 students	*CIMMYT, Mexico*	*In this training, students learn cutting edge technologies in plant pathology and molecular breeding for maize and wheat.*
8 students	*International Rice Research Institute, Philippines*	*In this training students got hands on experience of rice planting, hybridization and field work which can be implemented in home country to increase yield of rice with optimum utilization of resources.*
5 students	*Sabaragamuwa University of Sri Lanka, Srilanka*	*In this training, students visit various tea farm and factories by this they gain valuable insights on Sri lankan tea industry and supply chain. Export competitiveness of Sri lankan tea industry and how farmer producer organizations works in tea industry.*
17 students	*Asian Institute Technology, Thailand*	*In this training students got good exposure to new and innovative technologies for farming like drone technology, smart irrigation, precision farming. Some students learn adoption rate of online shopping, Consumer preferences and consumer buying behavior, Agri food supply chain, AI in plant disease management etc. with this exposure students gain valuable insights regarding collaborative research work.*
2 students	*Teagasc Food Research Centre, Ireland*	*In this training students get hands on experience in protein extraction, with*

		various visits they saw advanced and emerging technologies in food engineering, novel technologies in vegetable drying and understand importance of quality academic and research publications.
2 students	*Western Sydney University, Australia*	*In this training students learn how mobile application is helpful for farmers and its importance in agricultural extension services, various statistical techniques which will help in increase the precision of price forecasts.*
2 students	*Ben-Gurion University of the Negev, Israel*	*In this training students get exposure to latest and efficient agricultural biotechnological techniques, protected cultivation techniques which will helpful to develop innovative solution in modern agriculture.*
1 student	*Aberystwyth University, UK*	*In this training student explore various lab facility at university and collaboration with Aberinnovation to understand commercial aspects of crop development.*
1 student	*International Water Management Institute, Nepal*	*In this training student learn about financial aspects of solar irrigation practices and its benefits in cost reduction.*
Faculty Members		
4 Faculty	*Teagasc Food Research Centre, Ashtown, Dublin, Ireland*	*In this training faculties get good exposure at novel technological equipment at center and learn about sustainable food packaging, mathematical modelling and various disruptive technologies in food industry.*

5 Faculty	*Western Sydney University, Australia*	*In this training faculties learned a creation of automated forecasting system through the implementation of cutting-edge technologies such as Artificial Intelligence (AI), Deep learning (DL) and Machine Learning (ML). University officers get good exposure of various campuses and they learn how university structure runs at WSU and they can implement that learnings in mother university to increase effectiveness of university system.*
2 Faculty	*The National Geological Surveys for Denmark and Greenland (GEUS), Denmark*	*In this training faculties learn about Monitoring and assessment of pesticide residues leaching in field condition*
2 Faculty	*Prifysgol Aberystwyth University, UK*	*In this training faculties get good exposure to learn about Phenomics and its allied applications for crop improvements and also learn about sustainable and opportunistic future food.*
2 Faculty	*Asian Institute of Technology (AIT), Bangkok, Thailand*	*In this training faculties understand the concepts and the existing marketing system through farmers group approach through cooperative societies in Thailand. Faculties also learn about the Integrated Pest Management under climate change.*
1 Faculty	*The Royal Veterinary College, University of London, UK*	*In this training faculty get exposure about educational research to explore one health approach.*
1 Faculty	*CSIRO Land and Water flagship laboratory, Australia*	*In this training faculty learned about availability of inorganic contaminants in water treatment residue extracted and improved the analytical skill in instrumentation.*

1 Faculty	*Obihiro University of Agriculture & Veterinary Medicine, Japan*	*In this training faculty learned about the analysis of food derived potentially bio active peptides and learned different tools and techniques used for the downstream processing of fermented products.*
1 Faculty	*Global Change Research Institute, Brno, Czech Republic*	*In this training faculty learned about the plant phenotyping and multi-omics (Genomics and Metabolomics).*
1 Faculty	*McGill University, Canada*	*In this training faculty learned about present status and future scope for water resources management using Artificial Intelligence and Deep learning techniques, deep learning model development.*
1 Faculty	*International Rice Research Institute (IRRI), Manila, Philippines*	*In this training faculty learned about breeding modernization and strategies to enhance genetic gains.*
Annexure: V *list of beneficiaries along with training details*		

2. National trainings for students and faculties

Subject areas	*Host institutes, period of training*	*Output of the training*
Students		*As a part of evaluation of the programs, learning index and retention of knowledge was calculated. According to the study, the learning index of offline participants (70%) was much higher than that of online participants (49%). On the other hand, the study found that participants' knowledge improved significantly from pre-test to post-test in both offline and online capacity-building programmes.* *Participants in three to four-days (53.32%), five-days and more than five-days (52.87%) capacity building programmes had considerably better knowledge learning indexes than those*
122 training programs conducted in the area of Agricultural Market Intelligence	*Centre for Agricultural Market Intelligence under NAHEP-CAAST, AAU, Anand*	
Faculty		
122 training programs conducted in the area of Agricultural Market Intelligence	*Centre for Agricultural Market Intelligence under NAHEP-CAAST, AAU, Anand*	

		in one to two-day (40.21%) capacity building programmes. *The majority of participants (both in offline and online) assessed the capacity building programmes organized by the "Centre for Agricultural Market Intelligence" AAU, Anand as "Outstanding," and "Very Good." The participants also praised the organization and content of the training programme, as well as the facilities extended to them.* *(The participants who have attended pre- evaluation, post evaluation and retention test were selected for the study. Pre & Post-test were conducted for the participants at the beginning and at the end of the training respectively. Six months after the retention test was administered.* *The results attained from the pre, post and retention test were analyzed by paired samples t-test to investigate whether there was an improvement in the participants' knowledge. On the purpose of exploring the impact of the intervention on the participants' knowledge retention the results of the pre and retention test was compared by using paired samples t-test.)*

Annexure- VI Details of national training programmes

2.4. Input and activity monitoring

	Capital	Revenue
Total funds sanctioned during 2018-2023 by PIU (INR Lakhs)	406.57	1282.00
Total funds received till December 31, 2023 (Cumulative) (INR Lakhs)	406.57	1282.00
Total expenditure up to Decembe 31, 2023 (INR Lakhs)	406.57	1282.00

Input / Activity indicator	Sub- head / category	Apr'2018 to Dec'2023 Expenditure / input in INR lakhs		Activity elaboration
		Utilization	Planned	
Goods and equipment	Equipment, Plant & Machinery	118.00	118.00	
	Office equipment	8.94	8.94	
	Laboratory equipment	141.34	141.34	
	Furniture & fixtures	15.04	15.04	
	Computers and Peripherals	19.26	19.26	
	Books and Journals	16.00	16.00	
Civil works	Minor repair and renovation work	88.00	88.00	
Human capacity building	National level training	-		
	International level training	77.51	77.51	Under international training, a total 21 faculty members have undertaken international training at different countries.
	Short visit/ seminars	10.00	10.00	
	Meetings and workshops	8.00	8.00	
Consultancy	National level consultancies	84.53	84.53	National consultancies sub-head grant is utilized. Four studies are submitted with the help of consultants.
Recurrent cost / Miscellaneous	Travel	13.00	13.00	
	Contractual services	348.27	348.27	
	Operational costs	684.69	684.69	Under operation head, two national visit, contractual services, publications charges, capacity building programmes including certificate courses, 21 days

				Programmes, international training of 40 PG students have been conducted and this budget is utilized as per planned activities and intended objectives/indicators of the project.
	Institutional charges	56.00	56.00	Utilized in different utility bills of university as per norms.
	Total	1,688.57	1,688.57	

Observation

Capital expenditure: All released grant were utilized according to plan.
Revenue Head: Grant under different sub-heads are utilized according to plan.

2.5. NAHEP outreach and other unique initiatives undertaken

Please provide the brief progress undertaken against the different categories placed below along with the suitable photographs/links/documents etc. Please note that only significant activities/initiatives are to be incorporated in this document.

a) Case studies/success stories developed under NAHEP

(establishment of own enterprise by beneficiary student/high-impact research carried-out by AU under NAHEP/enhanced students learning outcomes due to establishment of modern facilities under NAHEP etc.)

Success story

Success story

Research work carried out by PG students inspired by objectives of NAHEP-CAAST, AAU project

Mr. Mohit Kumar, a M.Sc. student from Department of Agricultural Economics, B. A. College of Agriculture, AAU, Anand participated in various capacity building programmes of the NAHEP-CAAST project. He was inspired to do a research work in line with these programmes. As a result, he did M.Sc. thesis research work on market integration of onion. He was guided by our NAHEP team and he completed his research work and got best research thesis award from the University.

BACA ALUMNI ASSOCIATION
B. A. COLLEGE OF AGRICULTURE
ANAND AGRICULTURAL UNIVERSITY, ANAND 388 110

Certificate

The bonafide research work carried out by Shri Mohit Kumar, M. Sc. (Agri.) in Agricultural Economics under the guidance of Dr. A. S. Shaikh at B. A. College of Agriculture, Anand Agricultural University, Anand is awarded Shri Mukundbhai Varadhbhai Patel Master Degree Research Award in Social Science group for the academic year 2020-21.

Place : Anand
Date: 25.04.2022

(K. C. Patel)
Secretary

(Y. M. Shukla)
President

Case studies

Research work on projection of area and production with the help of satellite data

1. **Background:**

National Agricultural Higher Education Project (NAHEP) project by Centre of Advanced Agricultural Science and Technology (CAAST) aims at the advancement of students and faculty, to provide a better means of management and governance of the agricultural universities, and to develop a mechanism and resource for infrastructural support. As per the mandate of the NAHEP- CAAST AAU, Anand price forecast using market intelligence is the main objective of the project. There can be various ways of doing price forecast which is an important aspect when market is

Major goals of the study are: a) Price Forecasting and b) Production Forecasting. The univariate model using previous price data is used for the price forecast. This study focuses on developing the machine learning based techniques for area and production forecasts using remote sensing satellite data. The aim of the study is to develop the hybrid model combining both traditional method and remote sensing based parameters.

The factors considered for production forecasting using space /satellite data are as follow-

- Past and current weather variables for crop acreage
- Crop biophysical condition indicators (spectral indices from space)
- Soil physicochemical variables
- Past- year price, acreage, production
- Crop distribution
- Other deviation indicators

Among these, first three factors are referred here as Crop Growth Driving Variables (CGDVs) which can be determined using time series observations from a host of satellites and other geospatial data.

2. Study Area:

Three *rabi* season crops such as cumin, potato, wheat and three *kharif* season crops, such as maize, cotton and groundnut are chosen for the study. Figure 1 shows the dominantly growing districts of Gujarat for the above six (6) *kharif* and *rabi* crops.

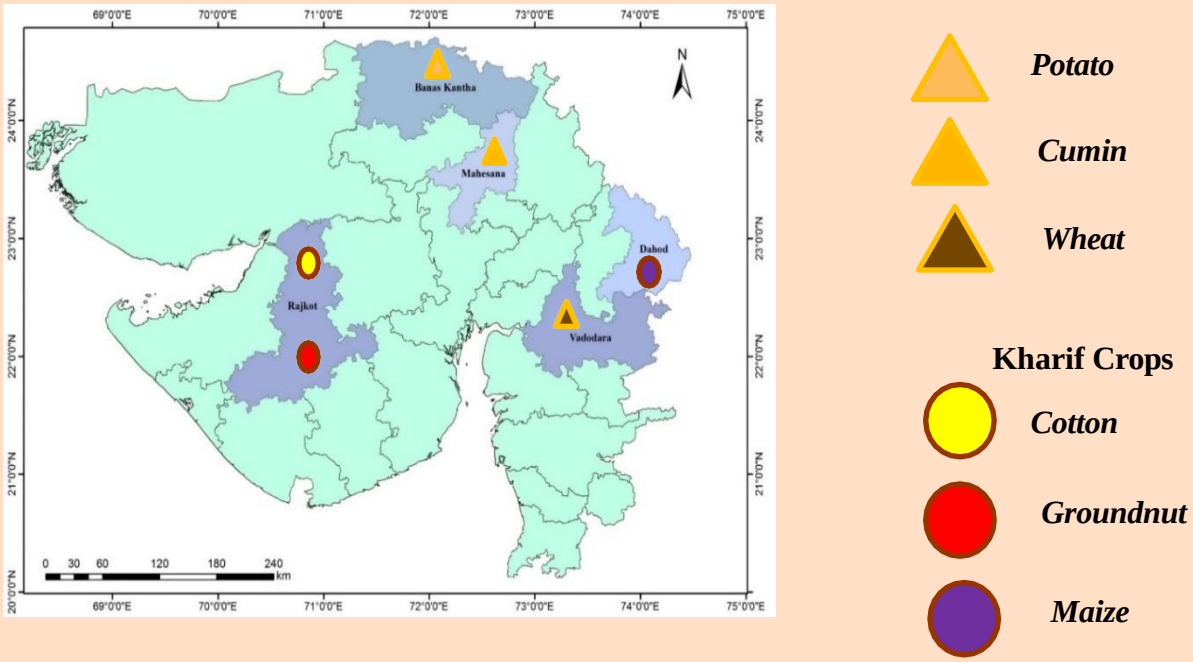


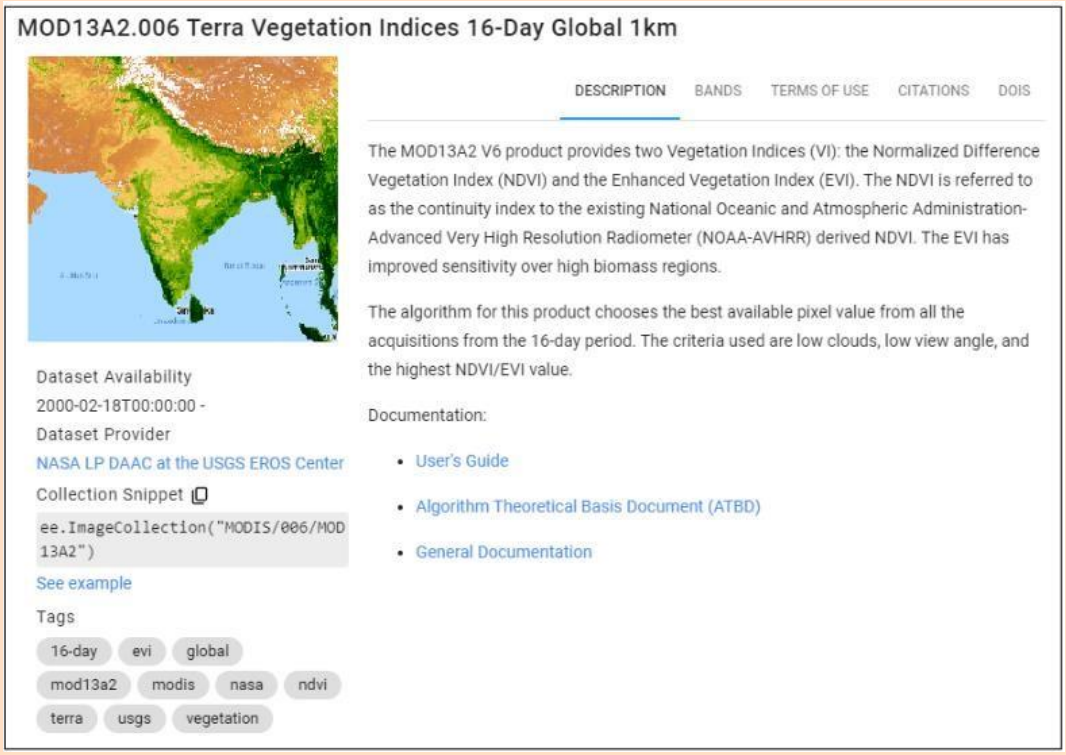
Figure1: Study area map with *Kharif* and *rabi* crops with dominantly growing districts in Gujarat

3. Material and Methodology

Development of models for both production and price forecasting needs long-term input data. Google Earth Engine (GEE) hosts various satellite, ren analysis and various geospatial products data and stores it in a public data archive that includes long-term earth imaging and environmental data. Geospatial processing can be done at various scales, powered by Google Cloud Platform, for scientific analysis and visualization. It combines a multi-petabyte catalog of satellite imagery and geospatial datasets with planetary scale analysis capabilities to detect changes, map trends and quantify differences on the earth's surface. Hence, we have chosen the GEE platform to perform all the tasks. Using the GEE-based open-source datasets, time series information is derived for various environmental parameters as well as multiple vegetation indices for the past 15 years.

Table 1. Dataset required for the generation of various indicators

SATELLITE DATA		ANCILLARY DATA
FOR RABI CROPS	**FOR KHARIF CROPS**	
LANDSAT 30 m (Source: Google Earth Engine)	MODIS 250m (Source: Google Earth Engine)	Older CCE (Crop Cutting Experiment) data from Gujarat SDA
AWiFS 56m data (from 2006) from Resourcesat-1 and Resourcesat-2 to be immediately intended for full seasons over entire Gujarat (Source : NDC, NRSC) for 2006-2019; SAC : 2020 onwards		Crop area data at block level from Gujarat SDA



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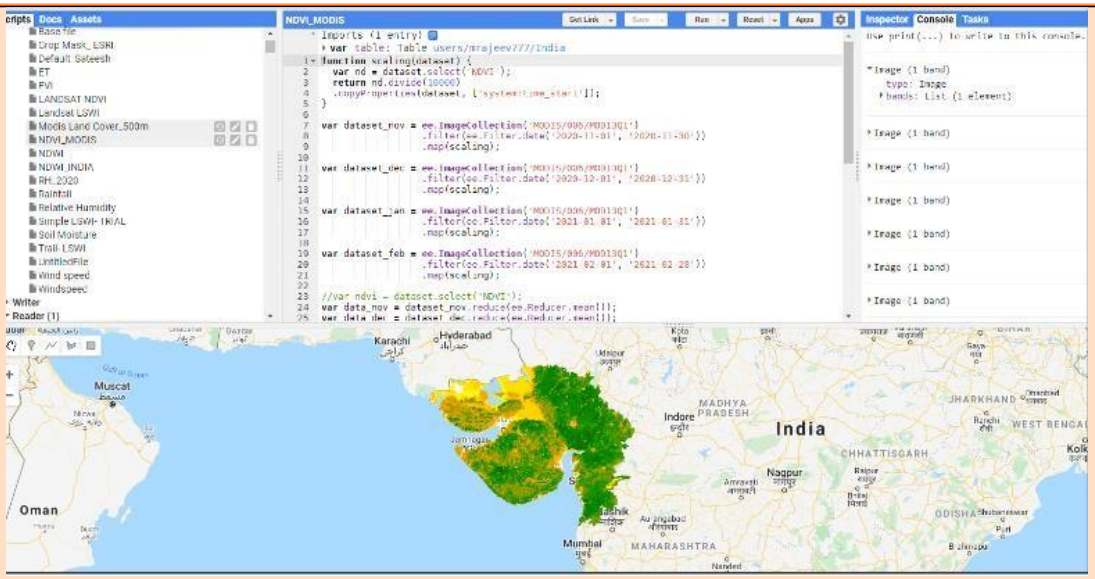


Figure 2. A snapshot from GEE providing the description of one of the parameters NDVI from MODIS TERRA data over Gujarat state

The environmental variables chosen for the present study are rainfall (RAIN) land surface temperature (LST), evapotranspiration (ET) and surface insolation (INS). The vegetation indices derived using GEE are NDVI (Normalized Difference Vegetation Index), EVI (Enhanced Vegetation Index), and NDWI (Normalized Difference Water Index). Data mentioned in Table 1 are used to generate the dataset for machine learning based algorithm development in R software.

Computation of monthly composite images for CGDVs:

After accessing individual environmental variables and vegetation indices from GEE repository, the monthly mean and/or sum values of each individual parameter were calculated. Individual bands of monthly mean values of each parameter were stacked together for entire year. The same exercise was repeated for every month from the year 2006 to 2020. The layer-stacked data of 15 years were thus prepared.

Table 2. Specifications of the CGDVs derived through GEE

Parameters & Product codes	Source of GEE geospatial data Assets	Data availability period	Update Cycle	Grid Size (m)	Unit	Data Availability Snippet
Satellite Based Data						
NDVI (MOD13Q1)	MOD13Q1 V6 product of MODIS data	2000 – 2022	16 Days	250	-	ee.ImageCollection("MODIS/006/MOD13Q1")
EVI (MOD13Q1)	MOD13Q1 V6 product of MODIS data	2000 – 2022	16 Days	250	-	ee.ImageCollection("MODIS/006/MOD13Q1")
NDWI	MODIS/MOD 09GA surface reflectance composites	2000 – 2022	Daily	460	-	ee.ImageCollection("MODIS/MOD09GA_006_NDWI")
Evapotranspiration (ET) (MOD16A2)	MOD16A2 V105 product	2000 – 2014	8 Days	500	Kg m^{-2}	ee.ImageCollection("MODIS/006/MOD16A2")
Land Surface Temperature (LST) (MOD11A1)	MOD11A1	2000 – 2022	Daily	1000	Kelvin	ee.ImageCollection("MODIS/006/MOD11A1")
Model Based Data						
Solar Radiation (INS)	ERA-5 Land Hourly Climate Reanalysis Data	1981 - 2021	Hourly	11132	MJ m^{-2}	ee.ImageCollection ("ECMWF/ERA5_LAND/HOURLY")
Rainfall (RAIN)	CHIRPS	1981 – 2021	Daily	5550	mm d^{-1}	ee.ImageCollection('UCSB-CHG/CHIRPS/DAILY')

Application of Agricultural Mask

ESRI 2020 Global Land Use Land Cover from Sentinel-2 was applied on the vegetation parameters in order to mask out the regions other than that of agriculture. The different classes of the agriculture mask considered are water, trees, grass, flooded vegetation, built area, bare ground, shrubs, clouds etc. A vegetation mask was generated through value thresholding and applied it on the parameters considered for the study.

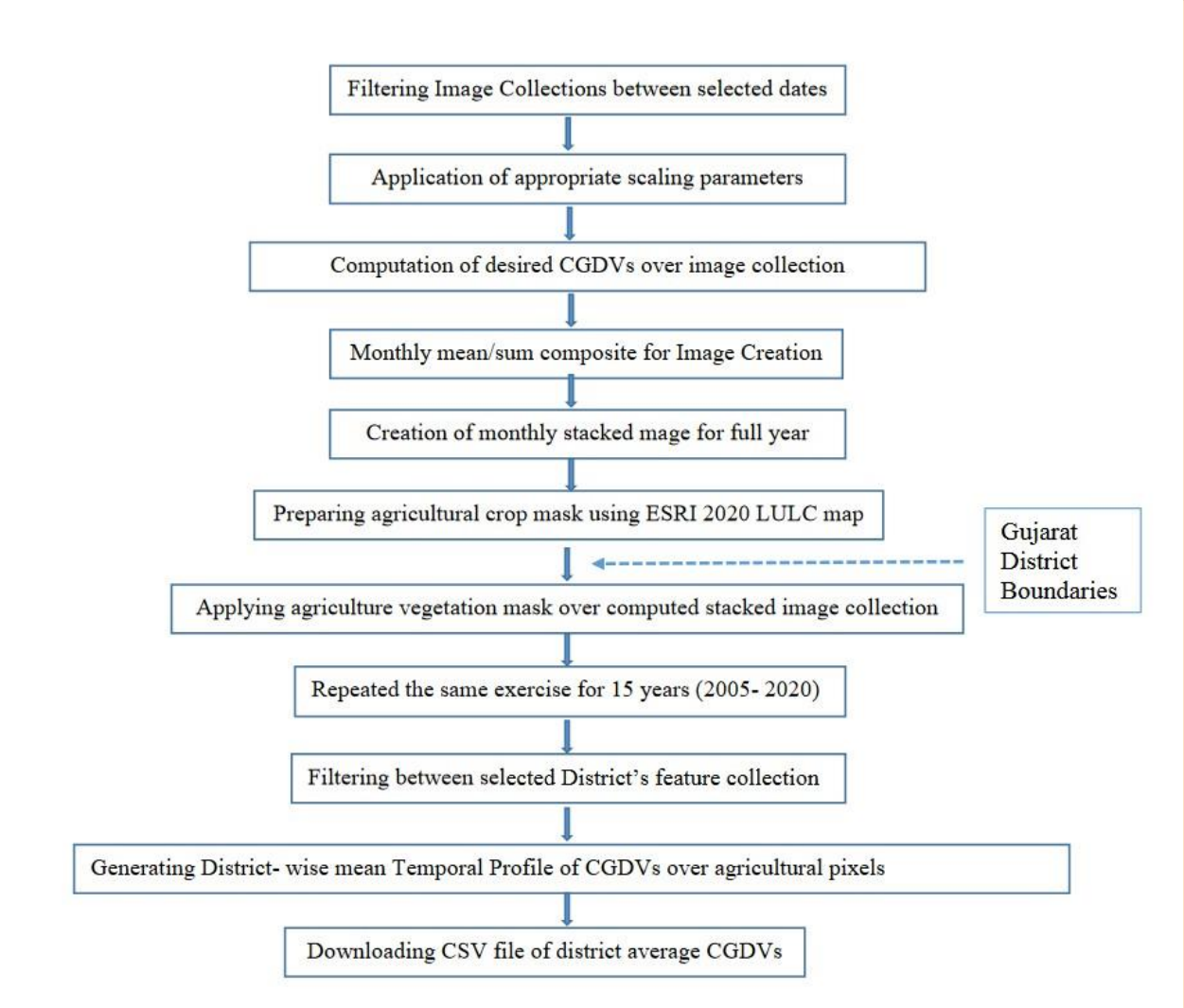


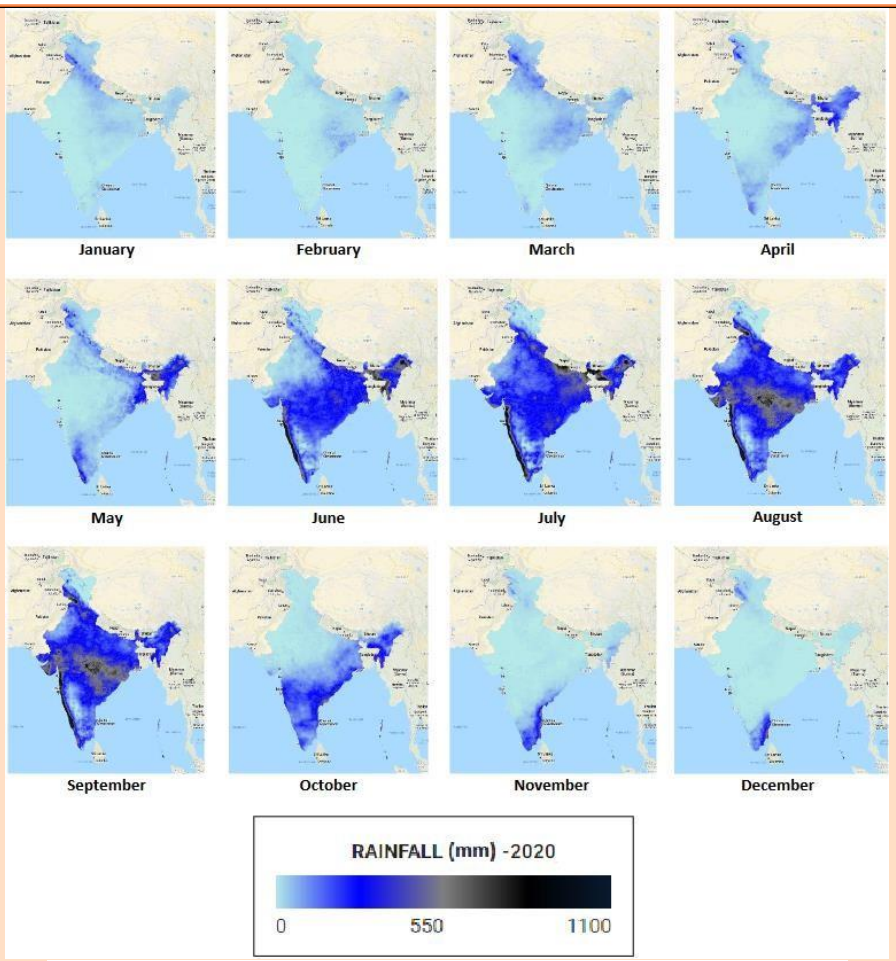
Figure 3. Methodology Flowchart for generating CGDVs

Generation of district-wise statistics:

District- wise as well as state-wise mean were generated for each parameter for both with and without agricultural mask over Gujarat districts. These operations were carried out for 15 years' timeframe and .csv files were downloaded for those Gujarat districts. A detailed step-by-step methodology explaining the various processes involved in the derivation of the environmental variables as well as the vegetation indices are shown in Figure 3.

Meteorological Drivers:

The environmental parameters rainfall, evapotranspiration, solar insolation are derived for the study districts as shown in Figures 4-6. The illustrations shown are only for the year 2020. However, the data were extracted for similar exercise was carried out for the past fifteen years (2005-2020). The Agriculture Mask of ESRI 2020 Global Land Use Land Cover from Sentinel-2 was applied on the stacked images in order to remove the other classes of forests, human settlements, water bodies etc., other than those representing agriculture. Few data gaps were observed in evapotranspiration.



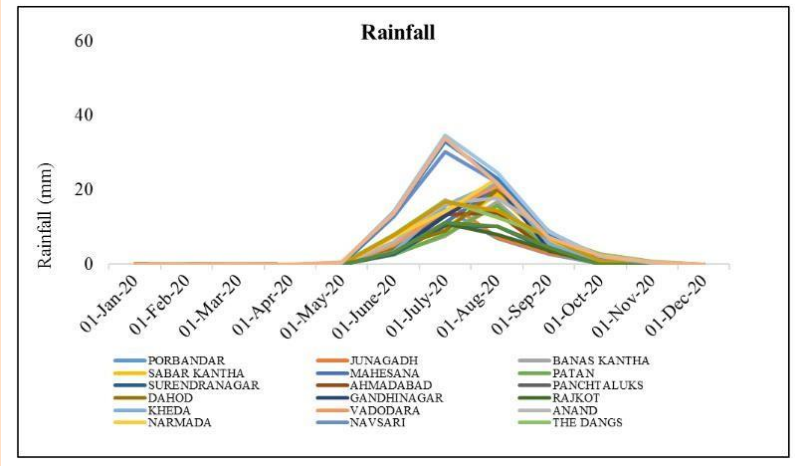


Figure 4. Spatial representation of monthly Rainfall over India and temporal dynamics for the study districts in 2020

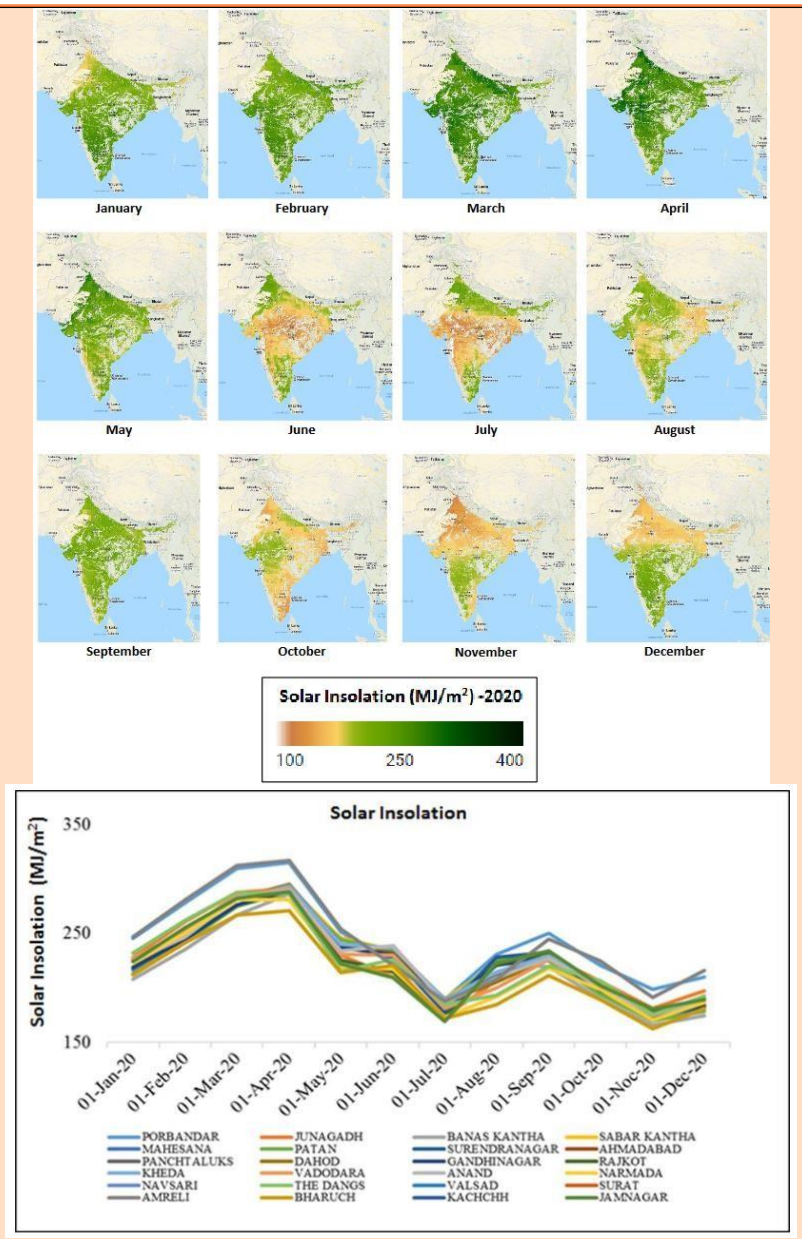


Figure 5. Spatial representation of monthly Solar Insolation over India and temporal dynamics for the study districts in 2020

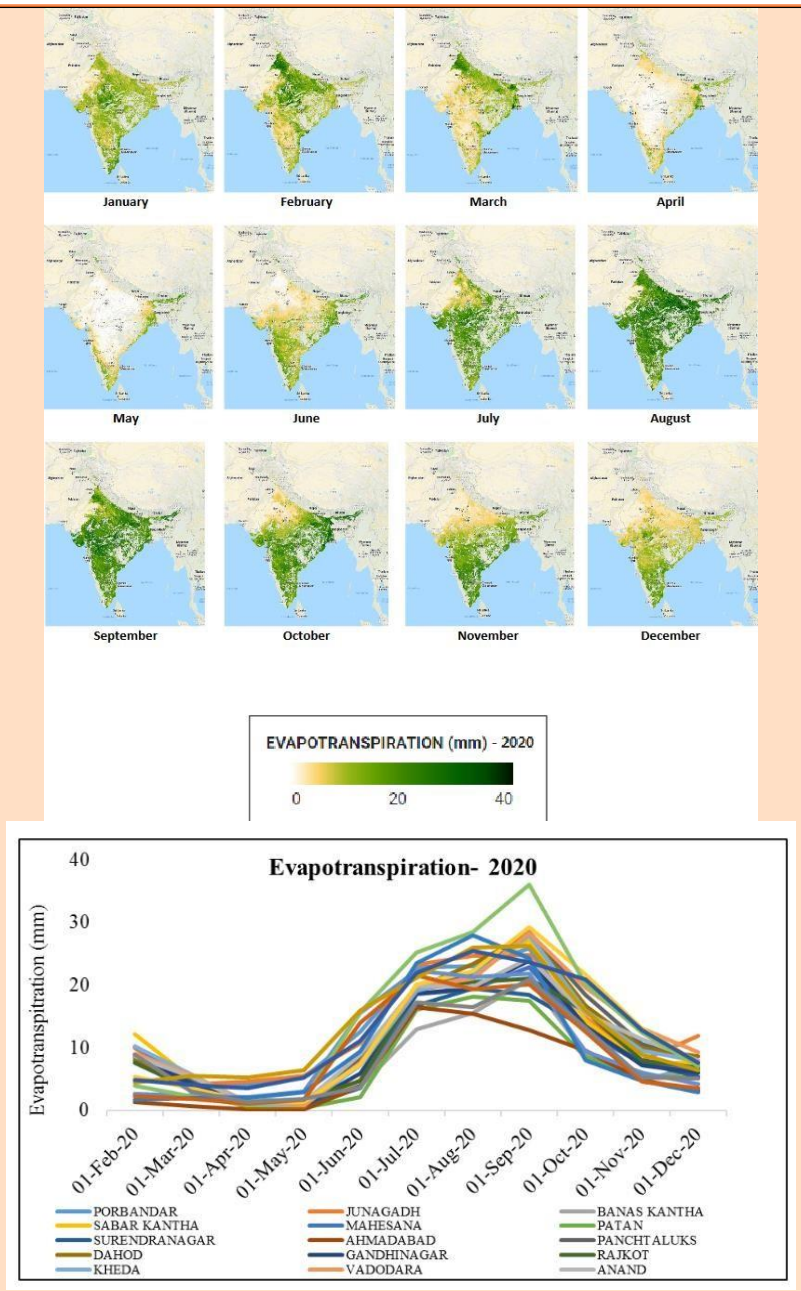
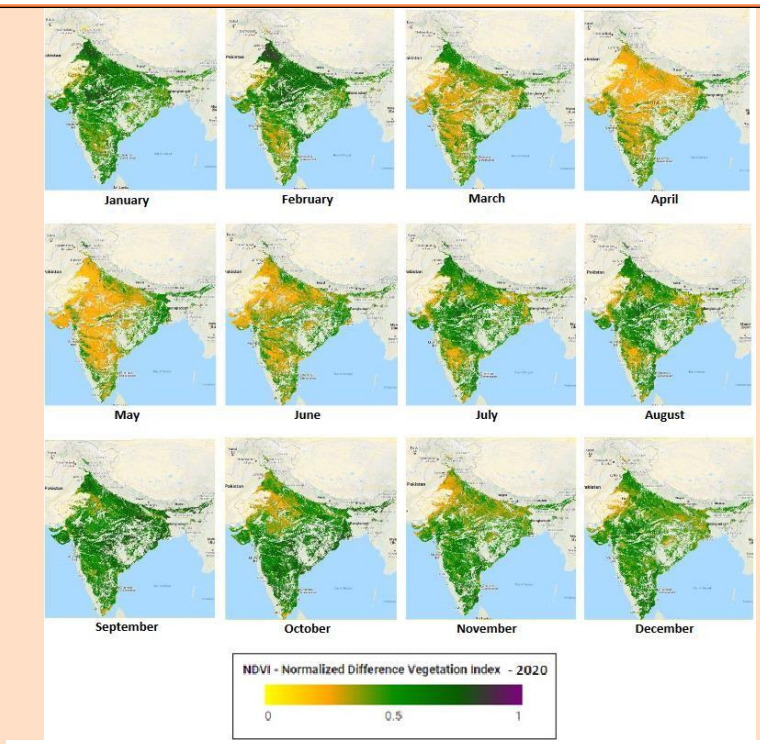


Figure 6. Spatial representation of monthly Evapotranspiration over India and temporal dynamics of study districts in 2020

Vegetation Controls:

In order to analyze the variations in the time series pattern of the spectral indices as well as the environmental variables, data were extracted through GEE. District-wise time-series data for Gujarat study districts was generated for some of the vegetation indices (NDVI, EVI, NDWI) and Land Surface Temperature (LST). Distribution for the monthly variability of the vegetation indices and LST is exemplified for the year 2020. The same exercise was repeated for the past fifteen years. Districts contributing their highest for each parameter can thus be demarcated by this method.



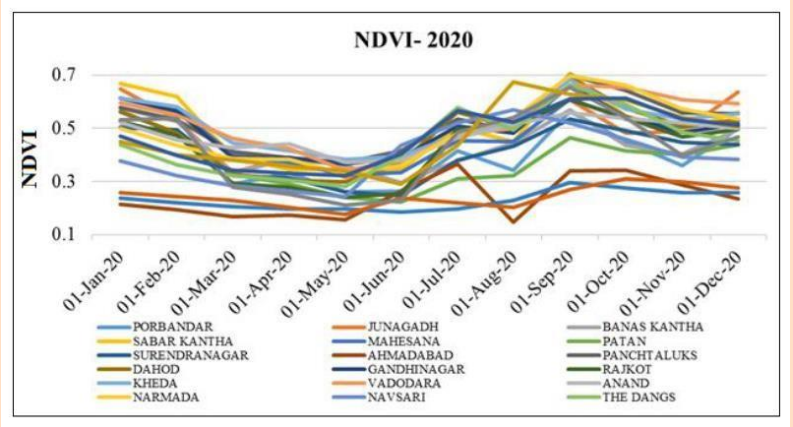
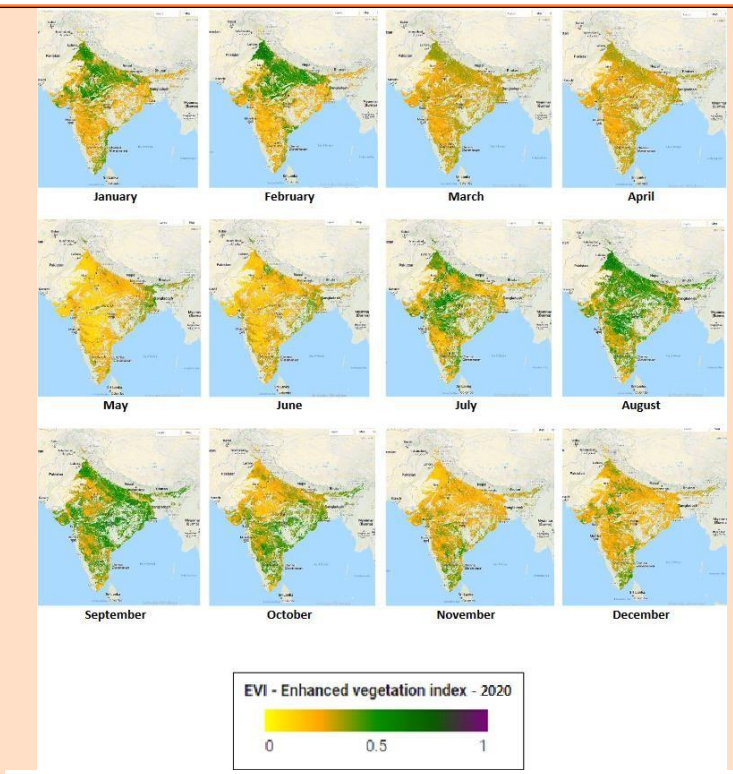


Figure 7. Spatial representation of monthly NDVI over India and temporal dynamics of study districts in 2020



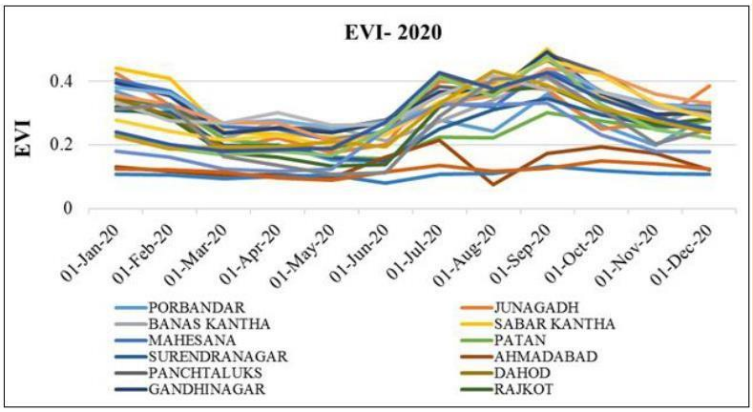
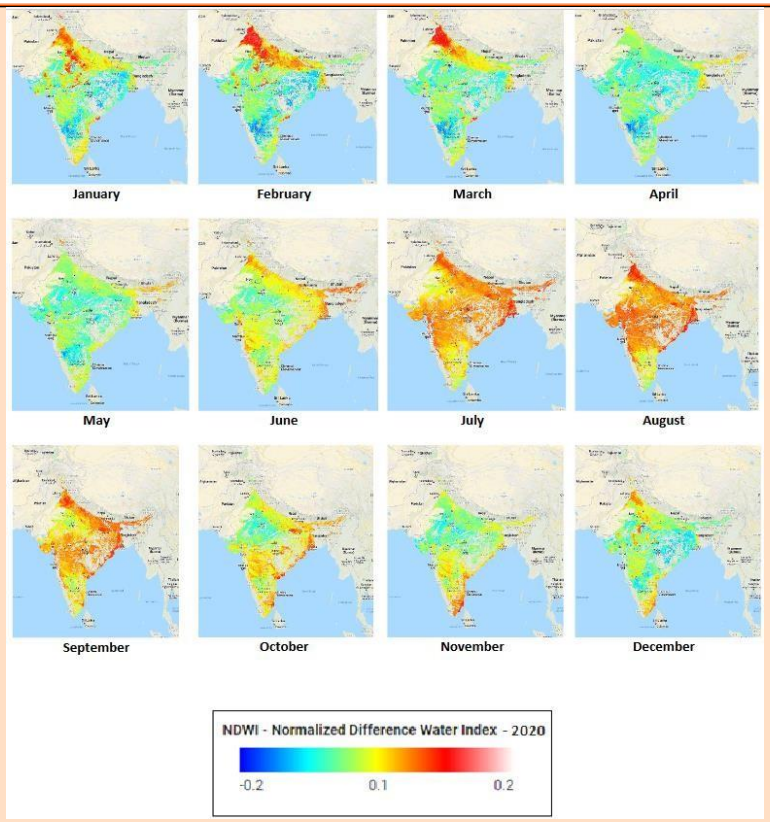


Figure 8. Spatial representation of monthly EVI over India and temporal dynamics of study districts in 2020



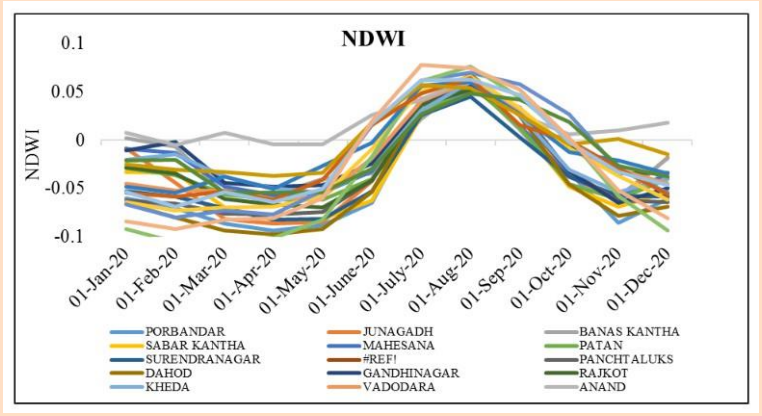
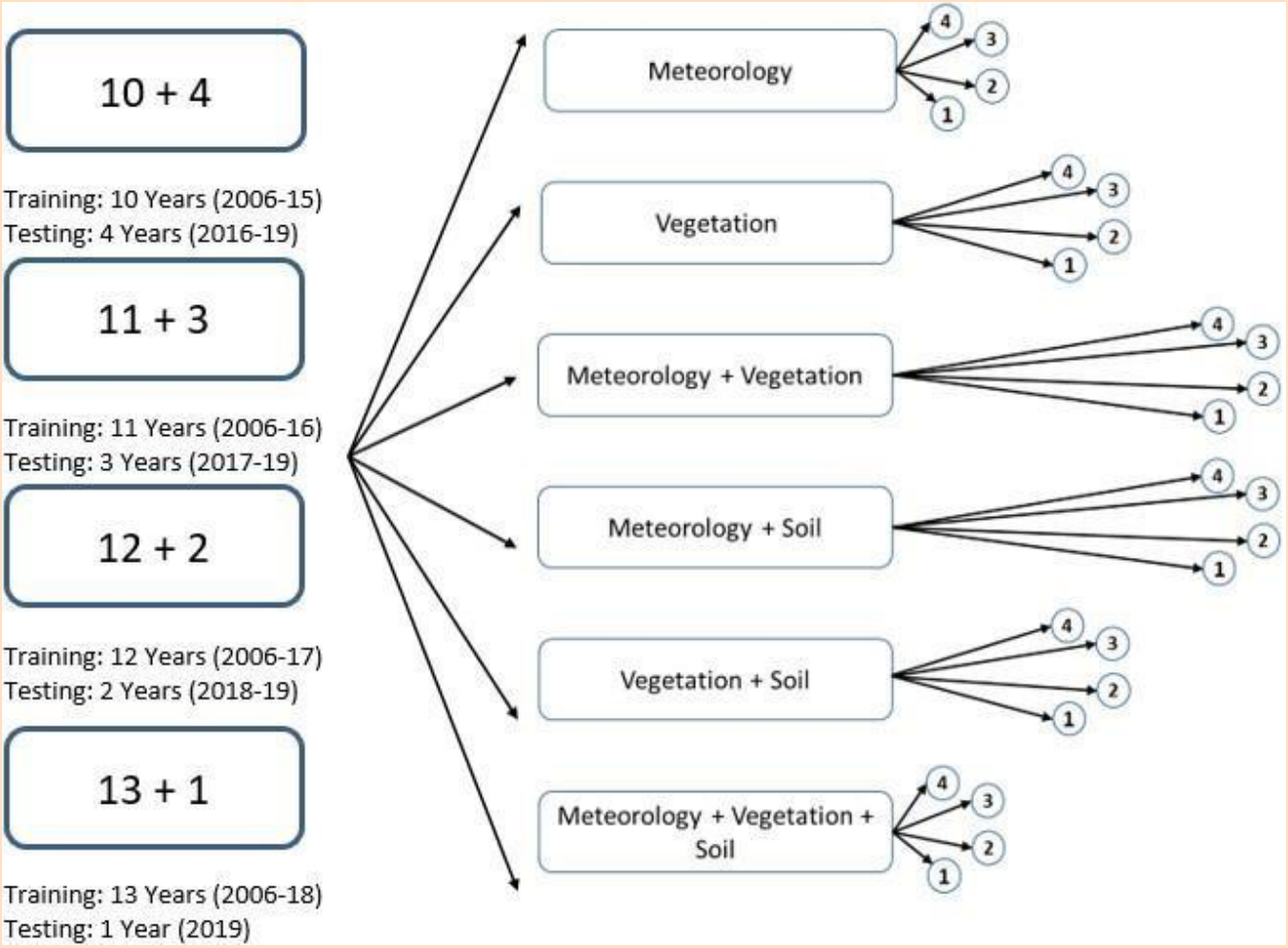


Figure 9. Spatial representation of monthly NDWI over India and temporal dynamics of study districts in 2020

4. Case study of Groundnut Crop

Total two major districts Junagadh and Rajkot are considered for this study. The machine learning algorithm is developed using various satellite derived parameters for 2006-2020 (14 years). Four scenarios are generated with different combinations of parameters to get area and production of the crop. Development of model for the different crops are done using R software platform.



(4) June, July, August and September

(3) June, July and August

(2) June and July

(1) June

- Meteorology: Rainfall, Solar Radiation
- Vegetation: NDVI, EVI, NDWI
- Soil: bdod, nitrogen, ocd, ocs, cec, sand, silt, clay, phh2o, soc and cfvo

The models were run for 5 min, 10 min, 1 hr, 2 hr, 3 hr, 6 hr, 8 hr, 10 hr, 12 hr. in various 96 combinations. The area and production were generated as the output of the models using machine learning algorithms. The best outcome was observed with the combination of all three parameters *viz.* Meteorology + Vegetation + Soil. The data of area and production of the crop generated using temporal satellite data are compared with the published data of Government of India collected from Directorate of Economics and Statistics , Ministry of Agriculture, GOI (https://eands.dacnet.nic.in/)

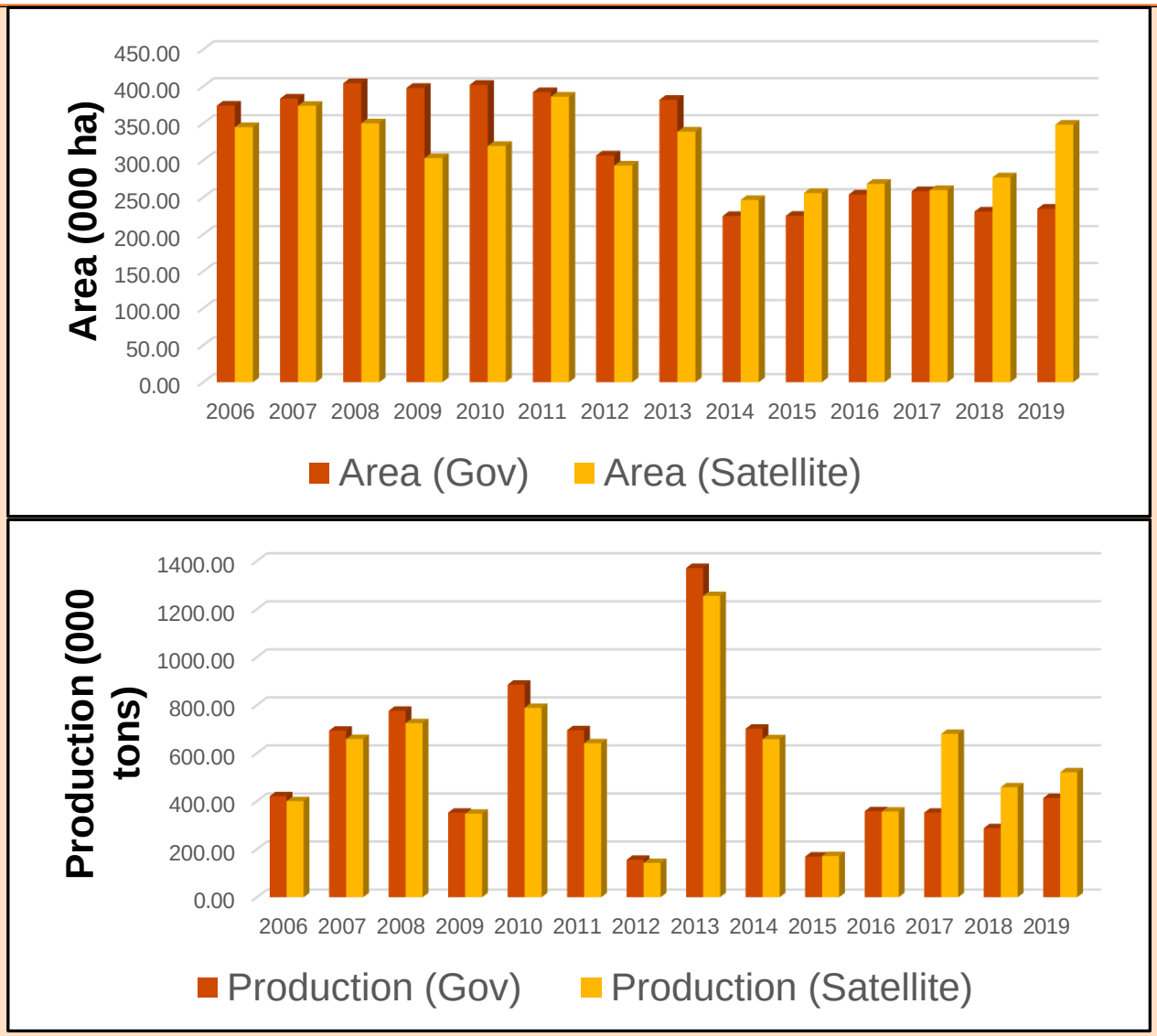
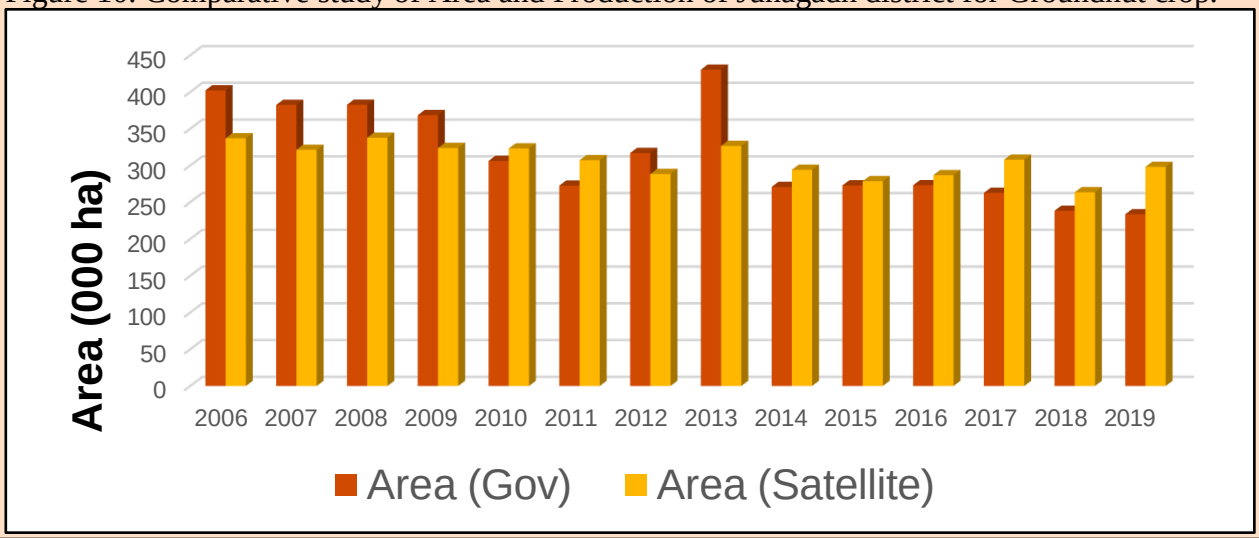


Figure 10. Comparative study of Area and Production of Junagadh district for Groundnut crop.



<<Name of the AU: Anand Agricultural University, Anand, Gujarat >

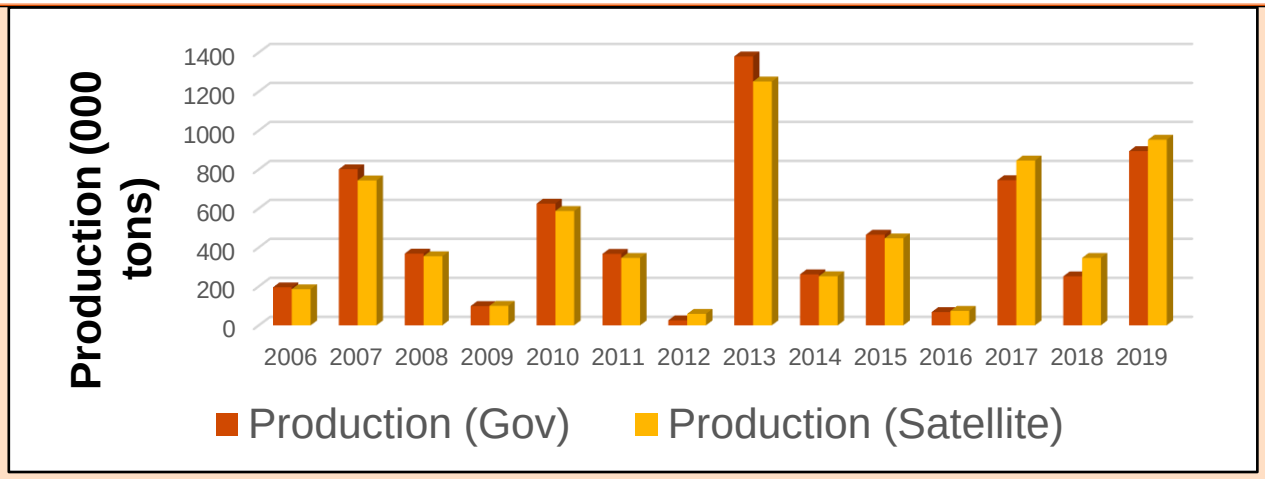
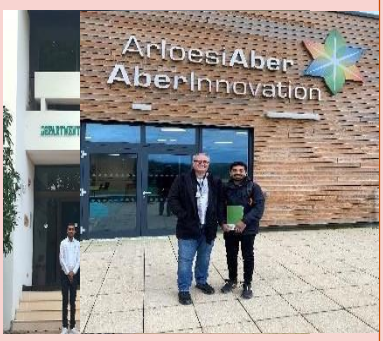


Figure 11. Comparative study of Area and Production of Rajkot district for Groundnut crop.

It is observed that, there is good matching of satellite derived data of area and production with the actual data published by GOI every year with approx. 5-15% difference. The calibration process of model is ongoing by taking other important parameters in consideration like crop mask and discrimination techniques to reduce the effect of other crops or land features in near proximity to make it more robust so that, it can be utilized for other districts growing the same crop not only in Gujarat state but in other states of India also. The final data of area and production after model validation will be utilized for establishing the relation with various parameters e.g crop, soil and weather affecting production and ultimately yield which are very important for deciding price.

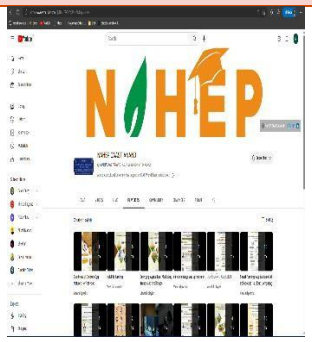
The efforts are being made to develop the multivariate model for price forecasting model including all the possible variable developed based on satellite data and marketing parameters. The results are encouraging and the model is under validation stage.

b) Knowledge management and outreach initiatives (development of collaterals, newsletter, social media outreach activities, creation of website, experiential learning workshop, exposure visits,
(provide the details of the documents/articles/reports/modules/social media outreach/ website creation/experiential learning workshop/exposure visits etc. developed under NAHEP along with the suitable photograph of the cover-page and web-link (if available) – brief summary, cover page,

S.N	Category of the collateral	Brief summary	Snapshot/cover page	Weblink (if any)
1	Foreign Exposure Visit- 40 PG Students.	40 PG students have completed training in 9 foreign institutions. These includes IRRI-Philippines, CIMMYT- Mexico, IWMI-Nepal, Prifysgol Aberystwyth University- UK, Western Sydney		

		University, Australia, Sabaragamuwa University of Srilanka, Teagasc Food Research Centre- Ireland, AIT- Thailand, Ben-Gurion University of the Negev- Israel.	 	
2	Foreign Exposure Visit- 21 Faculty Members	21 faculty Members have completed their training in in 11 foreign institutions. These includes The Royal Veterinary College, University of London-UK , CSIRO Land and Water flagship laboratory- Australia, Teagasc Food Research Centre, Ashtown- Ireland, Obihiro University of Agriculture & Veterinary Medicine- Japan, Global Change Research Institute-Czech Republic, The	 	

		National Geological Surveys for Denmark and Greenland (GEUS), Denmark, Prifysgol Aberystwyth University- UK, International Rice Research Institute (IRRI)- Philippines, Asian Institute of Technology (AIT)- Thailand, McGill University- Canada, WSU- Australia		
3	NAHEP-CAAST AAU Website	The nahep-caast.aau.in website is a comprehensive resource for agricultural education and research in India. It features a wide range of content related to agriculture, including research papers, videos, and e-books, and provides updates on the latest news and events related to the program and agricultural education in India. The website is easy to navigate and provides information on the program's different activities, participating universities, research areas, and facilities available. Overall, the website is a valuable resource for anyone		http://nahep-caast.aau.in

		interested in agricultural education and research in India and helps promote collaboration and knowledge sharing among agricultural universities in the country.		
4	You Tube channel	The YouTube channel has been especially useful during the COVID-19 pandemic for conducting various online programs targeting students, farmers, and faculty. With the restrictions on physical gatherings, the channel has enabled the NAHEP-CAAST project to continue its mission of promoting agriculture entrepreneurship in rural communities in India. The channel features videos of training programs, workshops, and stakeholder engagement events that can be accessed remotely by participants. The videos are in the local language and in other language like English & Hindi making them accessible to a wider audience,		https://www.youtube.com/nahepcaastanand

		and cover a range of topics related to agriculture entrepreneurship, such as best practices, new technologies, and business models. The channel has been particularly helpful for students and researchers who can access valuable resources and training materials from the comfort of their homes. Overall, the YouTube channel has played an important role in continuing the project's activities and supporting stakeholders.		
..				

c) Unique initiatives undertaken

1. Digital infrastructure

(development of digital/smart classroom, virtual reality facility, digital library system, other digital education and administrative infrastructure, Agri Diksha, AMS implementation etc.)

- **Developed Smart Classroom:** The Centre for Agricultural Market Intelligence has developed one smart classroom for enhancing the teaching and learning experience for students. It offers benefits such as interactive learning, visual aids, collaborative learning, personalized learning, better engagement, and access to digital resources.

- **Developed Digital Library System:** The Centre for Agricultural Market Intelligence has developed Digital Library System which offers students easy access to a wide range of resources, efficient search, cost-effectiveness, customizable learning, and collaborative learning opportunities.

2. Digital initiatives:
(organizing trainings through online, conducting online examinations, administering attendance, developing of web applications, e-learning modules etc.

S.N	Category of the collateral	Digital initiative	Practice before introduction of the initiative	Practice after introduction of the initiative
1.	Online training	Capacity building programmes have been conducted through online platform like Zoom and Google meet	Earlier offline programmes were conducted.	Online and offline programmes organize for the PG students and faculty members. More number of participants can be enrolled through this initiative.
2	Web applications	Web application on i-Kisansetu has been developed.	-If farmers need to have information on practices and markets, they have to visit APMC or through other mode. -For getting feedback from the farmers, there is need to visit individual farm.	-Now, farmers can get the information on package of practices through application which is prepared based on scientific recommendations. -Through this application, we can take the feedback from the farmers and we can modify our modules/information according to conditions/requirement and can change the behavior of farmers.
3	e-learning modules	Total 36 applications have been selected from the university for the development of course contents, reviewers, revisors under component-2 of NAHEP	Faculties were mainly involved in developing and publishing hard copies of the contents which were not only time consuming and costlier but also access a smaller number of readers.	
4	AAU Academic / Exam Management System	AEMS	The student's admission and registration procedure were offline mode.	The admission and registration process are fully online mode which easier for the students, teachers and administration / examination section for result preparation and maintaining students academic and examination related records.
5	Online Examination System	OES	The examination was conducted through offline mode	The examination is conducting online mode which easier for the students,

				teachers and examination section for result preparation and maintaining examination related records.
6	Mobile Apps for Farmers	i-Khedut Portal	The farmer had difficulty to get the crop related information	All the farming related information of various crops are available in this portal for farmers in local language.

Please provide up to 15 photographs with high quality (minimum 1-2MB) and label with suitable caption. Attach the photographs separately in the mail.

3. Potential impact of the intervention:

Observation

<<Please provide the explanation on potential impact of the intervention in short and long term while illustrating the key initiative/activity. Also, relate how input turned into output→outcome→impact in brief sentence or graphical way. Consider one or two examples/cases etc, >>

Activity/objective	Output/outcome
1. Centers established	1. One center under NAHEP-CAAST (This centre has been made permanent by the Government of Gujarat under Plan scheme
2. Price forecasting	2. Total 29 price forecast have been prepared and disseminated through various platforms
3. MoUs established	3. Total 6 MoUs have been executed.
4. Number of Applications development for dissemination	4. Total Three Applications have been developed.
5. Capacity building programme	5. Total 122 Capacity building of students/ trainings /skill development / entrepreneurial activities, Faculty upgradation trainings conducted and total beneficiaries= 84836 including 45560 PG students, 20641 faculties and 18635 others. -Total 40 PG students and 21 Faculty members have undergone international training at 15 various institutions of 13 countries. They have gone through research during their visit which is expected eventually, to quality of teaching and research.
6. Technical guidance to PG students in the broad area of Agricultural Market intelligence	6. Total 28 PG students have completed their research work in the broad area of Agricultural and allied sector with particular focus on Market intelligence.
7. Extraction and procurement satellite data	7. Satellite data have been procured and are being used for hybrid modelling for price forecast.

Impact

1. Two PG students have completed research work based on price forecast. Out of that, One PG student got best thesis award at university.
2. Three PG students have undertaken research on Demand and Supply projection, they are equipped with knowledge of demand modelling including elasticities calculation. Good quality publications will be emerged from the study.
3. PG students and faculties are acquainted with advanced techniques in the research and it will be helpful in drawing further new frontier of research. Through foreign visit, students and faculties learned new emerging research techniques and this will be helpful in future to enhance farmers' income.
4. Hybrid model based on satellite data will be helpful to make price forecast more robust.

Challenges faced and lessons learned while implementing the project at AU:

Challenges	
1	Faced difficulty during covid period in conducting comprehensive probing based primary surveys which needs visiting various places and meeting people and records their responses.
2	Some training programmes (offline) needing hands on practices are hampered.
3	Payment through PFMS system is well in place. However, in some cases payment through the system is causing some problem.
4	Ample power to the PI without clear procedures in some cases took undesirable more time in consultation with NAHEP office, New Delhi and concerned officers at SAUs.
Lessons learned	
1	The centre has received very encouraging response from students and faculties. According to them the information and skills gains from the capacity building programme is helpful them for their career growth.
2	To gain the potential benefit of market intelligence, promotion and encouragement of FPO is vital.
3	Training programmes on quantitative analysis pertaining to price forecast and demand and supply with hands on practice are of prime importance for PG students and faculties for their application for their research concern.
4	Training and skills in conducting online surveys is vital and needs focused attention.
5	Students and faculty members have learnt new frontier areas of research and techniques in international training components.
6	International exposure of PG students & faculty members in the premier institutions of the world and inviting and getting benefit of senior resource persons for training have been possible due to adequate availability funds under NAHEP project. It is very difficult to get such benefits under other routine activities/projects of the university.
7	Huge statutory powers given to the PI and likely given by the visionary leadership at the SAUs are vital factors for the success of the project.

4. Sustainability Plan

4.1. Sustainability plan of the AU

- *Does the AU have any sustainability plan for to make AU future ready and globally recognized? (**Yes** / No)*
- *If yes, details thereof?*

1	The Centre has developed expertise in all areas of Agriculture Market Intelligence. More particularly. in the area of: 1. Price forecast 2. Demand & Supply Projections 3. Impact Assessment for farmers' institutions 4. Projections of Area, Production and Prices based on satellite data by using AI & ML.
2	Based on the work done under the centre, Government of Gujarat has made the "Centre for Agricultural Market Intelligence", a permanent center under plan scheme 2023-24.

4.2. Sustainability plan for improving internal revenue generation through facilities and infrastructure created under the project

1	The Centre can design and conduct capacity building programs on chargeable basis in all areas of Agricultural Market Intelligence.
2	Based on the infrastructure facilities created and performance, the centre has been made a permanent by the Government of Gujarat with regular staff and independent budget allocation. This is the right step taken by the Government of Gujarat to make this centre sustainable in the long run. Now, the centre can do, *inter alia*, collaborative research and capacity building programme with other premier institution and generate revenue.
3	Based on above the Centre would provide consultancies and charge based capacity building programs. This will help Centre to become sustainable.

5. Contribution of each individual in project

5.1. Name of Vice Chancellors(s) during project duration and contributions each PI, Co-PI and team along with their photographs

Name	Gender	Designation in AU and contact details (email, mobile)	Role in project (PI/Co-PI/RA/SRF etc.)	Major contribution/output
Group I				
 Dr. K. B. Kathiria	Male	Regular Vice Chancellor (From 03-03-2021) I/c Vice Chancellor (From 07-08-2019 to 31-08-2019)	-	-
 Dr. R. V. Vyas		I/c Vice Chancellor (From 01-09-2019 to 15-02-2021)	-	-
 Dr. N.C. Patel		Vice Chancellor (Up to 06-08- 2019)	-	-
 Dr. R. S. Pundir	Male	Principal & Dean, IABMI and PI, NAHEP CAAST, AAU, Anand Mob: 9429252540 Email: rspundir@aau.in	Principal Investigator & Core Co-PI	Study: 1. Price Forecasting of Agricultural Commodities 2. Demand and Supply Projection of Agricultural Commodities in India 3. Demand and Supply Projection of Fish (Inland & Marine) in India 4. Demand and Supply Projection of Milk & Milk products in India 5. Price behavior and market integration

				6. A study on Operations of e-NAM at Gujarat 7. An Economic analysis of marketing of selected crops of Gujarat 8. Enhancing Agricultural Market Intelligence using Digital Knowledge Agribusiness Ecosystem platform for generating primary digital continuous data streams **Contribution:** • Principal investigator ensures that the studies proceeds smoothly, and any obstacles or issues are addressed in a timely manner • Weekly progress meetings should be held to examine the status of current projects and initiatives. Use statistical tools and techniques to analyse data for research studies. • Finalize study draft in accordance with defined Objective, including primary data analysis and interpretation. • Coordinate with consultants to analyse and improve study draft to ensure standard and quality of all study report. Moreover, finalize study draft and report by incorporating feedback and making any necessary modifications. • Write research papers, books, and articles for reputed journals. • Organize capacity-building workshops and international conferences aimed at enhancing participants' knowledge and abilities.
 **Dr. D. R. Kathiriya**	Male	Professor and Core Co-PI, NAHEP-CAAST, AAU, Anand Email: drkathiriya@aau.in	Core Co-PI	Study: 1. Timely dissemination of market intelligence through various sources including customized Apps 2. Hybrid model development through machine learning by using secondary and satellite data for making more robust price forecasting. 3. Enhancing Agricultural Market Intelligence Using Digital Knowledge Agribusiness Ecosystem Platform for Generating Primary Digital Continuous Data Streams Contribution:

				• Core Co-PI coordinate and monitor the different activities of the group and ensures that the activity proceed smoothly, and any obstacles or issues are addressed in a timely manner. • Arranging weekly progress meeting and discuss about the progress of the different activities of the group and analysis the weekly progress report. • Write popular articles, research papers, etc. for reputed journals. • Organize capacity-building programmes / certificate course aimed at enhancing participants' knowledge and abilities. • Constant monitoring and technical support or feedback for the smooth operation of all NAHEP Centre technical activities
 **Dr. Samit Dutta**	Male	Principal and Dean College of Food Processing Technology and Bio-Energy, A.A.U., Anand Email: samit@aau.in Mob:9426500816	Core Co-PI	As a Core Co-PI, Dr. Samit has checked all the reports overall and gave his expert opinions that helped the team understand the inferences in a better way, provided timely guidance at each step and regulate that the tasks divided under the project are going on timely basis. He also coordinated external activities wherever we needed any facilitations with traders, experts, consultant or industries. He streamlined all the activities and ensured the timely completion of the given tasks.
 **Dr. F. P. Savaliya**	M	Research Scientist & Head Poultry Research Station, Kamdhenu University, Anand Gujarat-388110 Email: fpsavaliya@yahoo.com, fpsavaliya@aau.in Phone: 02692-262352 Mobile: +919537913412	Core Co-PI	Overall supervision and coordination for the Livestock and Poultry Group.

 **Dr. Y. A. Lad**	Male	Associate Professor & Head, IABMI, AAU, Anand Email: yalad@aau.in Mo: 9427105990	Core-Co PI	• Organize capacity-building prhrams, workshops and international conferences aimed at enhancing participants' knowledge and abilities. • Overall supervision and guidance provided in all capacity building programs • Actively involved in all HR and Administrative activities of the project • Member of the procurement committee of the project • Coordinator of the PMTS data management
 **Dr. Snehal Mishra**	Female	Assistant Professor, Institute of Agribusiness Management, AAU, Anand Mob: 8840364598 Email:snehalmishra@aau.in	Core Co-PI (From Nov 2019 to 2021) Co-PI (Since Dec 2022)	Study: 1. Price Forecasting of Agricultural Commodities 2. Demand and Supply Projection of Agricultural Commodities in India 3. Demand and Supply Projection of Fish (Inland & Marine) in India 4. Demand and Supply Projection of Milk & Milk products in India 5. Price behavior and market integration 6. A study on Operations of e-NAM at Gujarat 7. An Economic analysis of marketing of selected crops of Gujarat **Contribution:** • Prepare study proposals • Examine the secondary data collected by RA and SRF on demand and supply. • Coordinate activity related to e-NAM such as primary survey, questionnaire, data analysis and report writing • Review price forecasting advisories
 **Dr. Ganga Devi**	Female	Assistant Professor, Department of Agril. Economics, AAU, Anand Mob: 8733070090, Email: drganga@aau.in	Core C-PI & Co-PI	Study title: "Market Potential and Trade Competitiveness of Selected Agro-commodities in India" "Price Volatility, discovery and hedging benefits of Agricultural commodity futures market in India". "Mapping and Performance analysis of FPOs in western region of India" Contribution: Effectively coordinating with the principal investigator, to the study progresses smoothly, and any challenges or issues are addressed in a timely manner, ultimately

				contributing to the successful completion of the study. Facilitate weekly progress meetings to review the status of ongoing projects and initiatives. Utilize statistical tools and techniques in conducting data analysis for research studies. Finalize drafts of studies, including data analysis and interpretation, in accordance with established guidelines and standards. Collaborate with consultants to review and refine drafts of studies, ensuring accuracy and quality. Finalize the drafts of studies by incorporating feedback and making necessary revisions. Prepare and finalize research papers or publications for dissemination in reputable journals or conferences. Organize and coordinate capacity-building programs aimed at enhancing the knowledge and skills of the organization's workforce.
 **Dr. Shakti Ranjan Panigrahy**	M	Assistant Professor & Head, Department of Operations Management, IABMI, AAU, Anand Email: shaktirp@aau.in Mobile: 08200631364	Core Co-PI & Co-PI	Formulation of work details, planning and implementation of fisheries group activities. Overall monitoring and control of the group activities, quality check and evaluation of different staffs working in the particular group. Member for the activities related to poultry marketing. Work includes research proposal preparation, schedule preparation, data collection, report preparation and other Human resource development activities
 **Dr. Ritambhara Singh**	Female	Assistant Professor, Institute of Agribusiness Management, AAU, Anand Mob: Email:	Core co-PI (2019-2021)	Study title: "Market Potential and Trade Competitiveness of Selected Agro-commodities in India" "Price Volatility, discovery and hedging benefits of Agricultural commodity futures market in India". "Mapping and Performance analysis of FPOs in western region of India" Contribution: The proposals for all three studies have been finalized, incorporating feedback from relevant stakeholders and ensuring alignment with research objectives and budgetary considerations. Played a key role in designing the detailed research activities and methodology for the studies, engaging in comprehensive discussions with the research team and

				other stakeholders to ensure a robust and rigorous approach. Successfully published a sectorial report on the cotton and maize commodities, which involved extensive data analysis, market research, and synthesis of findings to provide valuable insights to stakeholders and inform decision-making. Organized six capacity-building programmes aimed at enhancing the skills and knowledge of participants in areas such as research methodology, data analysis, and report writing, contributing to their professional development and improving their performance. Help in finalize of commodity reports. As an expert in commodity market and price volatility, she helps in designing and preparation of research proposal related to price behavior and price forecasting
 **Dr. B. K. Bhattacharya**	Male	Head, Agriculture & Land Ecosystem Division (AED), Biological and Planetary Sciences Group, Earth Ocean Atmosphere Planetary Sciences and Applications Area, Space Applications Centre, ISRO, Ahmedabad Mob: 9427521076 Email: bkbhattacharya@sac.isro.gov.in	Co-PI	Study: 1. Hybrid model development through machine learning by using secondary and satellite data for making more robust price forecasting. Contribution: Provide support and guidance with satellite data processing and model development using machine learning.
 **Dr. D. J. Parmar**	Male	Associate Professor, Department of Agricultural Statistics, AAU, Anand Mob: 9662527810 Email: djparmar.a@gmail.com	Co-PI	**Contribution:** Usage in statistical tools and Data analysis

 **Dr. K. S. Jadav**	Male	Professor and Head, Department of Agricultural Economics AAU, Anand Mob: 9601571629 Email: ksjadav@gmail.com	Co-PI (2019-2022)	**Contribution:** Assisting in design study proposal. Data Analysis and capacity building programme
 **Ms. Rucha Dave**	Female	Assistant Professor, Department of Basic Science and Humanities, BACA, AAU, Anand Mob: 9998467753 Email: rch.dave1@gmail.com	Co-PI	Study: 1. Hybrid model development through machine learning by using secondary and satellite data for making more robust price forecasting. Contribution: • Provide support and guidance with satellite data processing and model development using machine learning. • Planning and executing various capacity building programmes
 **Dr. Priti Kumari**	Female	Assistant Professor, Department of Agricultural Statistics, AAU, Anand Mob:7573027476 Email: psingh2506@aau.in	Co-PI	Study: 1. Price Forecasting of Agricultural Commodities Contribution: • Develop price forecasting model and review price forecasting analysis • Help in Preparing of research proposal on price forecasting. • Provide support for model development using machine learning • Planning and executing various capacity building programmes
 **Dr. Rachana Bansal**	Female	Assistant Professor, Department of Agril. Economics, AAU, Anand Mob: 7383340483, Email: rkbansal@aau.in	Co-PI	e Volatility, discovery and hedging benefits of Agricultural commodity futures market in India" . Contribution: Assisted in conducting data analysis and preparing drafts for research studies, ensuring accuracy and adherence to established guidelines. Collaborated with consultants to review and refine drafts of studies, incorporating feedback and suggestions to improve quality. Provided support in the preparation and finalization of research papers or publications, ensuring compliance with

				relevant publishing standards and guidelines. Organize and coordinate capacity-building programs
 **Dr. Raees Rajpura**	M	Assistant Professor, Department of Animal Science, BACA, AAU, Anand Email: raisvet@aau.in Mobile: 9408423121	Co-PI	Coordinator for the activities related to poultry marketing. Work includes research proposal preparation, schedule preparation, data collection, report preparation and other Human resource development activities.
 **Dr. Dilip R. Vahonoya**	M	Assistant Professor & Head, Department of Agri-entrepreneurship and Project Management, IABMI, AAU, Anand Email: dilip_iabmi@aau.in Mobile: 09712951952	Co-PI	Coordinator for the activities related to Goat marketing. Work includes research proposal preparation, schedule preparation, data collection, report preparation and other Human resource development activities. Contribution to the preparation and publication of a review paper for goat marketing. Contributed to the preparation of a Directory for commercial goat farms in Gujarat. Negligible work contributions for the fishery group. Only few meetings were attended during this period
 **Dr. Ashish Mahera**	M	Assistant Professor & Head, Department of Marketing Management, IABMI, AAU, Anand Email: ashish.mahera@aau.in Mobile: 09662648870	Co-PI	Member for the activities related to Goat marketing. Work includes research proposal preparation, schedule preparation, data collection, report preparation, and other Human resource development activities. Contribution to the preparation and publication of a review paper for goat marketing. Contributed to the preparation of a Directory for commercial goat farms in Gujarat. Negligible work contributions for the fishery group. Only few meetings were attended during this period
	Male	Assistant Professor vinayhm11@gmail.com Mob No: 8867576011	Co-PI (2019- Jan, 2023)	Helped in data collection, report evaluation, linkage with external experts, research paper writing and attend regular meeting. capacity building programs along with Webinars and Guest Lectures Actively involved in preparation of evaluation reports and progress reports

DR. VINAYA KUMAR, H. M.				
 **Dr. D. K. Parmar**	Male	Assistant Professor, College of Agricultural Information Technology, AAU, Anand Mob: 9909417451 Email: dkparmar@aau.in	Co-PI	Study: 1. Hybrid model development through machine learning by using secondary and satellite data for making more robust price forecasting. Contribution: • Provide support for handling of Satellite datasets Planning and executing various capacity building programmes
 **Dr. M. R. Prajapati**	M	Associate Professor & Head, IABMI, AAU, Anand Email: mrprajapati@aau.in Mo: 9726869279	Co PI	Organize & preparation of capacity building programs along with Webinars and Guest Lectures
 **Dr. Chetan R. Dudhagara**	Male	Assistant Professor and Head, Department of Communication & Information Technology, IABMI, AAU, Anand Mob: 9825151390 Email: drchetan@aau.in	Co-PI	Study: • Timely dissemination of market intelligence through various sources including customized Apps • Hybrid model development through machine learning by using secondary and satellite data for making more robust price forecasting. • Enhancing Agricultural Market Intelligence Using Digital Knowledge Agribusiness Ecosystem Platform for Generating Primary Digital Continuous Data Streams Contribution: • Provided inputs at various level for creating NAHEP Centre's website and mobile applications • Provided technical guidance for conducting online webinar / seminar / certificate course and lectures using Zoom and YouTube live streaming platform • Provide technical support and guidance regarding the any software and hardware installation and network related issues

				• Coordinating the development of Digital Knowledge Agribusiness Ecosystem Platform in collaboration with WSU for the development of iKisansetu mobile app • Planning and executing various capacity building programmes including webinars / seminar / lecture series / workshops / certificate courses, etc. • Provide guidance for publication of popular articles and paper.
 **Dr. M. M. Lunagaria**	Male	Associate Professor & Head, Department of Agril. Meteorology, BACA, AAU, Anand Mob: 8140000817, Email: ml@aau.in	Co-PI	Study: 1. Hybrid model development through machine learning by using secondary and satellite data for making more robust price forecasting. Contribution: • Provide support and guidance with satellite data processing and model development using machine learning.
 **Dr. A. K. Makwana**	Male	Associate Professor Dairy Business Management Kamdhenu University, Anand Mob: 9898273887 Email: akmakwana@kamdhenuuni.edu.in	Co-PI Dairy objective	Dr. Makwana based on his 25 years of experience, knows the complete dairy industry and so his expertise was utilised to check and authenticate and validate the field data collected from various sources. He also helped us to improvise the reports by connecting with various industry experts
 **Dr. M. D. Gurjar**	Male	Assistant Professor Dairy Business Management Kamdhenu University, Anand Mob: 9313283885 Email: mahendradgurjar@kamdhenuuni.edu.in	Co-PI Dairy objective	Dr. Gurjar has 1. prepared the schedules for survey 2. prepare the dairy commodity reports 3. compiled and prepared the final reports of the dairy objectives. 4. He is actively working on the paper publications for the Dairy part of the project. He also helped the research team to understand the broad perspective and write the inferences for the information collected.

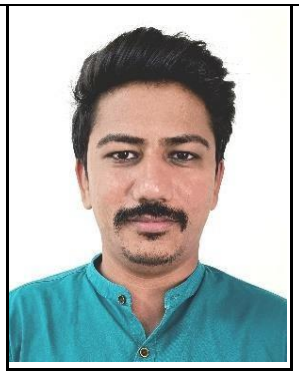
 **Ms. Vishita Khanna**	Female	Assistant Professor HRD and Personnel Management, IABMI, AAU, Anand Mob: 8401592671 Email: vishitakhanna@aau.in	Co-PIs Food Objective	She has guided the research team on how to 1. prepare the schedules for survey of food objective 2. She helped the research staff on how the interviews are done and its techniques like probing 3. compiled and prepared the final reports of the food objectives. 4. She is actively working on the paper publications for the Food part of the project. She also helped the research team to understand the broad perspective and write the inferences for the information collected. capacity building programs along with Webinars and Guest Lectures Actively involved in preparation of evaluation reports and progress reports
 **Dr. Jignesh Macwan**	Male	Research Associate NAHEP, AAU, Anand Mob:9737116096 Email: macwanjignesh@contractualemployee.aau.in	RA	Study: 1. Price Forecasting of Agricultural Commodities 2. Demand and Supply Projection of Agricultural Commodities in India 3. Demand and Supply Projection of Fish (Inland & Marine) in India 4. Demand and Supply Projection of Milk & Milk products in India 5. Price behavior and market integration 6. A study on Operations of e-NAM at Gujarat 7. An Economic analysis of marketing of selected crops of Gujarat 8. Enhancing Agricultural Market Intelligence using Digital Knowledge Agribusiness Ecosystem platform for generating primary digital continuous data streams **Contribution:** • Prepare and Formalize cumin and potato commodity report • Review and formalize the price forecasting model and advisories for cotton, cumin, and potato. • Coordination of demand and supply study lecture with consultant, assessment of secondary demand and supply data, and report • Report writing and review the market integration analysis • Coordinate all activity relate to economic analysis such as questionnaire, primary survey, data analysis and report writing.

				• Prepare package of practices (POP) for potato crop and secondary data collection for joint project with Western Sydney University (WSU) • Coordinate and finalize student and faculty foreign visit under NAHEP-CAAST • Prepare and review the financial report, weekly progress report and project progress report • Prepare Capacity building programme Schedule and finalize resource person.
 **Dr. Vijay Kumar Baldodiya**	Male	Research Associate NAHEP, AAU, Anand Mob: 8359830168 Email: vj071088@contractualemployee.aau.in	RA	Study: 1. Price Forecasting of Agricultural Commodities 2. Demand and Supply Projection of Agricultural Commodities in India 3. Demand and Supply Projection of Fish (Inland & Marine) in India 4. Demand and Supply Projection of Milk & Milk products in India 5. Price behavior and market integration 6. A study on Operations of e-NAM at Gujarat 7. An Economic analysis of marketing of selected crops of Gujarat 8. Enhancing Agricultural Market Intelligence using Digital Knowledge Agribusiness Ecosystem platform for generating primary digital continuous data streams Contribution: • Prepare and Formalize groundnut and wheat commodity report • Review and formalize the price forecasting model and advisories for groundnut, wheat, and maize. • Coordination of demand and supply study lecture with consultant, assessment of secondary demand and supply data, and report • Report writing and review the market integration analysis • Coordinate all activity relate to economic analysis such as questionnaire, primary survey, data analysis and report writing. • Prepare package of practices (POP) for onion crop and secondary data collection for joint project with Western Sydney University (WSU)

				• Coordinate and finalize student and faculty foreign visit under NAHEP-CAAST • Prepare and review the financial report, weekly progress report and project progress report • Prepare Capacity building programme Schedule and finalize resource person
 **Dr. Archit Kumar Nayak**	Male	Research Associate (from 3-11-2020 to 31-07-2022) archit.iabm@gmail.com Mob No: 8955798731	RA (from Nov. 2020 to July 2022) Left the job	Data collections, report and research paper writing of the fisheries group. He was also looking after routine official process of the fisheries group during his stay in the project
 **Dr. Deepak Waghmode**	Male	Research Associate, NAHEP, AAU, Anand Mob: 9545455268 Email.: w.deepak1@aau.in	RA (From Nov. 2019 to Aug. 2021) Left the job	Study title: "Market Potential and Trade Competitiveness of Selected Agro-commodities in India" "Price Volatility, discovery and hedging benefits of Agricultural commodity futures market in India". "Mapping and Performance analysis of FPOs in western region of India". Contribution Assisted in finalizing the proposal of three studies, providing support in study design, data analysis, and research methodologies to ensure successful completion. Efficiently managed account and finance aspects, adhering to budgeting and financial reporting guidelines. Engaged in consultancy and activities related to partner institutes, providing expert guidance and support in data analysis and capacity building. As the Coordinator, conducted extensive research and analysis to produce a comprehensive sectorial report on the cotton and maize industries, incorporating market trends, production data, and policy frameworks.

 **Dr. Pooja Gamit** (2021-till date)	Female	Research Associate, NAHEP, AAU, Anand Mob: 7874694379 Email.: gamitpooja@aau.in	RA	Study title: "Market Potential and Trade Competitiveness of Selected Agro-commodities in India" "Mapping and Performance analysis of FPOs in western region of India" Contribution: Drafting studies, including conducting data analysis and interpretation, in compliance with established guidelines and standards. Producing comprehensive reports in accordance with prescribed formats and requirements. Collaborating with core co-principal investigators to prepare and finalize research papers or publications. Facilitating coordination efforts for capacity-building programs to enhance organizational effectiveness and efficiency.
 **Mr. Divyang M Prajapati**	Male	Research Associate NAHEP-CAAST, AAU, Anand Mob: 7990789446 Email: divyang34@outlook.com	RA (From Nov. 2019 to June 2022) Left the job	His Role in the project was to prepare schedules, collect the data from the field, meet the industry experts, carry out the confrontation matrix, prepare the draft report and coordinate meeting with the experts to meet the deadline proposed for the Dairy Objectives
 **Mr. Bhavik M Patel**	Male	Research Associate NAHEP, AAU, Anand Email: bhavik0058@contractualemployee.aau.in Mo: 7405495058	RA	• Organized capacity building programs along with Certificate Courses, Webinars and Guest Lectures: For management of Participants data prepared Google forms for all program, preparation of brochure, Communication and liasoning with resource persons and participants. • Management of PMTS data. • Collection of feedback from participants and provide certificate to all attended participants. • Prepare Program Evaluation Report as per submitted feedback of all organized capacity building programs. Actively involved in all HR and Administrative activities i.e. preparation of documentation of recruitment and carrying out formalities for joining and separation of employees, monitoring job portals for posting new positions, corresponding with candidates, employee relation, renewals of contractual positions and other day to day all activities.

 **Mr. Nirav Prajapati**	Male	Research Associate NAHEP, AAU, Anand Mob: 9687897508 Email: niravprajapati@contractualemployee.aau.in	RA (From Nov 2019 to March 2023) Left the job	Study: 1. Timely dissemination of market intelligence through various sources including customized Apps 2. Hybrid model development through machine learning by using secondary and satellite data for making more robust price forecasting. Contribution: • Create and maintained NAHEP Centre's website and mobile applications • Prepared maps for various agricultural and meteorological parameters from Google Earth Engine • Downloaded and collected crop production data for crop acreage estimation • Prepared district wise actual crop production data of Gujarat state with geospatial datasets and Arranged satellite datasets into model friendly format • Report writing on crop acreage estimation.
 **Mr. Piyushkumar Suvagiya**	Male	Senior Research Fellow NAHEP, AAU, Anand Mob: 8460188719 Email: piyushsuvagiya@contractualemployee.aau.in	SRF	Study: 1. Price Forecasting of Agricultural Commodities 2. Demand and Supply Projection of Agricultural Commodities in India 3. Demand and Supply Projection of Fish (Inland & Marine) in India 4. Demand and Supply Projection of Milk & Milk products in India 5. Price behavior and market integration 6. A study on Operations of e-NAM at Gujarat 7. An Economic analysis of marketing of selected crops of Gujarat 8. Enhancing Agricultural Market Intelligence using Digital Knowledge Agribusiness Ecosystem platform for generating primary digital continuous data streams **Contribution:** • Prepare cumin commodity report • Forecast cumin and cotton prices and prepare price advisory in English and Gujarati • Collect secondary data for the Demand supply study • Collect price and arrival data and do analysis of price integration for cotton

				and cumin crop and collect price behaviour/Market integration literature review • Collects primary and secondary data for the e-NAM study. Continuous monitoring in selected 10 APMC. Analysis and Report writing on e-NAM study. • Prepare questionnaire, conduct primary survey, Data tabulation and write a report. • Prepare package of practises (POP) for cumin crop and primary survey of farmers as well secondary data collection for joint project with Western Sydney University (WSU) • Assist in planning and execution of various capacity building programmes at NAHEP-CAAST centre • Collect and manage student thesis documents as well as scholarship at NAHEP-CAAST centre • Assist in foreign visit documents preparation and manage files.
 **Mr. Vishesh Patel**	Male	Senior Research Fellow NAHEP, AAU, Anand Mob: 8200013966 Email: vishesh@contractualemployee.aau.in	PA (From Nov-2019 to March-2021) SRF (Since March 2021)	Study: 1. Price Forecasting of Agricultural Commodities 2. Demand and Supply Projection of Agricultural Commodities in India 3. Demand and Supply Projection of Fish (Inland & Marine) in India 4. Demand and Supply Projection of Milk & Milk products in India 5. Price behavior and market integration 6. A study on Operations of e-NAM at Gujarat 7. An Economic analysis of marketing of selected crops of Gujarat 8. Enhancing Agricultural Market Intelligence using Digital Knowledge Agribusiness Ecosystem platform for generating primary digital continuous data streams **Contribution:** • Prepare groundnut commodity report • Forecast groundnut prices and prepare price advisory in English and Gujarati • Collect secondary data for the Demand supply study

				• Collect price and arrival data and do analysis of price integration for groundnut crop and collect price behaviour/Market integration literature review • Collects primary and secondary data for the e-NAM study. Continuous monitoring in selected 10 APMC. Analysis and Report writing on e-NAM study. • Prepare questionnaire, conduct primary survey, Data tabulation and write a report. • Prepare package of practises (POP) for groundnut crop and primary survey of farmers as well secondary data collection for joint project with Western Sydney University (WSU) • Assist in planning and execution of various capacity building programmes at NAHEP-CAAST centre • Upload procurement documents in world bank step portal Manage and Review financial document of NAHEP-CAAST
 **Mr. Jigar Patel**	Male	Senior Research Fellow NAHEP, AAU, Anand Mob: 7874598996 Email: jigarpatel9227@gmail.com	SRF (From Oct-2020 to June-2022) (Left the Job)	Study: 1. Price Forecasting of Agricultural Commodities 2. Demand and Supply Projection of Agricultural Commodities in India 3. Demand and Supply Projection of Fish (Inland & Marine) in India 4. Demand and Supply Projection of Milk & Milk products in India 5. Price behavior and market integration 6. An Economic analysis of marketing of selected crops of Gujarat 7. Enhancing Agricultural Market Intelligence using Digital Knowledge Agribusiness Ecosystem platform for generating primary digital continuous data streams Contribution: • Prepare progress report for NAHEP-CASST centre • Forecast Potato prices and prepare price advisory in English and Gujarati • Collect secondary data for the Demand supply study

				• Collect price and arrival data and do analysis of price integration for Potato crop and collect price behaviour/Market integration introduction • Prepare package of practices (POP) for Maize crop and primary survey of farmers as well secondary data collection for joint project with Western Sydney University (WSU) • Assist in planning and execution of various capacity building programmes at NAHEP-CAAST centre
 **Ms. Kosha Mehta**	Female	Senior Research Fellow NAHEP, AAU, Anand Mob: 9512262346 Email: mehtakosha1993@gmail.com	SRF (From Nov-2019 to Dec-2022) (Left the Job)	Study: 1. Price Forecasting of Agricultural Commodities 2. Demand and Supply Projection of Agricultural Commodities in India 3. Demand and Supply Projection of Fish (Inland & Marine) in India 4. Demand and Supply Projection of Milk & Milk products in India 5. Price behavior and market integration 6. A study on Operations of e-NAM at Gujarat 7. An Economic analysis of marketing of selected crops of Gujarat 8. Enhancing Agricultural Market Intelligence using Digital Knowledge Agribusiness Ecosystem platform for generating primary digital continuous data streams **Contribution:** • prepare wheat commodity report • Forecast wheat and maize prices and prepare price advisory in English and Gujarati • Collect secondary data for the Demand supply study • Collect price and arrival data and do analysis of price integration for wheat crop and collect price behaviour/Market integration introduction • Prepare e-NAM status report. • Prepare package of practices (POP) for wheat crop and primary survey of farmers as well secondary data collection and UI & UX component preparation of i-Kisansetu application for joint project with Western Sydney University (WSU)

				• Assist in planning and execution of various capacity building programmes at NAHEP-CAAST centre
 **Mr. Jitendra Parmar**	Male	Senior Research Fellow NAHEP, AAU, Anand Mob: 8320107535 Email: jitu07011992@gmail.com	SRF (From Nov-2019 to May-2022) (Left the Job)	Study: 1. A study on Operations of e-NAM at Gujarat 2. Enhancing Agricultural Market Intelligence using Digital Knowledge Agribusiness Ecosystem platform for generating primary digital continuous data streams **Contribution:** • Prepare questionnaire and collect secondary data as well as primary data for e-NAM study • Prepare package of practises (POP) for tomato crop and primary survey of farmers as well secondary data collection for joint project with Western Sydney University (WSU)
 **Mr. Yogesh Jodhani**	Male	Senior Research Fellow NAHEP, AAU, Anand Mob: 6351309707 Email.:yogeshjodhani1818@aau.in	SRF (From Nov. 2019 to Sept. 2022) Left the job	Study title: "Mapping and Performance analysis of FPOs in western region of India" Contribution Contributions towards the preparation of a comprehensive sectorial report and research study in the field of commodity futures market, including data analysis. Cordinator of FPOs study Data collection (Gujarat, Maharshtra and Rajashthan) Data Analysis and report writing (90% done) Conveying informative lectures to farmers, elucidating the concept and benefits of Farmer Producer Organizations (FPOs) in a comprehensive and accessible manner. Contribute in capacity buiding programmes
 **Dr. Maitri Patel**	Female	Senior Research Fellow NAHEP, AAU, Anand Mob: 9712948040 Email.: maitripatel@aau.in	SRF (From Oct. 2020 to Oct. 2022) Left the job	Study title: "Mapping and Performance analysis of FPOs in western region of India" Contribution: Contributions towards the preparation of a comprehensive sectorial report and research study in the field of commodity futures market, including data analysis. Cordinator of FPOs study

				Data collection (Gujarat, Maharshtra and Rajashthan) Data Analysis and report writing (90% done). Conveying informative lectures to farmers, elucidating the concept and benefits of Farmer Producer Organizations (FPOs) in a comprehensive and accessible manner. Contribute in capacity buiding programmes Helped in the preparation of research proposal
 **Dr. Parth Shah**	Male	Senior Research Fellow NAHEP, AAU, Anand Mob: 9574505429 Email.: parthnahep93@aau.in	SRF (2021-till date)	Study title: "Price Volatility, discovery and hedging benefits of Agricultural commodity futures market in India". "Mapping and Performance analysis of FPOs in western region of India" Contribution: Creating preliminary drafts of studies, encompassing data analysis and interpretation, while adhering to established guidelines and standards. Crafting comprehensive reports that adhere to prescribed formats and meet specified requirements. Collaborating with core co-principal investigators to prepare, revise, and finalize research papers or publications. Facilitating coordination efforts in capacity-building programs, ensuring seamless execution and delivery of program objectives.
 **Mr. Anil Garwal**	M	Senior Research Fellow, Livestock and Poultry group, NAHEP-CAAST, AAU, Anand	SRF (From Jan 2022 to Oct 2022) Left the Job	Completed primary and secondary data collection for poultry marketing and goat marketing. Prepared and published a review paper for goat marketing. Data analysis and partial report preparation. Contribution to the preparation and publication of a review paper for goat marketing. Contributed to the preparation of a Directory for commercial goat farms in Gujarat.

 **Ms. Ayushee Darji**	Female	Senior Research Fellow NAHEP, AAU, Anand Email: ayusheedarji22@gmail.com Mo: 9033720836	SRF (From Nov. 2019 to April 2021) Left the Job	• Designing and organizing Capacity building programme in area of market intelligence (Management of Participants data and programme certification process) • Organizing lecture series on themes related to marketing Intelligence • Designing and preparation of short duration certificate and online courses in the areas of agriculture marketing intelligence • Feedback system of capacity building programmes • Preparation of Evaluation report of capacity building programmes
 **MS. Kripali Dave**	Female	Senior Research Fellow NAHEP-CAAST, AAU, Anand Mob:9998298220 Email: k.dave95@gmail.com	SRF (From Dec. 2019 to Sept 2022) Left the Job	Her Role in the project was to prepare schedules, collect the data from the field, meet the industry experts, carry out the confrontation matrix, prepare the draft report and coordinate meeting with the experts to meet the deadline proposed for the Food Objectives
 **Mrs. Kripa M. K.**	Female	Senior Research Fellow NAHEP, AAU, Anand Mob: 7990674276 Email:	SRF (From Oct, 2020 to Sept 2021) Left the job	Study: 1. Hybrid model development through machine learning by using secondary and satellite data for making more robust price forecasting. Contribution: • Frequently Downloaded satellite data which was getting from NRSC • Derived various environmental parameters using MODIS, LANSAT, and Sentinel-2 datasets from GEE and generated State wise and District wise shape file of India and import the data in GEE. • Calculated NDVI, NDWI for whole of India using shape file and also created cloud mask in GEE • Maintained and Handled ISRO Datasets

 **Mr. Harsh Bhanderi**	Male	Senior Research Fellow NAHEP, AAU, Anand Mob: 8401504929 Email: bhanderiharsh@contractualemployee.aau.in	SRF	Study: 1. Hybrid model development through machine learning by using secondary and satellite data for making more robust price forecasting. Contribution: • Prepared maps for various agricultural and meteorological parameters from Google Earth Engine • Downloaded and collected crop production data for crop acreage estimation • Prepared district wise actual crop production data of Gujarat state with geospatial datasets and Arranged satellite datasets into model friendly format • Implemented various machine learning techniques to estimate crop acreage for major agricultural commodities. • Report writing on crop acreage estimation
 **Mr. Ankur Vora**	Male	Senior Research Fellow NAHEP, AAU, Anand Mob: 7622941821 Email: ankurvora@contractualemployee.aau.in	SRF	Study: 1. Timely dissemination of market intelligence through various sources including customized Apps 2. Hybrid model development through machine learning by using secondary and satellite data for making more robust price forecasting. 3. Enhancing Agricultural Market Intelligence Using Digital Knowledge Agribusiness Ecosystem Platform for Generating Primary Digital Continuous Data Streams Contribution: • Prepared various Vegetation Indices from Google Earth Engine • Prepared district wise actual crop production data of Gujarat state with geospatial datasets and Arranged satellite datasets into model friendly format • Implemented various machine learning techniques to estimate crop acreage for major agricultural commodities. • Conducted farmers training for installation of the i-KishanSetu mobile app • Assist in the planning and execution of various capacity-building programmes, organized by the IT group.

				• Two articles were published on Remote Sensing and GIS in KrishiGoVidhya monthly magazine of AAU. • One review paper on "Application of Google Earth Engine for Big Data Analytics" has been published in The Pharma Innovation Journal. Maintained and Handling ISRO Datasets
 **Ms. Janki Patel**	Female	Senior Research Fellow, Livestock and Poultry group, NAHEP-CAAST, AAU, Anand	SRF (Feb. 2020 to Oct 2021) PA (Dec. 2019 to Feb 2020) (Left the Job)	Contributed to schedule preparation for poultry and goat marketing primary survey. Partially completed data collection for goat marketing and poultry marketing.
 **Mr. Smit Bhavsar**	Male	Project Assistant NAHEP, AAU, Anand Mob: 8460579983 Email: smitbhavsar@contractualemployee.aau.in	PA	Study: 1. Timely dissemination of market intelligence through various sources including customized Apps 2. Hybrid model development through machine learning by using secondary and satellite data for making more robust price forecasting. 3. Enhancing Agricultural Market Intelligence Using Digital Knowledge Agribusiness Ecosystem Platform for Generating Primary Digital Continuous Data Streams Contribution: • Developed and Maintaining the NAHEP Center website, and all social media platforms. • Updating and Maintaining of Mobile application for Centre • Installation & Troubleshooting of computer hardware and software & Network Related issues • Member of collaborative project work with WSU for the development of Digital Knowledge Agribusiness Ecosystem Platform of iKisansetu mobile app • Conducted farmers training for awareness and installation of the i-KishanSetu mobile app • Assist in the planning and execution of various capacity-building programmes, organized by the IT group. • Downloading and Manage ISRO Datasets

				• Maintained a farmer database and used it to send price forecast SMS messages to farmers. • Wrote and presented a review titled "Applications of Artificial Intelligence for Sustainable Agriculture - A Review" for the Regional Seminar on Agricultural Market Intelligence: Prospects and Challenges to Agriculture. Provided Technical Assistance during webinar/Lecture series and live streaming of program.
 **Mr. Chirag Pansuriya**	Male	Project Assistant (from 29-06-2021 to 16-01-2022) Mob No: 7600603568	PA (June 2021 to Jan 2022) (Left the Job)	He has done only consumer data collection of the fisheries project in the group.
 **Mr. Vivek Kumar Patel**	Male	Project Assistant (from 20-10-2020 to 12-02-2021)	SRF (Oct 2020 to March 2021) PA (Nov 2019 to Oct 2020) (Left the Job)	Helped in data collection and entry of some secondary data in the MS Excel Sheet
 **Mr. Jay Patel**	Male	Project Assistant NAHEP, AAU, Anand Mob: 8460155725 Email.: jayveeroatel84@aau.in	PA (Nov 2019 to Nov 2020) (Left the Job)	Contribution: Data collection Contribute in preparing draft, articles and news letter etc. Contribute in capacity building programes

 **Mr. Apurva Bhoi**	Male	Project Assistant Mob No: 9624522779	PA (from 13-02-2021 to 28-06-2021)	• Organizing Capacity building programmes Designing and preparation of Brochure and Certificate of Capacity Building Programmes • Reports and Newsletters Designing Prepare Press note of Capacity Building Programme and Media Coverage Responsibility
 **Ms. Shradhha Shah**	Female	Project Assistant NAHEP, AAU, Anand Email: shahshraddha519@gmail.com Mo: 9106898657	PA (From March 2021 to Jan 2023) Left the Job	• Designing and organizing Capacity building programme in area of market intelligence (Management of Participants data and programme certification process) • Organizing lecture series on themes related to marketing Intelligence • Designing and preparation of short duration certificate and online courses in the areas of agriculture marketing intelligence Collection and management of participants data and Feedback data of capacity building programmes
 **Ms. Jalpa Rana**	Female	Office Assistant NAHEP, AAU, Anand Email: ranajalpa13@gmail.com Mo: 8487093427	OA (From Nov 2019 to March 2020) Left the Job	• Maintain Employees Register, GST, IT Register, Client Ledger Register, Stationery Register • All Financial income and expenditure verification, Bill Voucher verification • Correspondence with other office and prepares notes & letters
 **Ms. Krishnaben Patel**	Female	Office Assistant NAHEP, AAU, Anand Email: krishnapatel@contractualemployee.aau.in Mo: 9714321091	OA	• Preparation of sanctions & bills and maintain related registers like Grant Register, Sanction Book etc • Maintenance of consumables and stationary items and Register • Prepare balance sheet and Other related forms for Audit related activities • Implementation of guidelines/ rules & regulations related to accounts & financial matters

 **Ms. Renuka Rohit**	Female	Office Assistant NAHEP, AAU, Anand Email: renukarohit@contractualemployee.aau.in Mo: 9714321091	OA	• Maintain Employees Register, GST, IT Register, Client Ledger Register, Stationery Register • All Financial income and expenditure verification, Bill Voucher verification • Correspondence with other office and prepares notes & letters • Work related to recruitment and leave orders, and RTI • Maintenance of records of deadstock register and deadstock items.
 **Mr. Alhaz Saiyed**	Male	Support Staff NAHEP, AAU, Anand Email: saiyadalhaj@gmail.com Mo: 9925250053	SS (From Nov. 2019 to Dec. 2022) Left the Job	• Maintenance of Public Financial Management System (PFMS). • Preparation of financial report and other information required by NAHEP Delhi Finance Team • Work related to Grant Order and Correspondence with Comptroller Office. • Deposit and Withdraw FD and Correspondence with Bank. • Maintenance of Income and deposits with related registers. • Other Activities given by PI
 **Mr. Kalpeshkumar Gohel**	Male	Support Staff NAHEP, AAU, Anand Email: kgohel1331@gmail.com Mo: 7777929959	SS	• Provide assistance to NAHEP-CAAST members and other office work • Work related to Comptroller office, Bank and Dispatch • Maintain attendance register of various meetings, workshop and other programmes • Provide assistance in capacity building programmes
 **Mr. Maheshbhai Gohel**	Male	Support Staff NAHEP, AAU, Anand Email: mbgohel7@contractualemployee.aau.in Mo: 7801953595	SS	• Maintenance of cheque book with register and bank reconciliation, Corresponding with Bank and other offices • Maintenance of cashbook register • Maintenance of Inward, Outward and Dispatch register with record, Postal Register • Provide Assistance in billing process

 **Mr. Nilesh Vaghela**	Male	Support Staff NAHEP, AAU, Anand Email: nileshvaghela2696@gmail.com Mo: 7990604039	SS	• Bill Entry in Online AAU Software • Maintenance of MES and employee register • Work related to account settlement • Preparation and submission of AUC • Provide Assistance in Billing Process
 **Mr. Dipakkumar Padhiyar**	Male	Support Staff NAHEP, AAU, Anand Email: dhpadhiyar1986@gmail.com Mo: 9574888706	SS	• Provide assistance to NAHEP-CAAST members and other office work • Work related to Comptroller office, Bank and Dispatch • Maintain attendance register of various meetings, workshop and other programme • To work under the overall guidance and instructions of the PI

5.2. Details of visits of PIU-NAHEP officials at your AU along with photographs (provide list)

1. Dr. Himanshu Pathak, DG, ICAR & Secretary, DARE discussing about Agricultural Market Intelligence at NAHEP-CAAST Centre, AAU, Anand

2. Dr. R. C. Agrawal, DDG (Education) & National Director, NAHEP, ICAR holding meeting with staff of NAHEP-CAAST Centre, AAU, Anand.

3. Dr. Anuradha Agrawal, National Coordinator, NAHEP-CAAST, ICAR with staff members at NAHEP-CAAST Centre, AAU, Anand.

Annexure-I

1. Publications: 04

Research Papers:

1. Title: Consumption pattern and demand forecasting of coarse cereals in Gujarat, India.
   Author: Raju, N., Devi, G. & Padaliya, M.
   Duration: 2023
   Publisher: *SN Bus Econ* **3**, 81 (2023). https://doi.org/10.1007/s43546-023-00457-w
2. Title: Status of Fisheries Sector in Gujarat: An Overview.
   Author: Nayak, A.K., Panigrahy, S.R., Pundir,R.S., & Kumar, V.H.M.
   Duration: 2022
   Publisher: Indian Journal of Economics and Development, 18(2), 381-387
3. Title: An Economic Evaluation of Freshwater Fish Production and Marketing in Gujarat.
   Author: Nayak, A.K., Panigrahy, S.R., Pundir,R.S., & Kumar, V.H.M.
   Duration: 2023
   Publisher: Indian Journal of Economics and Development, 19(1), 202-208
4. Title: Applications of Google Earth Engine for Big Data Analysis
   Author: Mr. Ankur P. Vora, Dr. Chetan Dudhagara, Dr. D. R. Kathiriya, Dr. R. S. Pundir
   Duration: January, 2023
   Publisher: The Farma Innovation
5. Title: Recurrent neural network architecture for forecasting banana prices in Gujarat, India
   Author: Prity Kumari, Viniya Goswami, Harshith N., R. S. Pundir
   Duration: June 2023
   Publisher: Public Library of Science (PLOS)
   URL Link: https://doi.org/10.1371/journal.pone.0275702
6. Title: Status of Fisheries Sector in Gujarat: An Overview.
   Author: Nayak, A.K., Panigrahy, S.R., Pundir,R.S., & Kumar, V.H.M.
   Duration: 2022
   Publisher: Indian Journal of Economics and Development, 19(1), 202-208
   URL Link: 10.35716/IJED/22043

2. Research Articles: 15

1. Title: Bharatmathi Batakana Aayat-Nikasni Paristhiti Ane Muskelio
   Author: Pooja Gamit, Ganga Devi, Parth Shah, R.S.Pundir
   Duration: October, 2022 Issue-6
   Publisher: Krishi Govidya, AAU, Anand
   URL Link: http://www.aau.in/sites/default/files/October_2022.pdf
2. Title: Krishi Vayda Bajarma Khedut Utpadan Sanagathan (FPO)/ Khedutoni Sulabhatao ane Mukselio
   Author: Parth Shah, Pooja Gamit, Ganga Devi
   Duration: April, 2023
   Publisher: Krishi Govidya, AAU, Anand
3. Title: Khedutone Aarthik Rite Saksham Kartu Sangathan: FPO -Khedut Utpadak Sangathan
   Author: Yogesh Jodhani, Maitri Patel, Jay Patel, R.S.Pundir
   Duration: 25 August, 2021
   Publisher: Krishi Prabhat News paper
4. Title: Khedut Utpadak Sangathan (FPO): Utpadak Company Hethal Nodhnini Prakriya
   Author: Yogesh Jodhani, Maitri Patel, Jay Patel, R.S.Pundir
   Duration: 14 October, 2021
   Publisher: Krishi Prabhat News paper
5. Title: Bharatmathi Nikasma Zalhaltu Gujarat
   Author: Y. A. Lad, Jignesh D Macwan, Bhavik M Patel, Ayushee R Darji
   Duration: 2021
   Publisher: Gujarat Baghayat Vikas Parishad and NAHEP-CAAST, AAU, Anand
6. Title: Prakrutik Kheti: Bajar Vyavsthapan ane Samsyao
   Author: Y. A. Lad, Bhavik M Patel, Shraddha S Shah
   Duration: 2022
   Publisher: Plant Protection Association of Gujarat (PPAG) and NAHEP-CAAST, AAU, Anand
7. Title: Krushi Khsetre Remote Sensing no Upayog
   Author: Ankur Vora, Dr. Chetan Dudhagara, Dr. Dhaval Kathiriya
   Duration: July, 2022
   Publisher: Krishi Govidya, AAU, Anand

8. Title: Krushi Khsetre GIS (Geographical Information Syatem) no Upayog
   Author: Ankur Vora, Dr. Chetan Dudhagara, Dr. Dhaval Kathiriya
   Duration: January, 2023
   Publisher: Krishi Govidya, AAU, Anand
9. Title: Kobij Pak ni Bajar Vyavstha
   Author: Dr. Jignesh D Macwan, Dr. R. S. Pundir
   Duration: July, 2022
   Publisher: Krishi Govidya, AAU, Anand
10. Title: Jirani Nikas: Hal ni Paristhiti ane Bhavi (**Got best article award**)
    Author: Dr. Jignesh D Macwan, Dr. R. S. Pundir and Piyush Suvagiya
    Duration: November, 2021
    Publisher: Krishi Govidya, AAU, Anand
11. Title: Kobijni khetinu Arthkaran
    Author: Dr. Jignesh D Macwan, Dr. R. S. Pundir and Parth Patel
    Duration: December, 2021
    Publisher: Krishi Govidya, AAU, Anand
12. Title: Khedut Utpaadak Sanghthan ni Bhumika ane nodhni prakriyaa

    Authors: Y. A. Lad, Bhavik M Patel, Apurva Bhoi
    Duration: 2023
    Publisher: Plant Protection Association of Gujarat (PPAG) and NAHEP-CAAST, AAU, Anand

13. Title: Nikas ni prakriyaa, tako, dstaavejikaran, sarkaari yojnao ane nikaaskaarone padti muskelio

    Authors: Vishita Khanna, Bhavik M Patel, Apurva Bhoi Duration: 2023
    Publisher: Plant Protection Association of Gujarat (PPAG) and NAHEP-CAAST, AAU, Anand

14. Title: Vaayda bjaarmaa hejingno Parichay

    Authors: Parth Shah, Dr. Jignesh D Macwan, Dr. Ganga Devi, and Dr. R. S. Pundir

    Duration: 2023
    Publisher: Plant Protection Association of Gujarat (PPAG) and NAHEP-CAAST, AAU, Anand

15. Title: Agri splay chain: Muddao ane ukel

    Authors: Dr. Snehal Mishra, Dr. Y. A. Lad, Bhavik M Patel,

    Duration: 2023

    Publisher: Plant Protection Association of Gujarat (PPAG) and NAHEP-CAAST, AAU, Anand

3. Annual Reports: 01

Title: Progress Report

Author: Dr. Y. C. Zala, Dr. R. S. Pundir

Duration: March, 2021

Publisher: NAHEP-CAAST, AAU, Anand

4. Books/Book Chapter: 18

A. Book

1. Title: Directory of Agricultural Market Intelligence of Gujarat State

   Author: Ganga Devi, R.S.Pundir, Yogesh Jodhani, Maitri Patel, Pooja Gamit, Parth Shah, Jaykumar Patel

   Duration: December, 2022

   Publisher: NAHEP-CAAST, AAU, Anand
2. Title: 10,000 Khedut Utpadak Sanagathano (FPOs)Ni Rachana- Sanchalan Margdarshika

   Author: Ganga Devi, R.S.Pundir, Yogesh Jodhani, Maitri Patel, PoojaGamit, Parth Shah, Jaykumar Patel

   Duration: December, 2022

   Publisher: NAHEP-CAAST, AAU, Anand
3. Title: Procedural Guideline for Registration of Farmer Producer Organizations

   Author: Ganga Devi, R.S.Pundir, Yogesh Jodhani, Maitri Patel, Pooja Gamit, Parth Shah, Jaykumar Patel

   Duration: December, 2022

   Publisher: NAHEP-CAAST, AAU, Anand

4. Title: Khedut Utpadak Sanagathanoni Nodhnini Prakriyagat Margdarshika
   Author: Ganga Devi, R.S.Pundir, Yogesh Jodhani, Maitri Patel, Pooja Gamit, Parth Shah, Jaykumar Patel
   Duration: December, 2022
   Publisher: NAHEP-CAAST, AAU, Anand
5. Title: Commodity Report- Cotton
   Author: Dr. Y. C. Zala, Dr. R. S. Pundir, Dr. Ganga Devi, Dr. Ritambhara Singh, Dr. Mahesh Prajapati, Dr. Deepak Waghmode, Mr. Yogeshkumar Jodhani, Dr. Maitri Patel, Mr. Jaykumar Patel
   Duration: April, 2021
   Publisher: NAHEP-CAAST, AAU, Anand
6. Title: Commodity Report- Maize
   Author: Dr. Y. C. Zala, Dr. R. S. Pundir, Dr. Ganga Devi, Dr. Ritambhara Singh, Dr. Mahesh Prajapati, Dr. Deepak Waghmode, Mr. Yogeshkumar Jodhani, Dr. Maitri Patel, Mr. Jaykumar Patel
   Duration: April, 2021
   Publisher: NAHEP-CAAST, AAU, Anand
7. Title: Commodity Report- Groundnut
   Author: Dr. Y. C. Zala, Dr. R. S. Pundir, Dr. Snehal Mishra, Dr. Vijay Kumar Baldodiya, Dr. Jignesh Macwan, Mr. Vishesh Patel, Ms. Kosha Mehta, Mr. Jigar Patel, Mr. Piyush Suvagiya, Mr. Jitendra Parmar
   Duration: April, 2021
   Publisher: NAHEP-CAAST, AAU, Anand
8. Title: Commodity Report- Cumin
   Author: Dr. Y. C. Zala, Dr. R. S. Pundir, Dr. Snehal Mishra, Dr. Jignesh Macwan, Dr. Vijay Kumar Baldodiya, Mr. Piyush Suvagiya, Ms. Kosha Mehta, Mr. Jigar Patel, Mr. Vishesh Patel, Mr. Jitendra Parmar
   Duration: April, 2021
   Publisher: NAHEP-CAAST, AAU, Anand
9. Title: Commodity Report- Potato
   Author: Dr. Y. C. Zala, Dr. R. S. Pundir, Dr. Snehal Mishra, Dr. Jignesh Macwan, Dr. Vijay Kumar Baldodiya, Mr. Jitendra Parmar, Mr. Vishesh Patel, Ms. Kosha Mehta, Mr. Jigar Patel, Mr. Piyush Suvagiya

Duration: April, 2021

Publisher: NAHEP-CAAST, AAU, Anand

10. Title: Commodity Report- Wheat

    Author: Dr. Y. C. Zala, Dr. R. S. Pundir, Dr. Snehal Mishra, Dr. Vijay Kumar Baldodiya, Dr. Jignesh Macwan, Ms. Kosha Mehta, Mr. Jigar Patel, Mr. Piyush Suvagiya, Mr. Vishesh Patel, Mr. Jitendra Parmar

    Duration: April, 2021

    Publisher: NAHEP-CAAST, AAU, Anand

11. Title: Sector Report – Fisheries

    Author: Dr. Y. C. Zala, Dr. R. S. Pundir, Dr. Shakti Ranjan Panigrahy, Dr. H. M. Vinay Kumar, Dr. Archit Kumar Nayak

    Duration: April, 2021

    Publisher: NAHEP-CAAST, AAU, Anand

12. Title: Sector Report – Polutry

    Author: Dr. Y. C. Zala, Dr. R. S. Pundir, Dr. F. P. Savaliya, Dr. Rais M Rajpura, Dr. S. R. Panigrahy, Dr. Dilip R Vahoniya, Dr. Ashish B Mahera, Ms. Janaki Patel

    Duration: April, 2021

    Publisher: NAHEP-CAAST, AAU, Anand

13. Title: Sectoral Report - Value Addition and Processing of Milk and Milk Products

    Author: Dr. Y. C. Zala, Dr. R. S. Pundir, Dr. Samit Dutta, Dr. Ashish K Makwana, Dr. Mahendra D Gurjar, Ms. Vishita Khanna, Mr. Divyang M Prajapati, Ms. Kripali Dave

    Duration: April, 2021

    Publisher: NAHEP-CAAST, AAU, Anand

14. Title: Sectoral Report - Value Addition and Processing of Fruit and Vegetable

    Author: Dr. Y. C. Zala, Dr. R. S. Pundir, Dr. Samit Dutta, Dr. Ashish K Makwana, Dr. Mahendra D Gurjar, Ms. Vishita Khanna, Mr. Divyang M Prajapati, Ms. Kripali Dave

    Duration: April, 2021

    Publisher: NAHEP-CAAST, AAU, Anand

15. Title: Baghayati Pedash: Aayaat – Nikas, Halni Paristhiti ane Bhavi

    Author: Y. C. Zala, D. J. Patel, K. P. Kikani, R. S. Pundir, Y. A. Lad, R. G. Jadav, N. S. Parekh, R. A. Khimani, B. N. Satodiya

Duration: January - March, 2021

Publisher: Gujarat Baghayat Vikas Parishad, Anand and Centre for Agricultural Market Intelligence, NAHEP-CAAST, AAU, Anand NAHEP-CAAST, AAU, Anand

16. Title: Rajy Kakshano Parisamvad: Prakrutik Krushima Pak Sanrakshan

    Author: Dr. R. G. Parmar, Dr. N. M. Gohel, Dr. N. B. Patel, Dr. Y. A. Lad, Shri P. C. Patel

    Duration: April, 2022

    Publisher: Plant Protection Association of Gujarat, Anand Zone, Platinum Jubilee, BACA, AAU, Gujarat Organic Agricultural University, Anand and Centre for Agricultural Market Intelligence, NAHEP-CAAST, AAU, Anand

B. Book Chapter

1. Title: Impact of Marketing Reforms on Farm-Market Linkages

   Author: Prabhat Kumar, Snehal Mishra, Vishita Khanna, Pinaki Roy, Archit Nayak, Vijay Kumar Baldodiya, Jignesh Macwan, and R. S. Pundir

   Duration: May, 2023

   Publisher: Springer Nature Singapore Pte Ltd. 2023, S. A. Narula and S. P. Raj (eds.), Sustainable Food Value Chain Development.

2. Title: Marketing of Medicinal Plants (Gujarati)

   Author: Jignesh Macwan, Roshani Bhoi, R. S. Pundir and K. S. Jadav

   Duration: May, 2023

   Publisher: Book on Scientific Farming of Medicinal and Aromatic Crops published by Department of Medicinal Plants, BACA, AAU, Anand.

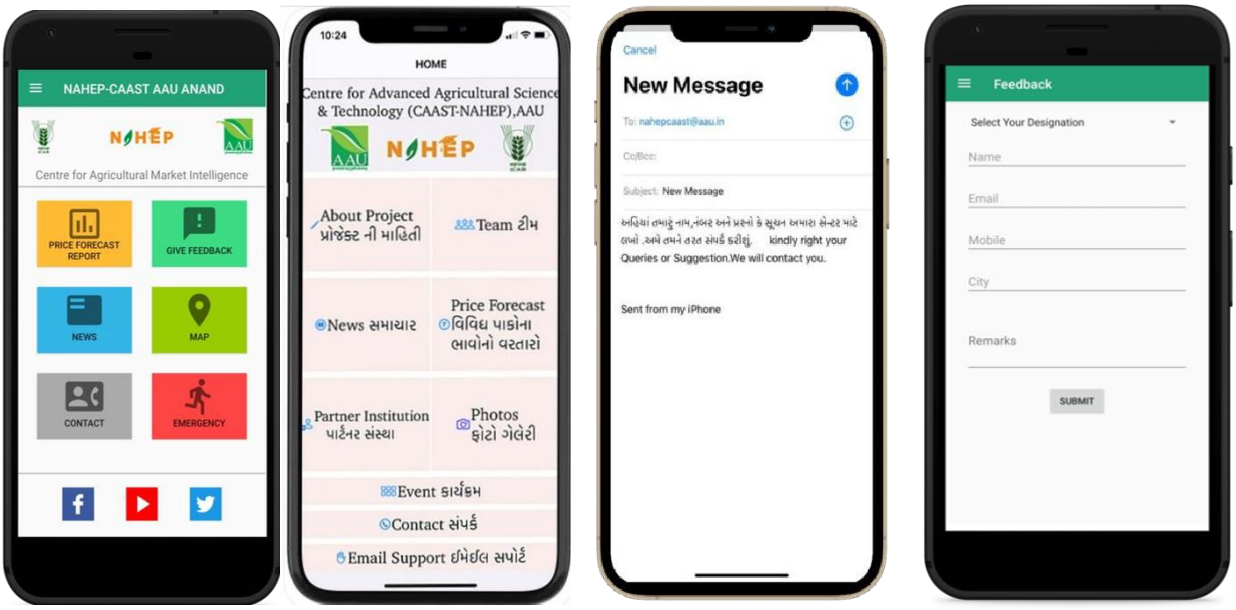
Annexure- II

1. Mobile Applications Developed

A. Android Application Link :
https://play.google.com/store/apps/details?id=com.nahep_aau.nahep_caast&pli=1

B. iOS application Link : https://apps.apple.com/in/app/nahepaau/id1542310929

2. **Mobile Applications developed** i-Kisansetu
Link : https://play.google.com/store/apps/details?id=com.aaunahep.ikisansetu&pli=1



3. Web Applications Developed

Website Link : http://nahep-caast.aau.in/

Website Visitors: 4805

Annexure: IV

1. No. of Posts on Social Media

Facebook: https://www.facebook.com/NAHEPCAASTANAND

Twitter : https://twitter.com/nahepcaast

Youtube : https://www.youtube.com/nahepcaastanand

Total Uploaded Videos in YouTube Channel: 194

Viewers: 4,21,113

Subscribers: 7670

LinkedIn : https://www.linkedin.com/company/nahep-caast-aau

2. No. of Posts on Newspaper : 194

r.no	Date	Name of News Paper	Total
	Inauguration		01
1.	2019	Times of India	
	Wheat & Cumin Forecasting		06
2.	19/05/2020	Navgujarat Samay	
3.	20/05/2020	Loksatta Jansatta	
4.	20/05/2020	Charotar no Avaz	
5.	21/05/2020	Charotar no Avaz	
6.	22/05/2020	Loksatta Jansatta	
7.	26/05/2020	Anand Today	
	Webinar on Goat farming		05
8.	02/06/2020	Sardar Gurjari	
9.	02/06/2020	Pratahkal	
10.	02/06/2020	Anand Today	
11.	02/06/2020	Charotar no Avaz	
12.	06/06/2020	Loksatta Jansatta	
	3. Webinar on eNAm		05
13.	11/06/2020	Sardar Gurjari	
14.	11/06/2020	Pratahkal	
15.	11/06/2020	Loksatta Jansatta	
16.	11/06/2020	Charotar no Avaz	
17.	11/06/2020	Charotar Bandu	
	Webinar on Impact of COVID-19 on Dairy and food processinng sector		04
18.	18/06/2020	Navgujarat Samay	
19.	18/06/2020	Sardar Gurjari	
20.	18/06/2020	Pratahkal	
21.	18/06/2020	Charotar no Avaz	
	webinar on Fisheries Business		04
22.	24/06/2020	Naya padkar	
23.	24/06/2020	Loksatta Jansatta	
24.	24/06/2020	Sardar Gurjari	
25.	24/06/2020	Charotar no Avaz	
	Webinar on Agricultural Market Reforms and Market Intelligence		06
26.	09/07/2020	Sardar Gurjari	
27.	09/07/2020	Naya padkar	
28.	09/07/2020	Pratahkal	
29.	09/07/2020	Charotar no Avaz	
30.	10/07/2020	Namaskar Gujarat	
31.	14/07/2020	Krushi Prabhat	
	Cotton & Groundnut Price Forecasting		06
32.	18/07/2020	Navgujarat Samay	
33.	18/07/2020	Krushi Prabhat	
34.	20/07/2020	Loksatta Jansatta	
35.	23/07/2020	Charotar bandhu	

36.	24/07/2020	Charotar no avaz	
37.	04/08/2020	Loksatta Jansatta	
	Webinar on farmer producer organization and commodity market		04
38.	29/07/2020	Naya Padkar	
39.	29/07/2020	Sardar Gurjari	
40.	29/07/2020	Pratahkal	
41.	03/08/2020	Loksatta Jansatta	
	Maize Price Forecasting		05
42.	06/08/2020	Krushi Prabhat	
43.	06/08/2020	Navgujarat Samay	
44.	06/08/2020	Divya samachar	
45.	07/08/2020	Pratahkal	
46.	10/08/2020	Loksatta Jansatta	
	10 Days Training on Research Methodology		06
47.	01-09-2020	Anand Today	
48.	02-09-2020	Charotar no avaz	
49.	02-09-2020	Pratahkal	
50.	03-09-2020	Krushi Prabhat	
51.	03-09-2020	Sardar Gurjari	
52.	03-09-2020	Divya samachar	
	Webinar on fruit & vegetable and Dairy commodities		02
53.	16-09-2020	Pratahkal	
54.	16-09-2020	Sardar Gurjari	
	Webinar on Market Dynamics in Poultry sector: perspectives and challenges		03
55.	21-09-2020	Sardar Gurjari	
56.	22-09-2020	Anand Today	
57.	22-09-2020	Naya Padkar	
	Webinar on International Trade in Agricultural Commodities		05
58.	23-09-2020	Anand Today	
59.	24-09-2020	Charotar no avaz	
60.	25-09-2020	Naya padkar	
61.	25-09-2020	Pratahkal	
62.	25-09-2020	Divya samachar	
	Webinar on technical writing		03
63.	20-10-2020	Sardar Gurjari	
64.	20-10-2020	Charotar no Avaz	
65.	22-10-2020	Charotar no Sougandh	
	Online Training on Space Technology and machine learning for Agriculture		02
66.	30-10-2020	Charotar no Avaz	
67.	31-10-2020	Sardar Gurjari	
	Price Forecasting (Groundnut, Cotton, Maize, Cumin, Wheat, Potato)		17
68.	17-10-2020	Anand Today- Groundnut	
69.	22-10-2020	Anand Today-Cotton	
70.	23-10-2020	Divya Samachar- Cotton	
71.	23-10-2020	Anand Today-Maize	
72.	23-10-2020	Charotar no Avaz-Cotton	
73.	24-10-2020	Pratahkal- Cotton	
74.	24-10-2020	Anand Today-Wheat	
75.	25-10-2020	Divya Samachar-Maize	

76.	25-10-2020	Navgujarat Samay-Maize	
77.	28-10-2020	Charotar no Avaz- Wheat	
78.	28-10-2020	Divya Samachar- Wheat	
79.	29-10-2020	Krushi Prabhat-Wheat	
80.	29-10-2020	Krushi Prabhat-Cumin	
81.	30-10-2020	Krushi Prabhat- Groundnut	
82.	30-10-2020	Krushi Prabhat- Cotton	
83.	31-10-2020	Krushi Prabhat-Potato	
84.	31-10-2020	Krushi Prabhat-Maize	
	Webinar on Modern Farming of Sandalwood		03
85.	04-11-2020	Sardar Gurjari	
86.	04-11-2020	Divya Samachar	
87.	04-11-2020	Krushi Prabhat	
	Webinar on શિયાળુ પાકોમાાં પોષણ વ્યવસ્થા		01
88.	9-11-2020	Krushi Prabhat	
	Online Seminar on Cost Effective and Innovative Green energy Initiatives for Futuristic Agriculture		02
89.	11-11-2020	Sardar Gurjari	
90.	11-11-2020	Naya Padkar	
	Webinar on જીવતાં જમીન સ્વસ્થ જમીન		
91.	09-12-2020	Pratahkal	
92.	09-12-2020	Sardar Gurjari	
	Online Seminar on Underutilized Horticultural Crops		04
93.	06-01-2021	Sardar Gurjari	
94.	06-01-2021	Krushi Prabhat	
95.	07-01-2021	Navgujarat Samay	
96.	07-01-2021	Naya Padkar	
	Online Seminar on Data Science for Agriculture		01
97.	14-01-2021	Krushi Prabhat	
	Online Training on Value Addition Milk Fruits & Vegetables		03
98.	19-01-2021	Krushi Prabhat	
99.	20-01-2021	Sardar Gurjari	
100.	21-01-2021	Naya Padkar	
	Online Seminar on Co-operative marketing in Gujarat		01
101.	31-01-2021	Sardar Gurjari	
	Online Seminar on Artificial Intelligence in Agriculture		01
102.	03-02-2021	Sardar Gurjari	
	Price Forecasting (Cumin, Wheat, Potato)		05
103	24-02-2021	Divya Samachar	
104	24-02-2021	Navgujarat Samay	
105	24-02-2021	Naya Padkar	
106	25-02-2021	Krushi Prabhat	
107	25-02-2021	Krushi Prabhat-Potato	
	Webinar on Startup Opportunities in Indian Fishery Sector		02
108	14-03-2021	Sardar Gurjari	
109	16-03-2021	Anand Today	
	Online Training on Sandalwood		02
110	10-04-2021	Sardar Gurjari	
111	13-04-2021	Anand Today	
	Price Forecasting (Groundnut, Maize, Cotton)		07

112	04-06-2021	Krushi Prabhat	
113	06-06-2021	Navgujarat Samay	
114	06-06-2021	Divya Bhaskar	
115	08-06-2021	Sandesh	
116	08-06-2021	Sandesh	
117	08-06-2021	Gujarat Samachar	
118	08-06-2021	Sardar Gurjari	
	World Environment Day celebration		03
119	08-06-2021	Navgujarat Samay	
120	08-06-2021	Divya Bhaskar	
121	10-06-2021	Krushi Prabhat	
	World Honey bee's day Celebration		03
122	20-06-2021	Sardar Gurjari	
123	20-06-2021	Naya Padkar	
124	22-06-2021	Krushi Prabhat	
	Inauguration Function of Renovated Building of centre for Agricultural Market Intelligence under NAHEP-CAAST		06
125	01-07-2021	Sardar Gurjari	
126	01-07-2021	Charotar no Avaz	
127	01-07-2021	Divya Samachar	
128	01-07-2021	Pratah Kal	
129	02-07-2021	Krushi Prabhat	
130	02-07-2021	Navgujarat samay	
	Orientation Program on J-Gate and CMIE Database		01
31	20-07-2021	Sardar Gurjari	
	પોલિહાઉસના પાકોમાાં રોગ જીવતન્ાં વ્યવસ્થપાન		04
132	25-07-2021	Sandesh	
133	25-07-2021	Sardar Gurjari	
134	25-07-2021	Divya Bhaskar	
135	25-07-2021	Krushi Prabhat	
	Webinar on Analysis of Pesticide Residues in Food & Agricultural Commodities		03
136	02-09-2021	Divya Bhaskar	
137	04-09-2021	Sardar Gurjari	
138	04-09-2021	Divya Samachar	
	Webinar on Prospect Functioning and commodity markets in India		02
139	21-09-2021	Sardar Gurjari	
140	22-09-2021	Sandesh	
	Five days Online Training program on Fish, Food & Future in 21st century		03
141	28-09-2021	Divya Bhaskar	
142	28-09-2021	Sardar Gurjari	
143	28-09-2021	Divya Samachar	
	Five days Online Training Program on Promotion of Public-Private Partnership in Agriculture and Allied Sectors		-
	Webinar on Climate Resilient Agricultural Production System through Organic Management		01
144	23-10-2021	Sardar Gurjari	
	Regional Seminar On Agricultural Market Intelligence: Prospects and Challenges		03
145	31-10-2021	Sandesh	

146	31-10-2021	Divya Samachar	
147	02-11-2021	Divya Bhaskar	
	Webinar on Remote Sensing and Machine Learning Technology for Precision Farming(29 November, 2021)		02
148	01-12-2021	Naya padkar	
149	02-12-2021	Sardar Gurjari	
	A Brainstorming Session for Effective Management of Farmer Producer Organizations (FPOs)28 December, 2021		01
150	28-12-2021	Sardar Gurjari	
	Five days Online Training Programme on 'Smart Farming Application of AI, Robotics, IoT & Cloud Computing' 28 Feb to 4 March, 2022		01
151	05-03-2022	Sardar Gurjari	
	Price Forecasting, Potato, Wheat		04
152	04-03-2022	Divya Samachar- Poatato	
153	04-03-2022	Madhya Gujarat Samay- Potato	
154	07-03-2022	Krushi Prabhat- Potato	
155	12-03-2022	Madhya Gujarat Samay- Wheat	
	Two-day Webinar on Emerging Agricultural Marketing Trends and Challenges		04
156	11-04-2022	Divya Bhasker	
	One Week Workshop cum Training Program on Data Analysis using Python, 23rd to 27th May, 2022		04
157	25-05-2022	Sardar Gurjari	
158	25-05-2022	Naya padkar	
159	01-06-2022	Divya Bhasker	
160	02-06-2022	Naya padkar	
	Two-day National Seminar on Experimental Designs in Agricultural Research, 23rd & 24th June, 2022		03
161	29-06-2022	Divya Bhasker	
162	30-06-2022	Naya padkar	
163	30-06-2022	Sandesh	
	Certificate Course on Data Analytics Using Python, 6th Aug. to 22nd Oct., 2022		03
164	15-11-2022	Sardar Gurjari	
165	15-11-2022	Naya padkar	
166	15-11-2022	Sardar Gurjari	
	Certificate Course on Statistical Analysis using R Software, 9th to 22nd Nov., 2022		01
167	16-11-2022	Divya Bhasker	
	One Day Seminar on Agri Business Opportunities through Services and Market Linkage, 10th November, 2022		02
168	12-11-2022	Sardar Gurjari	
169	14-11-2022	Divya Bhasker	
	International Training (Students and Staff)		11
170	25-11-2022	Gujarat Samachar	
171	25-11-2022	Divya Bhasker	
172	25-11-2022	Divya Samachar	
173	25-11-2022	Charotar no Avaz	
174	25-11-2022	Divya Bhasker	
175	29-11-2022	Sandesh	
176	30-11-2022	Divya Bhasker	
177	07-12-2022	Divya Bhasker	
178	20-01-2023	Sardar Gurjari	

179	23-01-2023	Divya Bhasker	
180	23-01-2023	Sardar Gurjari	
181	02-02-2023	Sardar Gurjari	
	Three Day Workshop on Dairy & Food Product Market Intelligence		02
182	17-12-2022	Sandesh	
183	19-12-2022	Sandesh	
	Certificate Course on e-Content Development using Multimedia		01
184	04-01-2023	Sardar Gurjari	
	Five-Day Workshop on "Changing Business Environment in Dairy and Food Sector"		03
185	08-02-2023	Sandes	
186	08-02-2023	Sardar Gurjari	
187	10-02-2023	Naya Padkar	
	Two Day Workshop on "Value Addition and Marketing of Millets"		03
188	21-02-2023	Sardar Gurjari	
189	22-02-2023	Divya Bhasker	
190	24-02-2023	Sandesh	
	Certificate Course on Agricultural Market Intelligence		02
191	24-02-2023	Sardar Gurjari	
192	03-03-2023	Divya Bhasker	
	Training Program on 'Women's Self Defiance'		02
193	02-03-2021	Naya Padkar	
194	03-03-2021	Sandesh	

Annexure- V

A. Student Foreign Visit Details (Total 40 participants)

Sr. No.	Student Name	Subject Area
CIMMYT, Mexico		
1.	P. L. N. Pravallika M.Sc. (Genetics & Plant Breeding)	Biofortification
2.	Mishra Sonal M.Sc. (Plant Pathology)	Wheat diseases and genetic analysis of grain Zn in wheat
Asian Institute Technology, Thailand		
1.	Adhikari Vivek M.Sc. (Agricultural Entomology)	Novel methods for pest management
2.	Modh Mihir Bharatkumar M.Sc. (Agronomy)	Effect of climate change and effect of biotic & abiotic stresses on agriculture production
3.	Patel Kena Sanjaykumar	IoT in horticulture

	MSc. (Vegetable Science)	
4.	Patel Kameshwar Kumar Pankajbhai M.Sc. (Horticulture)	Agrotechnology Innovations Toward Sustainability in Agriculture and Food Systems
5.	Prakasha R M.Tech. (Food Technology)	Post-harvest losses of food products
6.	Mohit S Rank M.Tech. (Food Process Engineering)	Food Engineering, technology and Management
7.	Dandwate Amruta Munjaji. M.Tech. (Food Technology)	Developing appropriate strategies for maximizing food production
8.	Rathwa Mayurbhai Kamrubhai. Ph.D (Agronomy)	Learn current micro-irrigation technologies and new strategies in crop production
9.	Shubham Dhakad M.Tech. (Farm Machinery and Power Engineering)	Advance farm machinery and novel technologies in spraying
10.	Ghanshyam Panwar Ph.D (Farm Machinery and Power Engineering)	Advanced farm machinery and precision agriculture
11.	Ghorband Anil Sheshrao Ph.D. (Food Technology)	Tools and techniques for preventing the post-harvest losses of horticulture crops
12.	Patel Hardi Vasantkumar M.Sc. (Agricultural Economics)	Agri-food supply chains
13.	Sukanya Baruri MBA (ABM) Agribusiness Management	Supply chain and export competitiveness and trade performance
14.	Gohel Prashant Raviibhai MBA (ABM) Agribusiness Management	Supply Chain Management
15.	Bhikadiya Ujas Utpalbhai MBA (ABM) Agribusiness Management	Agri-food supply chains
16.	Radadiya Anandi Shaileshbhai MBA (ABM) Agribusiness Management	Technological advancements in supply chain
17.	N. Naga Jyothi MSc (Plant Pathology)	Artificial intelligence in plant disease management
International Rice Research Institute (IRRI), Philippines		

1.	Vadodaria Hrushik K. M.Sc. (Genetics & Plant Breeding)	Genetic diversity analysis based on morphological traits and molecular markers
2.	Patel Hardik Harishchandra M.Sc. (Genetics & Plant Breeding)	Genetic analysis in cotton
3.	Prajapati Mansi Dineshkumar M.Sc. (Plant Pathology)	Methods of detection, diagnosis and management of rice diseases
4.	Treesa Thomas M.Sc. (Plant Molecular Biology & Biotechnology)	Development of putative RKN resistant tomato plants through cisgenesis using Mi-1 gene
5.	Dabhi Dharmesh Baldevbhai M.Sc. (Genetics & Plant Breeding)	Genetic studies & molecular characterization in Aromatic rice genotypes
6.	Karmata Riddhi S. M.Sc. (Genetics & Plant Breeding)	Rice Breeding
7.	Prajapati Pragati J. Ph.D. (Genetics & Plant Breeding)	Rice Breeding
8.	Makwana Sanjaykumar Natvarlal Ph.D. (Agronomy)	New ground-breaking approach currently trending in agriculture
Sabaragamuwa University of Sri Lanka, Srilanka		
1.	Patel Payalkumari Maheshbhai MBA (ABM) Agribusiness Management	International Fish Marketing
2.	Darji Dhawni Rajeshkumar MBA (ABM) Agribusiness Management	International trade
3.	Vachhani Deepkumar Rameshbhai MBA (ABM) Agribusiness Management	Farmer Producers Organizations
4.	Bhatiya Montu Navneetbhai MBA (ABM) Agribusiness Management	Rice Market Analysis
5.	Dhola Abhishek Jagdishbhai MBA (ABM) Agribusiness Management	Tea: International trade
Teagasc Food Research Centre, Ireland		
1.	Gandhi Rajdeep Rameshchandra	Advanced and emerging technologies in processing and food engineering

	M.Tech. (Processing and Food Engineering)	
2.	Shraddha Sethi M.Tech. (Processing and Food Engineering)	Novel technologies for drying of vegetables
Western Sydney University, Australia		
1.	Sherin Maria Saji M.Sc. (Agricultural Extension Education)	Digital Agriculture: A Forward-Looking Strategy to Bolster Extension Activities
2.	Harshith N. M.Sc. (Agricultural Statistics)	Agricultural forecasting using Machine learning and Neural networks
Ben-Gurion University of the Negev, Israel		
1.	Chaudhary Hetviben Mahendrabhai M.Sc. (Genetics & Plant Breeding)	Study of recent advances in molecular mechanisams of plant-insect interactions
2.	Chachapara Bhautik Arvindbhai M.Sc. (Agricultural Entomology)	Study of recent advances in molecular mechanisams of plant-insect interactions
Aberystwyth University, UK		
1.	Acharya Vishwas Rajeshkumar PhD (Genetics & Plant Breeding)	Genomics and its allied applications in crops
International Water Management Institute (IWMI), Nepal		
1.	Sathish Kumar Murugan PhD (ABM) Agribusiness Management	Financial analysis of Solar irrigation practices

B. Faculty Members Foreign Visit Details (Total 20 participants)

Sr. No.	Faculty Name	Subject Area
Teagasc Food Research Centre, Ashtown, Dublin, Ireland		
1.	Dr. Suresh Rajabhau Bhise Assistant Professor Department of Food Processing Technology	Sustainable packaging interventions by hyperspectral imaging techniques
2.	Dr. Govind Pradip Tagalpallewar Assistant Professor Department of Food Processing Technology	Disruptive technology applicable to food

3.	Dr. Bhaveshkumar H. Joshi Associate Professor Department of Food Quality Assurance	Bacteriophage as a bio control agent to enhance microbial safety in the food industry.
4.	Dr. Farid G. Sayyad Assistant Professor Processed & Food Engineering, PAE, Dahod	Mathematical modelling on drying of horticulture co-products
Western Sydney University, Australia		
1.	Dr. Prity Kumari Assistant Professor Department of Agricultural Statistics	Deep Learning
2.	Dr. Gautam R. Patel Registrar, AAU, Anand	Administration, Research, Teaching, Collaboration and partnership discussion.
3.	Dr. R. S. Pundir Principal and Dean, IABMI & PI, NAHEP-CAAST, AAU, Anand	Administration, Research, Teaching, Collaboration and partnership discussion.
4.	Dr. Samit Dutta Principal & Dean, College of FPT & BE and CCPI, NAHEP-CAAST, AAU, Anand.	Administration, Research, Teaching, Collaboration and partnership discussion.
5.	Dr. M. K. Jhala Director of Research and Dean PG Studies, AAU, Anand	MoU, Administration, Research, Teaching, Collaboration and partnership discussion.
The National Geological Surveys for Denmark and Greenland (GEUS), Denmark		
1.	Dr. Ravikumar Kalasariya Assistant Research Scientist AINP-PR, ICAR Unit -9	Monitoring and assessment of pesticide residues leaching in field condition
2.	Dr. Rathod Pareshkumar H. Assistant Research Scientist & Head AINP-PR, ICAR Unit -9	Monitoring and assessment of pesticide residues leaching in field condition
Prifysgol Aberystwyth University, UK		
1.	Dr. Rajeshkumar Acharya Professor Genetics & Plant Breeding, MVRS.	Phenomics and its allied applications for crop improvements.

2.	Dr. Sanjay Akbari Associate Professor & HOD Food Plant Operations	Sustainable and opportunistic future food considering the climate change and clean energy
Asian Institute of Technology (AIT), Bangkok, Thailand		
1.	Dr. Kaushikkumar Parmar Residual Analyst AINP-PR, ICAR Unit- 9	Integrated Pest Management in changing climate
2.	Dr. Ganga Devi Assistant Professor Department of Agricultural Economics	Impact of Farmer Producer Organisation (FPOs) on Rural Livelihood
The Royal Veterinary College, University of London, UK		
1.	Dr. Koringa Prakash G. Assistant Professor Department of Animal Biotechnology	Educational Research to explore "One Health approach"
CSIRO Land and Water flagship laboratory, Australia		
1.	Dr. Dileep Kumar Assistant Professor Micronutrient Research	Heavy Metals in relation to soil plant health
Obihiro University of Agriculture & Veterinary Medicine, Japan		
1.	Mr. Dhingani Rashmin Mansukhbhai Assistant Professor Department of Food Quality Assurance	Analysis of food derived potentially bioactive components; Bio peptides
Global Change Research Institute, Brno, Czech Republic		
1.	Dr. Ghanshyam B. Patil Assistant Professor Department of Agricultural Biotechnology	Plant Phenotyping and multi-omics (Genomics and Metabolomics)
McGill University, Canada		
1.	Dr. Mukesh K. Tiwari Assistant Professor Department of Irrigation and Drainage Engineering	Water Resource Management using Artificial Intelligence and Deep Learning Technique
International Rice Research Institute (IRRI), Manila, Philippines		
1.	Dr. Akarsh Parihar Professor Department of Genetics and Plant Breeding	Breeding modernizations and strategies to enhance genetic gains

Annexure- VI

Under the capacity building component of the project, the centre has organized various national and state-level capacity building programmes, namely, workshops, webinars, online seminars, guest lectures, etc. in areas of agricultural market intelligence, agricultural trade, dairy, veterinary, food processing, fisheries and other allied agricultural subjects for faculties, students, farmers, entrepreneurs and policymakers.

A total 103 programs were conducted under capacity building component of the project.

Sr. No.	*Title of the Program*	*Date*
1	*Workshop on Price Forecasting: Methodology and Approaches*	*19th to 21st December, 2019*
2	*Workshop cum Training on Remote Sensing, Data Science & Agro-Block Chain for Market Intelligence*	*31st Jan to 2nd February, 2020*
3	*Workshop cum Training on Role of Farmer Producer Organizations (FPOs) in Enhancing Farmers' Income*	*12th & 13th February, 2020*
4	*Guest Lecture on Food Processing and Value Addition under Lecture Series on Food Processing and Value Addition*	*15th February, 2020*
5	*Guest Lecture on Use of Technology in Fishery Marketing and Trade under Lecture Series Fisheries on Market Intelligence and Environmental Sustainability*	*15th February, 2020*
6	*Guest Lecture on Water Management with focus on Eastern States under Lecture Series on Fisheries Market Intelligence and Environmental Sustainability*	*17th February, 2020*
7	*Workshop cum Training on Market Analytics with R - Phase I*	*24th to 26th February, 2020*
8	*Workshop cum Training on Methodology for price forecasting, market competitiveness and export opportunities assessment for dairy and food products*	*28th & 29th February, 2020*
9	*Workshop cum Training on Market Analytics with R - Phase II*	*2nd to 4th March, 2020*
10	*Webinar on Goat Farming: Potential Opportunity for Agribusiness*	*30th May, 2020*
11	*Webinar on eNAM: Challenges and Prospects*	*10th June, 2020*
12	*Webinar on Impact of COVID-19 on Dairy and Food Processing Sector*	*16th & 17th June, 2020*
13	*Webinar on Fishery Business Eco-system in India*	*22nd & 23rd June, 2020*

14	*Webinar on Agricultural Market Reforms and Market Intelligence*	*7th & 8th July, 2020*
15	*Webinar on Farmer Producer Organizations and Commodity Markets*	*27 & 28 July, 2020*
16	*Online Guest Lecture on Opportunities for Probiotic Functional Foods in India under the Lecture Series on Food Processing & Value Addition*	*7 August, 2020*
17	*State Level Webinar on Exisitng Questins of Plant Protection in Kharif Crops*	*20 August, 2020*
18	*Guest Lecture on Sustainable Agri-Entrepreneurship: Case Study analysis under Lecture Series on Agripreneurship*	*28 August, 2020*
19	*Guest Lecture on Enabling Ecosystem for Agripreneurship under Lecture Series on Agripreneurship*	*28 August, 2020*
20	*Online Guest Lecture on Changing Behaviour of Fish Consumers and Probable Market Segmentation in India under the Lecture Series on Fisheries Market Intelligence and Environmental Sustainability*	*29 August, 2020*
21	*Ten day training programme on Research Methodology for Social Sciences*	*1 to 11 September, 2020*
22	*Webinar on Trade in F&V Products & Dairy Commodities*	*15 September, 2020*
23	*Webinar on Plant Protection Measures in Cotton*	*16 September, 2020*
24	*Webinar on Market Dynamics in Poultry Sector: Perspectives and Challenges*	*17 & 18 September, 2020*
25	*Webinar on International Trade in Agricultural Commodities*	*21 to 23 September, 2020*
26	*Guest Lecture on Innovation and Incubation to connect modern science with farmers under Lecture Series on Agricultural Market Intelligence*	*25 September, 2020*
27	*Guest Lecture on Bankers perspective to Rural India under Lecture Series on Agricultural Market Intelligence*	*27 September, 2020*
28	*Guest Lecture on Warehousing and Collateral Management under Lecture Series on Agricultural Market Intelligence*	*3 October, 2020*
29	*Webinar on Plant Protection in Vegetable Crops of Rabi Season*	*6 October, 2020*
30	*Guest Lecture on Chicken Egg: Nutritive Value, Myths vs Facts under Lecture Series on Incredible Chicken Eggs*	*9 October, 2020*
31	*Guest Lecture on Everything About How Chicken Eggs Are Produced under Lecture Series on Incredible Chicken Eggs*	*9 October, 2020*
32	*Webinar on Technical Writing*	*16 & 17 October, 2020*
33	*Webinar on Plant Protection in Organic Farming*	*27 October, 2020*
34	*Online Training on Space Technology and Machine Learning for Agriculture*	*28 & 29 October, 2020*
35	*Webinar on Modern Farming in Sandalwood*	*2 November, 2020*
36	*Guest Lecture on Export of Value Added Traditional Dairy Products under the Lecture series on Food Processing and Value Addition*	*5 November, 2020*
37	*Webinar on Nutrient Management in Winter Crops*	*9 November, 2020*

38	*Online Seminar on Cost Effective and Innovative Green Energy Initiatives for Futuristic Agriculture*	*11 November, 2020*
39	*Webinar on Live Soil: Healthy Soil*	*5 December, 2020*
40	*Online Training on Accounting for Climate Risk in Crop Yield Modeling*	*7 to 11 December, 2020*
41	*Online Seminar on Paradigm Shift in Mechanization for Futuristic Agriculture*	*16 December, 2020*
42	*Online Seminar on Advances in micro-irrigation and fertigation for improving water use efficiency and crop productivity*	*18 December, 2020*
43	*Online Seminar on Protected cultivation for enhancing resource use efficiency and productivity of horticultural crops*	*22 December, 2020*
44	*Online Seminar on Underutilized Horticultural Crops*	*5 January, 2021*
45	*Guest Lecture on Fisheries Business Incubation for Sustainable Production to Marketing under the Lecture Series on Fisheries Market Intelligence and Environmental Sustainability*	*8 January, 2021*
46	*Webinar on Data Science for Agriculture*	*12 January, 2021*
47	*Five-Day Training Program on Value-Addition in Milk, Fruits & Vegetables: A Success Mantra for Agripreneurs*	*18 to 22 January, 2021*
48	*Online Seminar on Co-operative Marketing in Gujarat*	*30 January, 2021*
49	*Webinar on Artificial Intelligence in Agriculture*	*2 February, 2021*
50	*Special Guest Lecture on Aiming for Productive Conversation on Gender Equity in Turbulent times*	*8 March, 2021*
51	*Webinar on Startup Opportunities in Indian Fishery Sector*	*10 March, 2021*
52	*Special Guest Lecture on Social Equity – Recognizing and Facilitating Women Contribution to Agriculture*	*8 April, 2021*
53	*Online Training on Sandalwood*	*9 to 11 April, 2021*
54	*Webinar on Madhmakhi Palan*	*20 May, 2021*
55	*Online Orientation Programme on J-Gate and CMIE Database*	*16 & 17 July, 2021*
56	*Special Guest Lecture on Salient Features of the Sales Promotion Employees (Conditions of Service) Act, 1976 for Sales Promotion Employees*	*20 July, 2021*
57	*Webinar on Disease and Pest Management in Playhouse Crops*	*23 July, 2021*
58	*Special Guest lecture on What's the future for agriculture: The case for entrepreneurial thinking?*	*27 August, 2021*
59	*Webinar on Analysis of Pesticide Residues in Food & Agricultural Commodities*	*27 August, 2021*
60	*Guest Lecture on Fish–to –2030 and Startups*	*13 September, 2021*

61	*Guest Lecture on Role of Renewable Energy for Sustainable Development of Rural India under Lecture series on Paradigm Shift in 4th & 5th Generation Agriculture*	*15 September, 2021*
62	*Guest Lecture on Role of Engineering Interventions in 4th and 5th Generation Agriculture under Lecture series on Paradigm Shift in 4th & 5th Generation Agriculture*	*15 September, 2021*
63	*Webinar on Prospects and Functioning of Commodity Markets in India*	*17 & 18 September, 2021*
64	*Five Day Training on Fish, Food and Future in the 21st Century*	*20 to 24 September, 2021*
65	*Five Days Online Training Program on Promotion of Public - Private Partnership in Agriculture and Allied Sector*	*27 September to 1 October, 2021*
66	*Special Guest Lecture on Future of Dairy Commodity Trade – A Post-Pandemic Scenario*	*14 October, 2021*
67	*Guest Lecture on Rural Marketing Strategies – Issue & Challenges in Present Situation under Lecture series on Global Market Intelligence*	*18 October, 2021*
68	*Guest Lecture on Trade Scenario of Processed Agricultural Commodities under Covid-19 Pandemic Situation under Lecture series on Global Market Intelligence*	*18 October, 2021*
69	*Webinar on Climate Resilient Agricultural Production System through Organic Management*	*20 & 21 October, 2021*
70	*Regional Seminar on Agricultural Market Intelligence: Prospects and Challenges*	*28 and 29 October, 2021*
71	*Webinar on Remote Sensing and Machine Learning Technology for Precision Farming*	*29 November, 2021*
72	*A Brainstorming Session for Effective Management of Farmer Producer Organizations (FPOs)*	*28 December, 2021*
73	*Special Guest Lecture on Potato Post-harvest Losses and Mycotoxin Contamination in the Human Food Chain*	*5-Jan-2022*
74	*Five days Online Training Programme on 'Smart Farming Application of AI, Robotics, IoT & Cloud Computing'*	*28 Feb to 4 March, 2022*
75	*Guest Lecture on Total factor productivity estimation and returns to research investment in India under Lecture Series on Agricultural Market Intelligence and e-NAM*	*5 March, 2022*
76	*Guest Lecture on Food and nutrition security in India: The Way Forward under Lecture Series on Agricultural Market Intelligence and e-NAM*	*5 March, 2022*
77	*Guest Lecture on Demand and Supply Analysis- I under Lecture Series on Agricultural Market Intelligence and e-NAM*	*7 March, 2022*
78	*Guest Lecture on Demand and Supply Analysis- II under Lecture Series on Agricultural Market Intelligence and e-NAM*	*7 March, 2022*
79	*Webinar-based Program 'Sambhav' NLAP 2022 on Entrepreneurship*	*28th March, 2022*
80	*Seminar on Plant Protection in Natural Farming*	*5th April, 2022*

81	*Guest Lecture on Managing Weather and Climatic related Constraints in Agriculture by Agrometeorological Interventions under Lecture Series on Climate Change Indicators for the Israeli Agriculture*	*21st April, 2022*
82	*Seminar on Digital Marketing in Agriculture*	*22nd April, 2022*
83	*Two day Webinar on Emerging Agricultural Marketing Trends and Challenges*	*29th & 30th April, 2022*
84	*Webinar on Satellite Farming*	*9th & 10th May, 2022*
85	*One Week Workshop cum Training Peogram on Data Analysis using Python*	*23rd to 27th May, 2022*
86	*Guest Lecture on Crop Modeling for Climate Change Mitigation and Adaptation*	*8th June, 2022*
87	*Two day National Seminar on Experimental Designs in Agricultural Research*	*23rd & 24th June, 2022*
88	*Brainstorming Session on Status and Problems in Effective Implementation of eNAM at APMCs with APMCs Officers*	*28th July, 2022*
89	*Two Day National Seminar on "Modelling Techniques for Agricultural Applications"*	*5th & 6th August, 2022*
90	*Certificate Course on Data Analytics Using Python*	*6th Aug. to 22nd Oct., 2022*
91	*Guest Lecture on Nutrient Enrichment, Processing and Marketing of Chicken Eggs under Lectures on Goodness of Chicken Egg: Nature's Perfect Food*	*14th October, 2022*
92	*Guest Lecture on Production, Nutritive values, Myths bursting and Facts about Chicken Eggs under Lectures on Goodness of Chicken Egg: Nature's Perfect Food*	*14th October, 2022*
93	*Certificate Course on Statistical Analysis using R Software*	*9th to 22nd Nov., 2022*
94	*One Day Seminar on Agri Business Opportunities through Services and Market Linkage*	*10th November, 2022*
95	*Three Day Workshop on Dairy & Food Product Market Intelligence*	*15th to 17th Dec., 2022*
96	*Certificate Course on e-Content Development using Multimedia*	*28th Dec., 2022 to 10th Jan., 2023*
97	*Certificate Course on Statistical Analysis using SPSS Software*	*23rd Jan. to 4th Feb., 2023*
98	*Five-Day Workshop on "Changing Business Environment in Dairy and Food Sector"*	*6th to 10th February, 2023*
99	*Two Day Workshop on "Value Addition and Marketing of Millets"*	*20th & 21st February, 2023*
100	*Certificate Course on Agricultural Market Intelligence*	*23rd February to 10th March 2023*

101	*Training Program on 'Women's Self Defiance'*	*28th February to 3rd March, 2023*
102	*Guest Lecture on 'Breaking the Glass Ceiling'*	*3rd March, 2023*
103	*Guest Lecture on 'Agriculture Market Research- As a Career Option'*	*24th March, 2023*
104	Certificate Course on "Data Analytics Using Python"	5th to 17th June, 2023
105	Guest Lecture on "Defining Crop Varietal Diversity using Metabolic Fingerprinting''	21st June, 2023
106	One Day Seminar on "Sample Size and Sampling Methods in Agriculture and Allied Sciences"	30th June, 2023
107	Certificate Course on "Statistical Analysis using R Software"	24th July to 5th August, 2023
108	Two Day National Seminar on "Digital Agricultural Marketing"	3rd & 4th August, 2023
109	Ten Day training Program on "Agri Supply Chain Management"	1 to 11 September, 2023
110	One Day Workshop on "Role of APMCs, Market Intelligence & FPOs in Enhancing Farmers' Income"	14th September, 2023
111	21 Days Training Program on "Fostering Foundations: A Journey into R and Python for Data Analytics"	14th September to 4th October, 2023
112	"પાક સંરક્ષણ અને બજાર વ્યવસ્થાપન સમસ્યા અને સમાધાન" વિષય ઉપર એક દિવસીય ખેડૂત સંવાદ	30th September, 2023
113	One Week Training Program on "Fundamentals of Finance for Non-financial Individuals in the area of Agri and Allied Sectors"	25th to 30th September, 2023
114	Ten Day training Program on "Dairy Business Management"	4th to 13th October, 2023
115	21 days training program on "Agripreneurship for Atma Nirbhar Bharat"	6th to 26th October, 2023
116	One Week training program on "Entrepreneurship Development Opportunities in The Livestock and Poultry Sector"	16th to 21st October, 2023
117	Ten Day training Program on Dairy and Food Business Management in 21st Century	25th October to 3rd November, 2023
118	One Day Program on "Ayurveda for One Health– Ayurveda for Farmers"	27th October, 2023
119	Certificate Course on "Agricultural Insurance"	30th October to 3rd November, 2023
120	One Week Training Program on "Agri-Rural Institutional Arrangement for Rural Prosperity"	1st to 7th November, 2023
121	International Conference on "Driving Agriculture Forward: Recent Trends and Innovations in Agricultural Market Intelligence"	11th to 13th December, 2023
122	One day training program on "Natural Farming"	22nd December, 2023

Details of Participants

Particulars/Progrms	***Total Programs***	***Students***	***Faculties***	***Farmers & others***	***Total***

National and State-level capacity building programs, namely, workshops, trainings, webinars, online seminars, guest lectures, etc.	*122*	*45560*	*20641*	*18635*	***84836***

Details of International Speakers

Sr. No.	***Name and Designation***	***Topic***	***Date***
1.	*Dr. Brian K Slater* *Associate Professor Associate Director College of Food, Agricultural and Environmental science School of Environment and Natural Resources The Ohio State University, USA.*	*Delivered key note address in two days online training on "Space Technology and Machine Learning for Agriculture"*	*28 October, 2020*
2.	*Dr. Sakthi Subburayalu* *Research Assistant Professor , Dept. of Soil Science and Agronomy Agricultural Research Development Program Central State University, Ohio, USA.*	*Delivered lecture on Ohio-Gujarat Remote Sensing for Agriculture Partnership in two days online training on "Space Technology and Machine Learning for Agriculture"*	*28 October, 2020*
3.	*Dr. Lav Khot* *Associate Professor of Precision Agriculture Centre for Precision and Automated Agril. Systems Department of Biological Systems Engineering Washington State University, USA*	*Delivered lecture on Precision Agriculture & Automation Technologies for Specialty Crop Production Management in the Online Seminar "Paradigm Shift in Mechanization for Futuristic Agriculture"*	*16 December 2020*

4.	*Dr. Sameer Rohadia* *IT Trainer & Data Analyst Hannover, Germany*	*Delivered lecture on Keynote address in the Webinar on "Data Science for Agriculture"*	*12 January, 2021*
5.	*Dr. Peter Osterberg* *Researcher, Dept. of Economics and Management, Faculty of Agriculture Forestry Head of the Well-being team, University of Helsinki, Finland*	*Delivered Guest Lecture on "What's the future for agriculture: The case for entrepreneurial thinking?"*	*27 August, 2021*
6.	*Prof. Athula Ginige* *Professor, Western Sydney University, Australia*	*Delivered lecture on "Digitalization of agriculture and public-private partnership: A case Study" in the five days training program on "Promotion of Public-Private Partnership in Agriculture and Allied Sector"*	*30 September, 2021*
7.	*Mr. Kevin Bellamy Global Sector Head* *Rabobank – Dairy Sector, PO Box 17100 (UC 053), 3500 HG Utrecht (NL)* *The Netherlands*	*Delivered Guest Lecture on "Future of Dairy Commodity Trade – A post-pandemic scenario"*	*14th October 2021*
8.	*Dr. Ittai Herrmann* *The Robert H Smith Faculty of Agriculture, Food and Environment,* *Hebrew University of Jerusalem, Israel*	*Delivered lecture on Crop traits estimation by spectral sensing – can we assess what we do not see? in the Webinar on "Remote Sensing and Machine Learning Technology for Precision Farming"*	*29 November, 2021*
9.	*Dr. Alexandre Rutikanga* *Deputy Chief Executive Officer ,Sustainable Agriculture and Livestock Initiative (SALI), Aberdeen, Scotland, United Kingdom*	*Delivered Guest Lecture on "Potato Postharvest Losses and Mycotoxin Contamination in the Human Food Chain"*	*5 January, 2022*
10.	*Ugochukwu Godson Ikpeoha* *Founder, UGOvations Limited, Nigeria*	*Delivered lecture on Embedded system and Iot devices for smart farming in a five day training program on 'Smart Farming: Application of AI, Robotics, IoT & Cloud Computing'*	*2 March, 2022*