ICAR-National Agricultural Higher Education Project

Project Report (up to Dec 31, 2023)

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

Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur

Title of Project: Skill Development to Use Spatial Data for Natural Resources Management in Agriculture

Jawaharlal Nehru Krishi Vishwa Vidyalaya,

Krishi Nagar Colony, Adhartal, Jabalpur, Madhya Pradesh 482004

Executive summary

Name of the AU: Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur

Project Title: Skill Development to Use Spatial Data for Natural Resources Management in Agriculture

Executive Summary:

ICAR-NAHEP-CAAST at Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV), Jabalpur, established in the March 2020 has achieved significant milestones in the implementation of the CAAST project on Skill Development to Use Spatial Data for Natural Resources Management in Agriculture. The project aimed to build capacity in geospatial techniques for natural resource management in agriculture, to identify and solve problems using remote sensing and GIS technology and to develop user-friendly spatial products for policymakers, researchers and farmers.

To achieve this goal, JNKVV CAAST established a capacity-building laboratory that provides both in-person and online training opportunities to university faculty, scientists, KVK staff, administrators, and PG students. The laboratory features advanced digital infrastructure and tools for image processing, GIS, and proximal remote sensing instruments. It includes digital podium, 38 digital terminals with image processing software, and high-speed internet access. The centre prepared comprehensive hands-on training manuals for the participants, allowing them to learn how to use geospatial data and software in a controlled environment. Since 2020, the centre has organized 155 capacity building programs for students, faculty, scientists, and government officers from various agricultural universities, KVKs, and government departments. A total of 21731 individuals have been benefited from capacity-building programs, including 19620 students and 2111 faculty members with all categories and gender.

The ICAR-NAHEP-CAAST at JNKVV has also established a cutting-edge spatial data analysis laboratory equipped with 20 workstations having advanced hardware and software to promote spatial data research and experimentation with novel spatial analysis methods. A capacity building centre has been developed with 35 digital terminals equipped with audio visuals and internet facility. Spatial maps on 18 different themes are prepared in the project which is related to mapping and monitoring of natural resources viz., soil, water, vegetation and climate. The centre has developed five interactive digital maps and Nine user-friendly mobile and web applications to

disseminate geospatial information to a wider audience, supporting research and decision-making.

As major objective of CAAST the post graduate students were addressed for their betterment in learning advanced techniques in their respective discipline. More than 2134 PG and PhD students from 17 different departments of all three faculties of JNKVV, faculty of agriculture, faculty of horticulture and faculty of agricultural engineering are trained under the themes of the project, guided for research topics and facilitated in experimentation and analysis. As an outcome of the project 44 students from 12 departments conducted their research covering different areas of spatial data application in the field of agriculture and allied sector.

The programs conducted by the project under Environmental Sustainability Plan (38) with 2702 participants and Equity Action Plan (27) with 5120 participants, were related to personality development and awareness of concurrent subjects as climatic change, Artificial Intelligence, machine learning, big data analysis and Internet of Things. It has created a positive environment among faculty and students to improve effectiveness of teaching and research which is reflected in enhanced number of successful candidates in all India competitive examinations for entry to Higher Education in India and abroad as well as selection at national level. The research work of students going through the project has also been awarded at different forum.

Overall, the NAHEP-CAAST enabled JNKVV to establish a supportive environment for faculty and students to learn and acquire the skills needed to develop innovative and impactful spatial products using Remote Sensing and GIS, that support natural resource management in agriculture.

Introduction

Background of the project:

In recent years, there has been a growing need to improve the standard and quality of agricultural higher education to enhance the relevance of teaching and research for the agriculture. The investment under the component of Centre of Advanced Agricultural Science & Technology (CAAST) has focused on the development of multidisciplinary faculty, innovative approaches to teaching and research, technology development and commercialization. The objective of the CAAST component is to make agricultural universities (AUs) globally competitive and locally relevant by strengthening the industry orientation of agricultural science and technology generation system through strengthened association and partnerships.

Geospatial data is indispensable in all sectors of development, particularly in agriculture where it can have a significant impact. Spatio-temporal satellite images play a great role in precision agriculture. They provide information regarding land type and vegetation including biomass and water stress in crops. Precision agriculture is a crop management concept, field-specific, which uses real-time data gained by employing wireless sensors, RS & GIS to make smarter decisions for better productivity. Fortunately, our country is self-reliant in space technology. The use of remote sensing data for natural resource management is increasing worldwide. However, analysing remote sensing data requires specialized skills, expensive software, hardware and training. To harness the benefits of remote sensing technology, there is a need for sufficient trained manpower.

Introduction of the project:

To achieve these objectives, Jawaharlal Nehru Krishi Vishwa Vidyalaya in Jabalpur has been awarded the CAAST on Skill Development to Use Spatial Data for Natural Resources Management in Agriculture. The project aims to build basic capacity for using Remote Sensing (RS) and Geographic Information System (GIS) techniques for the betterment of natural resource management, particularly in agriculture and allied sectors. The project aims to identify appropriate techniques for integration of spatial and ground data to realize problems related to land, water, and vegetation, and develop user-friendly spatial data products using identified technologies for policy makers, researchers, field workers, and farmers.

Title and key objectives:

The title of the project is "Skill Development to Use Spatial Data for Natural Resources Management in Agriculture". The main objectives of the project were:

- To build basic capacity for using RS and GIS techniques applied for the betterment of Natural Resource Management, particularly in Agriculture and allied sectors.
- To identify appropriate techniques for integration of spatial and ground data to realize problems related to land, water, and vegetation.
- To develop user-friendly spatial data products using identified technologies for policy makers, researchers, field workers, and farmers.

Activities

- Awareness program for Students
- Introductory program for administrators
- Educative learning for executives
- Capacity building for Scientists, Teachers, officials, students and young professionals
- National and international Training of faculty for knowledge upgradation
- Problem identification in realizing process with satellite and ground data with techniques available.
- Making the spatial data maps more precise and accurate using fine resolution data available with present satellite systems.
- Providing research fellowship to the students undergoing master and doctoral degree involved to undertake research project on related aspects.
- Preparation of Theme based maps
- Preparation of Integrated maps for decision making
- To develop user friendly spatial data products using identified technologies for policy makers, researchers, field workers and farmers.

Intended benefits:

The project's activities were designed to benefit various stakeholders involved in agricultural higher education and research. The project has following intended benefits:

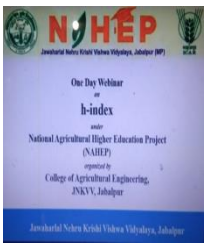
- Increased awareness and curiosity about the capabilities of spatial data among students and administrators.
- Learned executives to accept remote sensing and GIS approaches for fieldwork.

- Capable scientists, teachers, officials, students, and young professionals in using spatial data for various application areas.
- National and international exposure for faculty.
- Development of theme-based and integrated maps for decision making.
- User-friendly spatial data products for policy makers, researchers, field workers and farmers.

Overall, these activities were expected to generate skilled manpower that is well-versed in using remote sensing and GIS capabilities and capable of applying spatial data for various application areas. The project has enabled students and faculty to create thematic maps and integrate them for desired applications, thereby facilitating better decision making in managing land, water, and vegetation in agriculture.

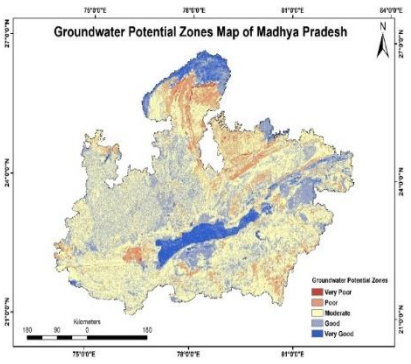
1. Key activities carried out under the project during the entire period

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

Key interventions	*Remarks/Photographs*
Advanced instrumentation introduced • Plant Canopy Analyzer • Line Quantum PAR Sensor • Spectro-radiometer • Hyper Spectro-radiometer • Chlorophyll SPAD meter • Network Attached Storage System • Global Positioning System • Digital soil moisture meter • Digital Planimeter • Chartometer • Thermal imaging camera Provided hands-on training in satellite image processing, image interpretation, GIS and the use of remote sensing instruments.	 • Access to state-of-the-art technologies for students and faculties to collect, process and analyze data effectively with satellite and proximal remote sensing and RS & GIS software enabled the university to attain high-quality research in geospatial data application for natural resource management.
Seminar/Webinar for Enhancing Research Skills: • Forming peer groups for learning • Thesis Writing and evaluation • h-Index Enhancement • Improving language competency in spoken English • Improving language in competency in writing English • Awareness program on Plagiarism	  Improved thesis and research article writing skills. Lead to increase in h-index by 8% during 2020-2023.

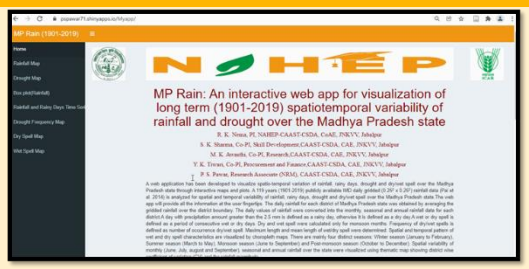
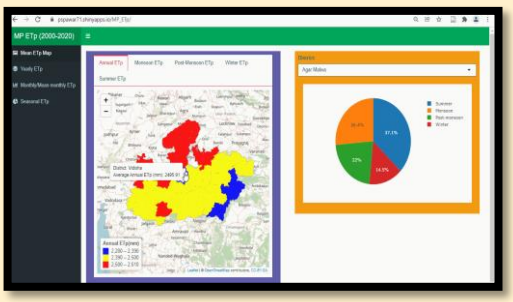
1.2. How the facilitative units helped to enhance learning outcomes

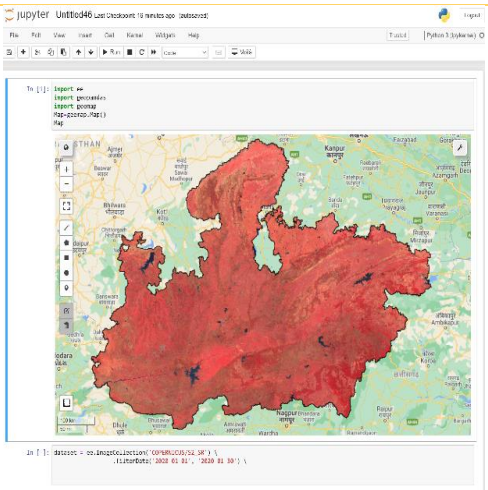
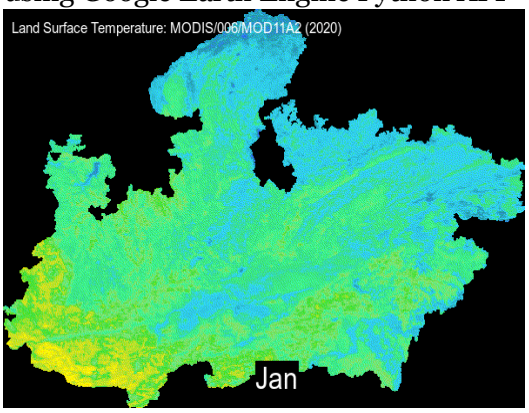
Facilitative unit	*Activity/achievement*	*Remarks/Photographs*
Capacity Building Lab with capacity of 35 participants to work on 35 digital terminals with RS & GIS software	• Building the skills of both faculty and students in using geospatial data for natural resource management in agriculture. • Hands-on training in satellite image processing, image interpretation, GIS,	

	and the use of remote sensing instruments. • A total of 1648 students and 663 faculties from various agricultural universities benefited from the online and offline training programs.	
Spatial Data Lab with 20 highly configured workstations including software namely ERDAS IMAGINE, ArcGIS, ENVI, MODFLOW, MIKE SHE and MATLAB	• Use of satellite data of different locations and for different time period • Using spatial data in research, testing new approaches of spatial analysis • Developing user-friendly spatial information for different stakeholders. • 30 Ph.D. and 14 PG students have completed projects on various topics using Remote Sensing and GIS techniques with thesis in progress. • Spatial products in the form of maps have been generated in GIS environment on various aspects such as groundwater potential zoning, watershed prioritization, crop phenology, crop classification, land use/land cover, drought, surface waterbody, potential evapotranspiration etc. • Such maps will facilitate concerned departments to undertake micro-level planning more effectively.	  
Advanced Equipment includes: • Plant Canopy Analyzer	• Collecting spectral signature, Photo active radiation, Chlorophyll	

• Line Quantum PAR Sensor • Spectro-radiometer • Hyper Spectro-radiometer • Chlorophyll SPAD meter • Thermal imaging camera • Network Attached Storage System • Global Positioning System • Digital soil moisture meter • Digital Planimeter • Chartometer	content, capturing thermal images, soil moisture depletion pattern, of different crops such as wheat, soybean, maize, chickpea, field pea, lentil and linseed.	
Experimental field with 12 Insect proof cage	• To study and monitor the extent of crop damage under different population attack of Fall Army Worm	 Insect proof cage

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

Out-of-box initiative	*Activity/achievement*	*Remarks/Photographs*
Development of Interactive Geospatial Data for Madhya Pradesh State • Rainfall-Monthly, Seasonal and Annual • Drought index • Potential Evapotranspiration, • Area under surface waterbody • Groundwater potential zones	Development of interactive Geospatial Data for Madhya Pradesh State to provide a comprehensive view of various spatial aspects of the state. New features added to the data, such as topography, soil, agricultural drought, land use/land cover, and drainage pattern. This will be highly beneficial for the government and other stakeholders in the planning and management of natural resources in the state.	 

Cloud Computing and Time-Lapse Animation for Efficient Earth Observation Analysis	The initiative has been undertaken to encourage the use of advanced digital techniques in accessing, handling, processing, and analyzing large amounts of freely available satellite data for natural resource management. These initiatives include big data analysis through cloud computing, interactive visualization of large spatial data and the development of time-lapse animation of historical satellite data. As part of this initiative, time-lapse animations of NDVI, net evapotranspiration, land surface temperature and surface waterbodies of Madhya Pradesh have been prepared.	 Assessing and visualization of Sentiel-2 satellite data for Madhya Pradesh state using Google Earth Engine Python API  Land surface temperature using MODIS data of Jan 2020 as part of time-lapse animation using Cloud platform

1.4. Collaborations with industry and other HEIs for bringing relevancy

SN	Area	Institute	Purpose	Benefits
1	Horti-Tech	Central Citrus Research Institute, Nagpur	To promote joint research/education activities	Training and field work for horticultural crops
2	Engineering-Tech	Jabalpur Engineering College	To promote joint research/education activities	Shared expertize available for AI, Machine learning, Environmental issues and Electronics for faculty, staff & students.
3	Green-Tech	Jabalpur Municipal Corporation, Jabalpur	To promote Green Tech activities in students	Students Health and saving of Conventional fuel
4	FMP and equipment	IRRI Philippines	Training and development of Farm machinery	Developed equipment in collaborative project

5	IT in Engineering design	Indian Institute of Information Technology Design and manufacturing IIITDM	For promotion of joint research and Students exchange	Working with students of IIITDM at JNKVV

1.5. 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*
Initiatives were taken to arrange interaction with industry people and entrepreneurs in different fields. • Workshop on Strengthening Industries-Academia Relationship for Promoting Entrepreneurship Among Students	• Organized workshop on Strengthening Industries-Academia Relationship for Promoting Entrepreneurship among Students on 12th Apr 2022. • 27 industry experts attended the workshop, where they shared their experiences and provided insights into the entrepreneurship opportunities in the field of agriculture. • Discussed importance of quality testing, matching education with practical aspects, and promoting student training in industries • Emphasized focus on research areas and providing facilities for field trials and thesis research • Promoting natural and organic farming, exploring biodiversity, and implementing climate smart agriculture	 
• Agriculture Conclave 2022	• Organized Agricultural conclave on 16th- 17th Sep 2022, to attain agrarian prosperity by Academia-Industrial Partnership through Alumni. 40 numbers of alumni working in different fields participated from different corners of country. More than 600	

	students participated in person and about 3000 students attended the event online. • The event provided a great opportunity for alumni members to share their knowledge and information with the students.	
• Seminar on Opportunity in Agri-Entrepreneurship for Women Empowerment	• Organized One Day Seminar on Opportunity in Agri-Entrepreneurship for Women Empowerment on 9th Feb 2023. • The purpose of program to promote the contribution of women entrepreneurs and their impact in achieving the motto of G20, advancing socioeconomic development and sustainable development goals. • Eight successful women entrepreneurs shared their experiences and journey in entrepreneurship to encourage students to contribute to socioeconomic development. • A total of 147 students participated in the program and interacted with the speakers with their queries, gaining valuable insights into entrepreneurship and the challenges faced by women entrepreneurs.	  **Students got the ideas to initiate, incubate and to develop entrepreneurship including marketing economics**.

• National Conference on Production, Processing and Marketing of Millets: Issues & Solutions	• Conference was a comprehensive event addressing critical aspects of millet agriculture • The inaugural session honored Ms. Lahari Bai and 14 progressive farmers for their contributions to millets germplasm conservation. The conference released 11 publications on millet-related topics.Ten food courts provided live demonstrations of value-added millet products.	The event underscored the importance of gene banks for landrace conservation and incentivizing farmers for adopting millet cultivation practices, particularly in low-productive areas and vulnerable climate regions. 
• Regional Conference on Recent Innovation in Agricultural Sector	• The conference facilitated meaningful knowledge exchange among participants, fostering a deeper understanding of recent innovations in the agricultural sector	
• National Convention of Agricultural Engineers & National Seminar on Emerging Technologies for Advances in Agriculture & Horticulture	• Jointly organized by The Institution of Engineers, Jabalpur Local Centre and JNKVV, Jabalpur, marked a pivotal moment for the agricultural engineering community. The primary purpose was to foster collaboration and knowledge-sharing among agricultural engineers, scientists, and stakeholders to address the evolving challenges in the agriculture and horticulture sectors. The focus of the event was on emerging technologies and their role in advancing sustainable agricultural practices.	Knowledge sharing amongs engineers, scientists and agricultural experts  

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	5%	-
2.	% increase in faculty research effectiveness: 2019-20 (47), 2020-23 (59)	4%	8%
3.	Number of direct beneficiaries of the project	3040	21731
4.	Number of female beneficiaries	1013	9006
5.	% increase in JRF/SRF/GATE/IIM Test/ARS: 2019-20 (60), 2020-23 (115)	5%	23 %
6.	% increase in number of students who were admitted in foreign universities 10% per year or 1 student per year	2	5
7.	% increase in PG student placements 10% per year or 2 students per year 2019-20 (20), 2020-22 (46)	10%	10%
8.	Number of industry- sponsored projects and positions in cutting-edge areas of agri-science 1 per year	2	1
9.	Number of faculty training programmes (national) undertaken by AU	18	19
10.	Number of faculty training programmes (international) undertaken by AU	4	2
11.	Number of student training programmes (national) undertaken by AU	18	21
12.	Number of student training programmes (international) undertaken by AU	4	2

Observation

The project has made significant progress in achieving its goals and targets in various areas. The % increase in faculty research effectiveness has exceeded the target, with an achievement of 8% against a target of 4% for the period 2019-20 to 2020-23.

Another notable achievement is the increase in the number of direct beneficiaries of the project, which are 21731 against a target of 3040. The number of female beneficiaries has also surpassed the target, with 9006 against a target of 1013. This indicates that the project has successfully reached out to a larger audience, especially women, and has created opportunities for their growth and development. This was possible due to adoption of blended learning mechanism even for learning geospatial data analysis.

In addition, the project has achieved a 23% increase in JRF/SRF/GATE/IIM Test/ARS against a target of 5%. This indicates that the project has been able to attract talented researchers and scholars who have the potential to contribute to the advances in field of agriculture.

The project has also achieved a 10% increase in PG student placements against a target of 10% per year or 2 students per year. This indicates that the project has been successful in creating opportunities for students to develop their skills required for their placement.

S. N.	Particulars	Apr'2018 to Dec '2023 Target	Apr'2018 to Dec '2023 Achievement

The international exposure for faculty and students were organized in order to expose them and learn cutting edge technologies in apex institutes recognized globally. There is a need to improve the commercialization of technologies, which is an area where the project has yet to achieve its target.

38 Students and Faculty have undergone to international exposure of higher educational Institute recognized globally including USA, Australia, Vietnam and Indonesia. This program benefitted 22 male and 16 Female candidate for gaining the latest knowledge of smart Agriculture and Advanced Technology in their respective disciplines.

2.2. Knowledge Management Collaterals

I. Knowledge Collaterals	Apr'2018 to Dec'2023
1. Publications (Training Manuals:6, Souvenir and abstract 4 Technical Bulletin 3)	13
2. Research Articles (38 Research paper & 23 Review paper)	61
3. Annual Reports	3
4. Books/Chapter in Book	13
5. Success Stories	5
6. Newsletter	3
7. Poster magazine (64 pages)	2
8. Article in magazine	7
9. Blogs (18 post)	1
	Annexure I

II. Mobile and Web Applications	Apr'2018 to Dec'2023
1. Mobile Applications Developed	4
2. Web Applications Developed	5
	Annexure II

III. Number of IPR (Intellectual Property Rights) Registered/Obtained	Apr'2018 to Dec'2023
1. Copyrights	5
2. Patents	5
3. Others (Patents in pipeline)	5
	Annexure III

IV. Dissemination and Outreach	Apr'2018 to Dec'2023
1. No. of Posts on Social Media	65
2. No. of Posts on Newspaper	168
3. No. of Posts on Magazines	7
4. No. of Unique Promotional or Outreach Collaterals	1
	Annexure IV

2.3. Capacity building programs to improve the research effectiveness

1. International trainings for students and faculties

Subject areas	*Host institutes, period of training*	*Output of the training*
Students		
Intelligent Technologies for Modern Agriculture Smart Agriculture	Can Tho University, Vietnam 05.12.2023 to 27.12.2023	Profound transformation brought about in participants understanding and application of smart agricultural practices
Advanced Technologies for Modern Agriculture	HUE University of Agriculture and Forestry, Hue city, Vietnam 30.10.2023 to 28.11.2023	Immersive introduction to Vietnamese culture, food, language and history, enhanced cultural exchange, exposing participants to innovative agricultural practices. The program provided a platform for the exchange of ideas, skills, and cultural experiences.
Faculty		
Advanced Technologies for Modern Agriculture	Hue University of Agriculture and Forestry, Vietnam 26.11.2023 to 26.12.2023	It was an opportunity to explore the cutting-edge research conducted at Hue University, with specific emphasis on topics like soil mapping, the use of biological controls for post-harvest diseases, and the development of small-scale mobile dryers for paddy grains. The exchange also shed light on the status of agroforestry systems and their policy implications, offering a comprehensive understanding of the socio-economic and environmental considerations in agriculture
Training in thematic of Molecular Plant	University of Arkansas Fayetteville, AR 72701, USA	Gained expertise has a pivotal role in the identification of promising QTLs for selected traits, contributing to the

Pathology and applied Plant Protection	05.11.2023 to 29.12.2023	development of improved crop varieties with resistance to biotic and abiotic stresses. Involvement in Scanning Electron Microscopy, bioinformatics software for meta-QTL analysis, Next Generation Sequencing, and field visits provided a new experience.

Annexure V

2. National trainings for students and faculties

Subject areas	*Period of training*	*Total beneficiaries*	*Output of the training*
Students			
Hands-on training on Remote Sensing & Geographical Information System	21 Days, 12 Training	458	Students were trained in the working of geospatial techniques in the field of agriculture and Natural resource management. Many students came forward to adopt these technologies for their PG & Ph.D. research as 44 students already enrolled to work on these techniques.
Artificial Intelligence & Machine Learning	5-10 Days, 3 Training	326	The students learned about AI & ML principles, programming logic, and their applicability in the field of agriculture.
Spatial data processing and analysis using R and Python programming languages	10 – 21 Days, 9 Training	705	Students get practical exposure to learning the R language and also got trained to adopt R programming for satellite data processing.
Training on introduction to Mobile based Application development	3 Days, 1 Training	211	The Android application development basics and practical knowledge were gained by students.
Improving Language Competency	10 Days, 5 Training	1132	The techniques to speak and write the English language along with grammatical competence were developed among students
Thesis Writing and online Thesis Evaluation	1 Day, 1Taining	492	The Thesis writing protocols and guidelines were taught to the students and also techniques for, how to write plagiarism-free articles were also learned by the students
Personality Development & Soft Skills	10 Days, 5 Training 1 Day, 3 Training	856	A positive response was seen on the student attending this course where they have been aware of confidence building, team building, body language and communications, etc.
Yoga for Sustainable life Style	21 Days, 3 Training 1-3 days	1009	A life style change adopted by students The different components like Asanas, Surya Namaskar, Yoga Mudras and Pranayam are

	3 Trainings		helpful in skillful working, efficient studies, maintaining relationships and living healthy with minimal stress.
Holistic Development Programs for students	7 - 21 Days, 7 Training 1-2 days 3 Seminars/workshops	3170	Students developed an understanding of the various skills that are important along with education to cope-up the challenges in life and developed leadership qualities.
Grievance Redressal Mechanism	1 Day, 2 Trainings	292	Students were made aware of the University Grievance Redressal Mechanism where there are 3 different levels to reach out the officials regarding any Grievance
Human Rights for Agricultural Students	1 Day, 1 Training	96	Students were made aware of human rights to live peacefully in workplace and in society.
Environmental sustainability	1 Day, 35 Trainings 7 days 2 Trainings	950	Students learned techniques for soil and water conservation, organic farming, optimum usage of fertilizers, pesticides, insecticides, Parthenium eradication and importance of Honey bee Keeping.
Faculty			
Hands-on training on RS & GIS	21 Days, 14 Training	246	Faculties/Scientists were trained in the working of geospatial techniques in the field of agriculture and Natural resource management. All 17 departments of Agriculture, Horticulture and Agricultural Engineering faculties came forward to adopt these technologies for their research in Agriculture and NRM.
Artificial Intelligence & Machine Learning	10 days, 1 training	86	AI & ML principles, programming logic, and their applicability in the field of agriculture were taught to faculties and scientists
Spatial data processing and analysis using R and Python programming languages	10 days 4 Training	239	Scientists and faculties were received practical exposure to learning the R language and also got trained to use R programming for satellite data processing.
Training on introduction to Mobile based Application development	3 Days, 1 Training	73	The Android application development basics and practical usage were gained by faculties/scientists
Educative learning for agricultural Executives	7 Days, 4 Training 1-2 days 3 Training	169	Administrates and executives were trained to read the spatial data and readily available spatial maps for decision-making and policy planning
Pedagogy to Improve the Performance of Weak Students & Peer Learning	5Days 2 Training	232	The faculties/scientist got exposure to new education policies, teaching techniques, peer learning groups and were prepared to form a specialized consultative group for students.

Yoga for Sustainable life Style	21 Days, 3 Training 1-3 days 3 Training	167	The different YOGA mudras and PRANAYAM were taught to the faculties and stress management tactics were also taught in the session.
Grievance Redressal Mechanism	1 Day 2 Trainings	120	Faculties were made aware of the University Grievance Redressal Mechanism where there are 3 different levels to reach out the officials regarding any Grievance
Thesis Writing and online Thesis Evaluation	1Day 1Taining	167	The Thesis writing protocols and guidelines were taught to the faculties and also techniques for, how to write plagiarism-free articles were also part of the session.
Environmental sustainability	1 Day, 35 Trainings 7 days 2 Trainings	1691	The faculty learned the techniques Soil and Water conservation, organic farming, optimum usage of fertilizers, Parthenium eradication and Honey bee Keeping.

Annexure VI

2.4. Input and activity monitoring

	Capital	Revenue	Total
Total funds sanctioned during 2020-2023 by PIU (INR Lakhs)	708.50	1204.50	1913.00
Total funds received till Dec 31, 2023 (Cumulative) (INR Lakhs)	708.50	677.00	1385.5
Total expenditure up to Dec 31, 2023 (INR Lakhs)	498.85	621.78	1120.64

Input / Activity indicator	Sub- head / category	Apr'2018 to Dec'2023 Expenditure / input in INR lakhs Utilization	Planned	Activity elaboration
Goods and equipment	Equipment, Plant & Machinery	210.09	265.00	Procured Spectro-radiometer, Hyper Spectral Radio- meter, work Station, Server with Software and Thermal Imaging Camera, Network Attached Storage for precise data collection and processing
	Office equipment	4.13	6.50	Procured multi-functional photocopier machine, Public Address System and smart LED display TV to enhance office functionality and communication capabilities
	Laboratory equipment	161.00	295.00	Procured advanced digital equipment and software including Digital Terminals with peripheral, Global Positioning Systems, ArcGIS, ERDAS, MATLAB, MIKE SHE, Visual MODFLOW Software, Canopy

Input / Activity indicator	Sub- head / category	Apr'2018 to Dec'2023 Expenditure / input in INR lakhs Utilization	Planned	Activity elaboration
				analyser, Line Quantum PAR sensor with logger, Soil moisture meter with sensors, Crop Nitrogen Sensor and Chlorophyll SPAD meter to collect and analyze data with greater accuracy and efficiency, leading to improved research outcomes.
	Furniture & fixtures	18.27	22.00	Procured steel almirah, book shelves, lab stool, computer tables and chairs, file cabinet and side table with drawer to improve the infrastructure and facilitate better organization in the workspace.
	Computers and Peripherals	11.74	18.00	Procured computer equipment including photo scanner, desktop computer, printer, and peripherals.
	Books and Journals	11.99	12.00	Procured books and journals related to the project theme, which facilitated the faculty and students in their knowledge and research activities.
Civil works	Minor repair and renovation work	81.62	90.00	Civil works for renovation and establishment of RS and GIS lab and training facility, Electrification of Computer Lab with accessories, Generator for power supply and Formation of Cubical for lab.
Human capacity building	National level training	14.62	22.00	Funds allocated for national-level faculty training to enhance knowledge and skills in respective fields, contributing to overall institutional development.
	International level training	96.76	100.00	Faculty and students were sent USA, Australia, Vietnam and Indonesia to facilitate international training as an opportunities for them to get acquaint with modern, smart and updated technology at well-recognized institutions and organizations.
	Short visit/ seminars	7.25	15.00	Organized short visit and seminars/symposium on advance techniques for managing NRM, spatial data, AI, ML, Instrumentations and sensor development for monitoring and management for students and faculty at National level.
	Meetings and workshops	6.83	10.00	Organized meetings and workshops to promote entrepreneurship and empower women in agriculture.
Consultancy	National level consultancies	0.00	50.00	The national-level consultants could not be finalized for various purposes including

Input / Activity indicator	Sub- head / category	Apr'2018 to Dec'2023 Expenditure / input in INR lakhs Utilization	Planned	Activity elaboration
				product development, application of Artificial Intelligence and Machine Learning techniques and newer applications of spatial data.
Recurrent cost / Miscellaneous	Travel	6.93	15.00	Travel expenditure includes the hiring of vehicles for staff members and students to collect ground truth information for the validation of spatial products developed under the project.
	Contractual services	245.65	280.00	Hiring contractual services such as Research Associates (RA), Senior Research Fellows (SRF) and Young Professionals (YP) to assist in conducting project activities smoothly.
	Operational costs	203.08	650.00	Operational costs of the project encompass various activities such as capacity building through training, vehicle hiring for field studies, internet and web space charges, publication of reports and bulletins, printing and stationery, advertisement, repair and maintenance, honorarium, satellite data procurement, research experimentation, soil and water testing and other related expenses to ensure smooth project functioning.
	Institutional charges	40.63	62.50	Institutional charges involve services that are provided from outside the university such as payment of electricity bills, statutory auditor charges and other office requirements essential for the smooth functioning of the institution and ensure that all necessary services are available to faculty, staff and students working for the project.
Total		1120.64	1913.00	

Observation

The NAHEP-CAAST procured various equipment and software for research and data analysis, as well as renovated and established lab with furniture, computer equipment, purchased books & journals and organized capacity building programs, seminar, visits and workshops. However, due to various challenges such as difference financial powers and procurement rules than VV, World Bank tender norms, insufficient vendors and non-compliance of contracts, the procurement of remaining equipment could not be completed within timeframe. The operational cost was lower due to online organizing programs and closure disturbance due to Corona problems. The national level trainings were organized for students and faculty of the university. The international exposure for faculty and students was organized in order to expose them and learn cutting edge technologies in apex institutes recognized globally.

2.5. NAHEP outreach and other unique initiatives undertaken

Significant activities/initiatives

a) Case studies/success stories developed under NAHEP

Success storis

1. Excellence of PG students at National level

Student development programs were organized with the goal of improving students' academic achievement as well as their participation in various co-curricular activities. Programs on improving language competency, personality development and improving soft skills as well as a workshops for holistic development with several orientation program prepared students for national level competitions. As a result of these programs, students achieved significant success in national competitive exams. In comparison to previous three years total of 92 students, 127 students qualified in the year 2021-22 only. In addition to this 19 students have also qualified to enter into ICAR-Agricultural Research Services. 17 students qualified for Junior/Senior research fellowship. 29 students have also qualified for admissions to IIT, IIM, IISc and other premium institutes of the country

2. Awards for Excellence to students

Miss Ayushi Trivedi, a Ph.D. scholar, received the Best Paper Award for research paper on “Determination of Quantum Recharge Requirement by Utilizing Spatial Data for Revival of Kanari River’ at the National Web-Conference on Technological Approaches for Resource Conservation and Management for Environmental Sustainability, Aug.16-17, 2020 at the Academy of Natural Resource Conservation and Management (ANRCM). Ms. Ayushi Trivedi, also received Augmenting Writing Skill for Articulating Research(AWSAR) Award by Department of Science and Technology (DST) for excellent article including cash prize of 10000/- for science story entitled “Reviving Hopes: Re-Establishment of a Lost River”.

- Mr. Deepak Patle, Ph.D. Scholar received the Best Poster Award for research on "Wetlands Change Detection using Geospatial Techniques in Kanha National Park, Madhya Pradesh, India, on 2nd Feb 2022, at JNU ENVIS Resource Partner Centre on 'Geodiversity & Impact on Environment' New Delhi.

- **Makhan Singh Karada, receives M.P. Young Scientist Award**

Makhan Singh Karada, a second-year Ph.D. student in Forestry Agroforestry at the College of Agriculture JNKVV, Jabalpur, has been awarded the M.P. Young Scientist Award with a cash prize of 20,000. His research focused on the performance of wheat varieties at different thermal and radiation environments concerning carbon sequestration under open and agroforestry systems. His success story highlights the role of NAHEP CAAST Center in providing hands-on training programs on Remote Sensing and GIS, research facilities, and advanced digital equipment to students, enabling them to carry out their research effectively. The Council also provides fellowship for training of young scientists to be availed within one year of participation in MPYSC. Makhan Singh's achievement in receiving the M.P. Young Scientist Award is a testament to the valuable support provided by the NAHEP CAAST Center in fostering and encouraging research excellence in the field of agricultural science. By providing students with the necessary tools and resources, the center is helping to shape the future of agriculture and contributing to the overall development of the sector.

- **M.P. Council of Science and Technology awards Fellowship to Mr. Deepak Patle, PhD student, CAE, JNKVV**

Mr. Deepak Patle's achievement in receiving the Fellowship for Training of Young Scientists at the 38th M.P. Young Scientist Congress is a testament to the comprehensive resources and training provided by NAHEP CAAST Center. His research on using geo-informatics to identify suitable sites for artificial groundwater recharge in the Ken River Basin highlights the critical role of technology and

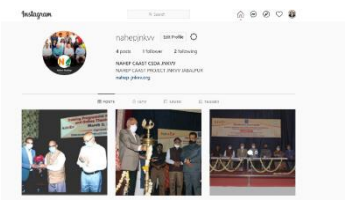
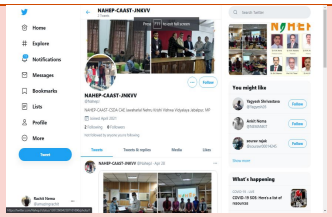
innovation in addressing significant challenges in agriculture. NAHEP CAAST Center support enabled Mr. Patle to showcase his work on a prestigious platform and receive recognition for his contributions to the field of Earth and Atmospheric Sciences. His success reflects the dedication of NAHEP CAAST Center in nurturing young talents and providing them with advanced research facilities and training programs that equip them with the skills and knowledge needed to excel in their fields.

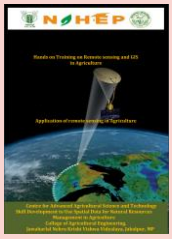
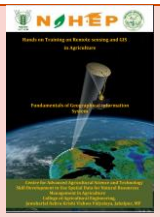
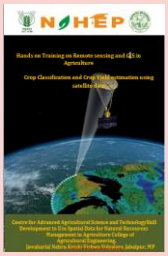
- **M.P. Council of Science and Technology awards Fellowship to Miss. Ayushi Trivedi, Ph.D. (Soil and Water Engineering), CAE, JNKVV**

The 38th M.P. Young Scientist Congress was held from March 17-19, 2023 at Samrat Ashok Technological Institute (SATI), Vidisha. The event was organized by the Madhya Pradesh Council of Science & Technology (MPCST) in Bhopal. Ayushi Trivedi presented her research paper on "Analysis of LULC Matrix Change for Determination of Kanari River Flow Retardation using ArcGIS and ERDAS Imagine" in the discipline of Earth and Atmospheric Sciences through online mode. Her outstanding presentation earned her the prestigious "Fellowship for Training of Young Scientists" awarded by the M.P. Council of Science and Technology. The NAHEP CAAST Centre played a crucial role in enabling Miss. Trivedi to conduct her research and present her findings at the 38th M.P. Young Scientist Congress.

b) Knowledge management and outreach initiatives (development of collaterals, newsletter, social media outreach activities, creation of website, experiential learning workshop, exposure visits,

S.N	Category of the collateral	Brief summary	Snapshot/cover page	Weblink (if any)
1	Project Website	The project website provides a brief overview of the project, including its objectives and the scientists and team members involved in the project. It serves as a platform to publish all ongoing activities of the project and provides information on all the training programs being conducted. Visitors to the website can access a wealth of information on the project		https://nahep-jnkvv.org

		and stay up-to-date on its progress.		
2	Social Media	**YouTube channel:** The NAHEP CAAST JNKVV YouTube channel is a platform where the project can upload recordings of important training programs, success stories, and other student welfare activities. Number of videos: 65 Subscriber: 77		https://www.youtube.com/@nahepcaast-jnkvv1291
		Facebook: The NAHEP CAAST JNKVV Facebook page has been used to share information about training schedules, awareness programs, project initiatives, and other student welfare activities. This platform is ideal for building a communication around the organization and engaging the young followers through comments, likes and shares. Number of post:52 Followers: 391		Facebook: https://facebook.com/Jnkvvnahep
		Instagram: The NAHEP CAAST JNKVV Instagram account is used to share visual content related to training programs, success stories, and other student welfare activities. This platform is ideal for reaching a younger demographic and engaging with followers through likes, comments, and direct messages. Number of post:52 Followers: 155		https://www.instagram.com/nahepjnkvv/
		Twitter: The NAHEP CAAST JNKVV Twitter account is used to share quick updates and news related to training programs, success stories, and other student welfare activities.		https://www.twitter.com/nahep

		Number of post:52 Followers: 14		
3	**Exposure Visits**	Exposure visits for faculty and students were organized at four different locations: • National Academy of Construction at Hyderabad. ICAR-IISS at Bhopal. • ICAR-National Institute of Abiotic Stress Management (NIASM) at Baramati (Pune) • Envirocare Labs Pvt Ltd. at Mumbai. These visits aimed to enhance technical skill of faculty and students and knowledge in various agriculture fields, covering topics such as laboratory management, internal auditing, geospatial tools in soil science, non-destructive phenotyping for abiotic stress tolerance in crops and agroforestry, and chemical and microbiological analysis in food.	  	47 PG and PhD students and 5 faculty were benefited
4	**Developed Training Manual on Remote Sensing & GIS**	Developed 5 Hands-on training manuals on RS & GIS software. Hands-on Training manual on 1. RS & GIS using QGIS 2. Satellite data and image processing 3. Application of remote sensing in Agriculture 4. Crop classification and crop yield estimation 5. Fundamental of Geographic Information System	 	 

c) Unique initiatives undertaken

1. Digital infrastructure

Spatial Data Laboratory:

Digital infrastructure in a Spatial Data Lab typically includes:

- Workstations: A highly configured computer systems equipped with hardware and software necessary for geospatial data analysis and processing.

- GIS software: The laboratory includes software such as ArcGIS, ERDAS IMAGINE, ENVI, MATLAB, MIKE-SHE and other related software programs.
- Remote sensing instruments: To support geospatial data acquisition and processing, the laboratory equipped with a range of remote sensing instruments such as GPS, plant canopy analyzers, line quantum PAR sensors, digital soil moisture meter, Spectro-radiometers, and thermal imaging cameras.
- Digital podium with interactive LED: The interactive presentation tool for teaching and presenting spatial data analysis.
- Plotter: Used to produce large-format, high-quality graphics such as maps and posters.

- Ao Scanner: Used to digitize large documents, such as maps and posters, into digital images that can be stored and manipulated on a computer. The scanner can capture high-resolution images with great accuracy and detail.

Capacity Building Laboratory:

The digital infrastructure in a capacity-building laboratory for skill development in using spatial data for natural resource management in agriculture includes:

- Digital terminals (computers)
- GIS software
- Digital podium with interactive LED display

2. Digital initiatives:

S.N	Category of the collateral	Digital initiative	Practice before introduction of the initiative	Practice after introduction of the initiative
1	**e-learning**	Providing digital platform or teaching & learning	Teaching offline using chalk and duster along with smart class room, OHP and PPT. Due to COVID 19 disturbances offline classes were not possible.	Teaching online using smart class room and PPT. Even with COVID 19 disturbances online classes could continue the academic session.
2	**Peer learning**	Formation of WhatsApp group of students	Before forming a WhatsApp group for students were studying at their own as and where available in non-organized way.	Grouping students in different discipline organize them and made it possible to have guided studies supported by likeminded students.

3	**Examination**	Conducting online examinations	Offline examination was not possible due to absence of students in the campus.	The online examination could solve the problem using MCQ format of the question and appropriate examination platform such as TEST-MOZ or Google.
4	**e-learning modules**	Organizing audio lectures on WhatsApp	Reading and learning from books and class room teaching.	Learning through audio and video on technical aspects.
5	**Trainings to teachers**	Online training to the teachers on how to organize online classes	Could not teach online and was felt necessary	All the teachers were taking online classes using online platforms such as ZOOM, Google Meet, Microsoft Team etc.
6	**Academic management of students**	Adopting Agricultural University Academic Management System (AUAMS)	The work from admission to award of degree was manual with online support of hired agencies in admission and declaration of results.	Online admission, selection of courses, allotment of teachers, scheduling of classes, monitoring at different administrative levels, scheduling of examination, results and awarding Degree is possible.
7	**Virtual Classroom Agri-Diksha**	AR-VR Modules	Scattered modules of limited subjects and lower visualization capacity were available	Student can access and visualize complicated process and structures with advanced techniques with augmented and virtual reality through virtual labs.
8	**Web based applications**	Development of web based applications on: • MP Rain (1901-2019) • MP ETp (2000-2020) • MP SWB (2020)	Data on Rainfall, Potential evapotranspiration and area under surface waterbodies was available from different sources and for larger unit area. The geospatial data was not available in user friendly format.	The web applications developed can visualize monthly, seasonal and annual rainfall along with drought index for each district. MP ETp suggest ETp at each unit area of 25ha. Area of waterbodies on surface may be mapped with its areal computation at any given location which is used to plan water resources utilization and management.

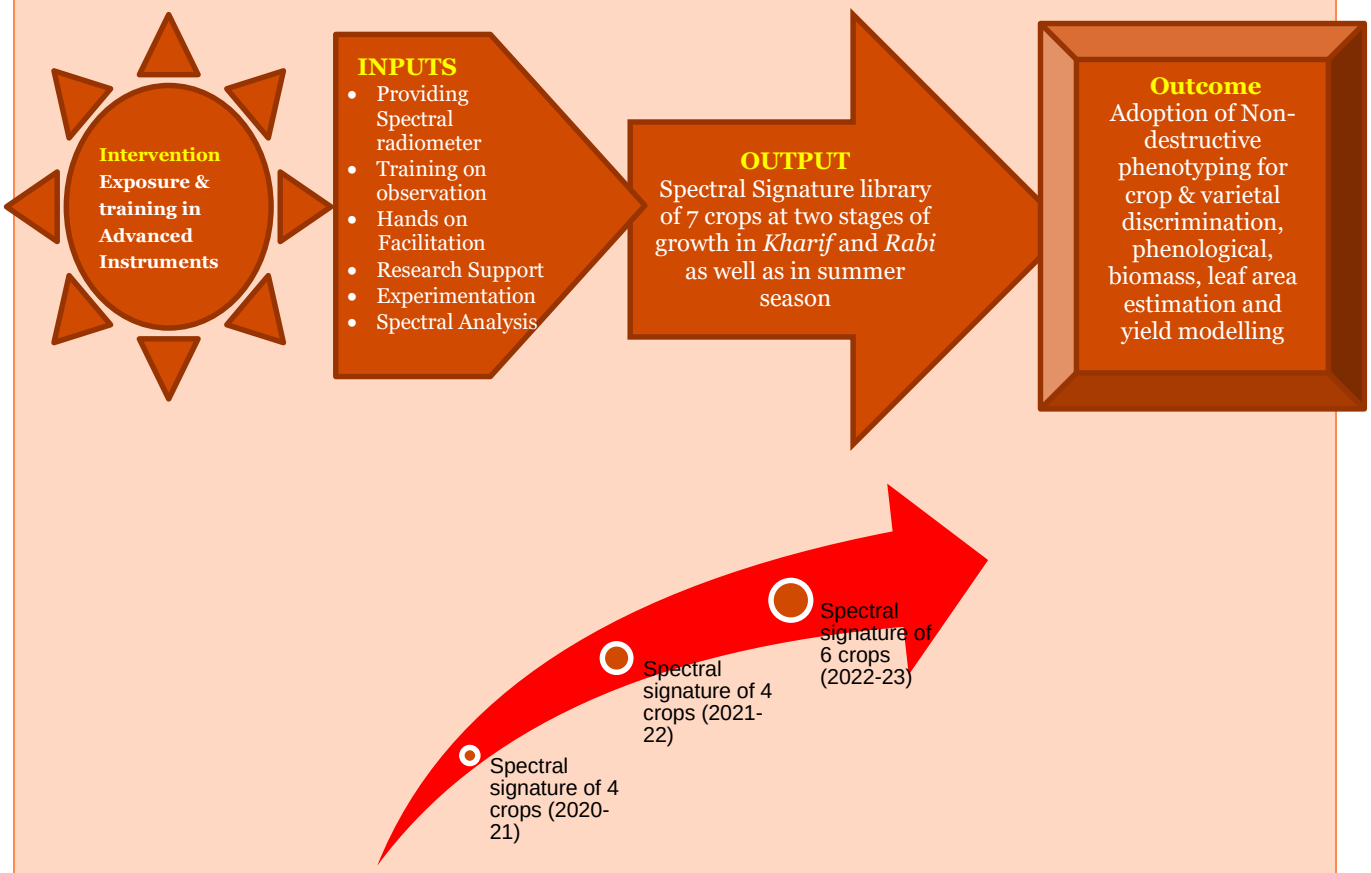
3. Potential impact of the intervention:

Observation

Potential of impact of the intervention

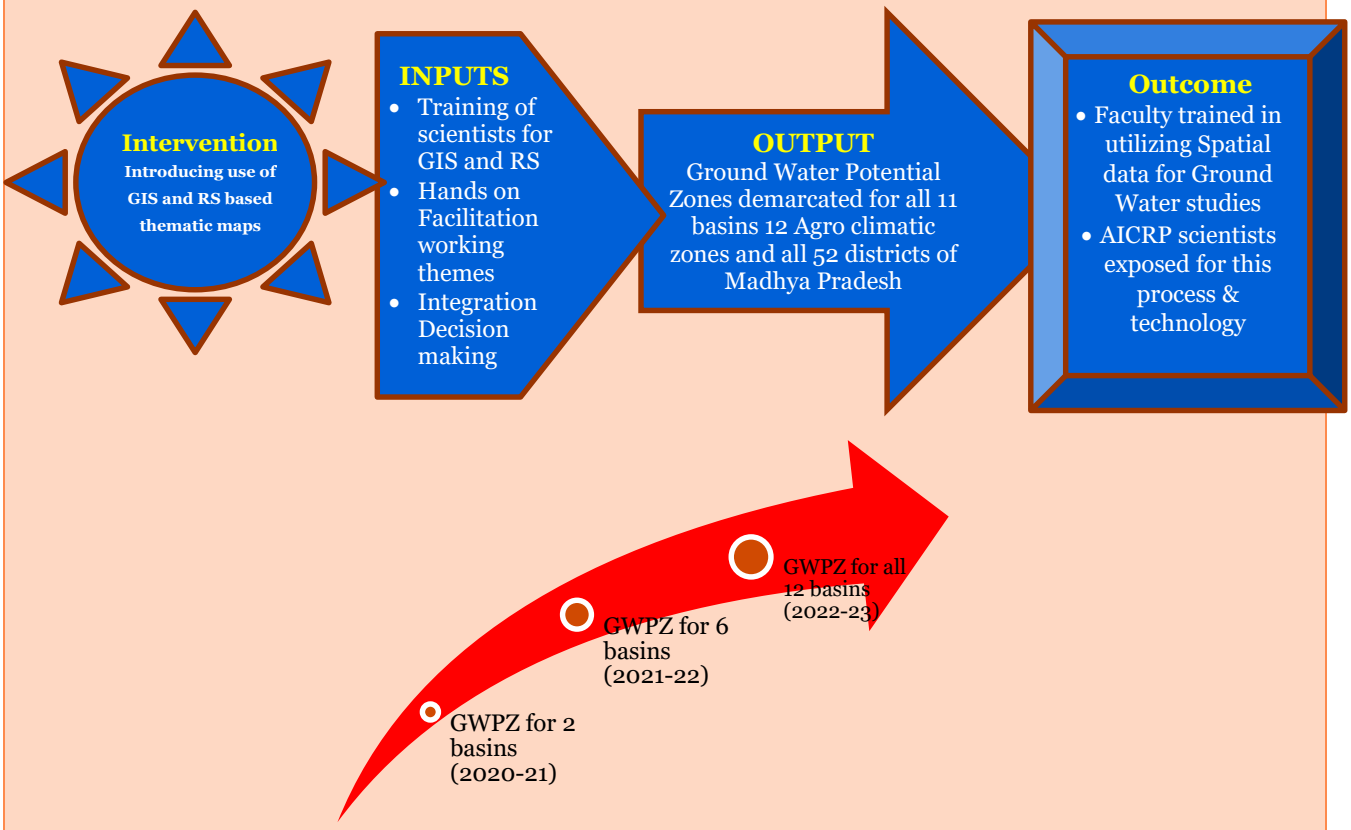
1. Characterization of Crops and Varieties through Proximal Remote Sensing

The provision of a spectral radiometer, observational training, hands-on facilitation, research support, experimentation, and spectral analysis would enable researchers to collect and analyse spectral data of crops at different phases of development. The intervention resulted in creation of a coherent spectral signature library at NAHEP JNKVV Jabalpur. The accelerated crop improvement program requires rapid, non-destructive, and accurate monitoring of crop responses. This can be possible with proximal remote sensing. In the crop improvement program to identify the genes, QTLs, and molecular markers of abiotic stress tolerance, high yield & biomass, and leaf area, it is necessary to dig a large population and a variety of lines for phenotyping. In this context, non- destructive phenotyping protocol for rapid assessment of phenology, biomass, leaf area, and yield in seven crops, viz., wheat, chickpea, linseed, lentil, field pea, Oat, and barley, was developed. ICAR has adopted this technology for varietal discrimination through proximal remote sensing under AICRP on Seed (Crops) Seed Technology Research and formulated a research trial in network mode to utilize this technology in seed quality assessment under Grow out Test.



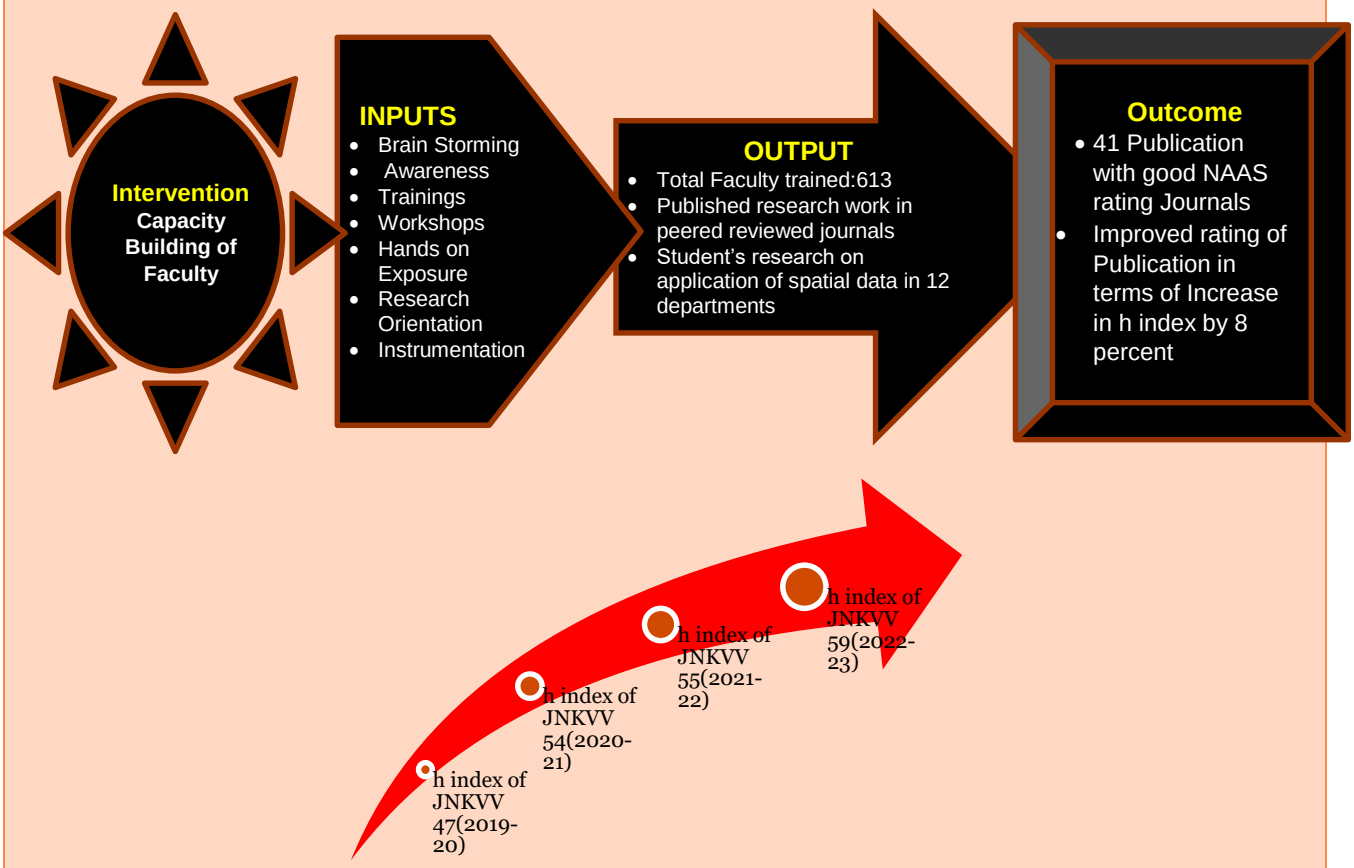
2. Demarcation of Basin and district wise Groundwater Potential Zones (GPZ) in MP

In recent years, depletion, contamination, and poor quality of water have endangered the availability and quality of groundwater in several districts of Madhya Pradesh. Effective management and conservation of the groundwater resources of Madhya Pradesh needs to map and monitor water resources on the surface and underground. The intervention to demarcate different zones of groundwater potential is a initiative to plan and utilize basin and district wise potential in Madhya Pradesh. By utilizing RS-GIS-based thematic maps for spatial information, such as Slope, Drainage, Soil, Geology, Geomorphology, LULC, Rainfall, and Lineament, decision-makers can obtain a deeper understanding of the relationships among various spatial factors and make more informed decisions. GPZs have been derived for all 12 major basins covering all 11 Agro-Climatic Zones in Madhya Pradesh by applying the multicriteria decision-making method to various themes. The development of GPZs will facilitate a greater understanding of groundwater availability, recharge potential, and quality, resulting in more efficient groundwater resource management, which would contribute to improved decision-making and the sustainable use of groundwater resources. The project exposed AICRP research scientists across India to these spatial RS-GIS-based GWZ assessment techniques and technologies to ensure groundwater studies across India to attain sustainable groundwater resources in the future.



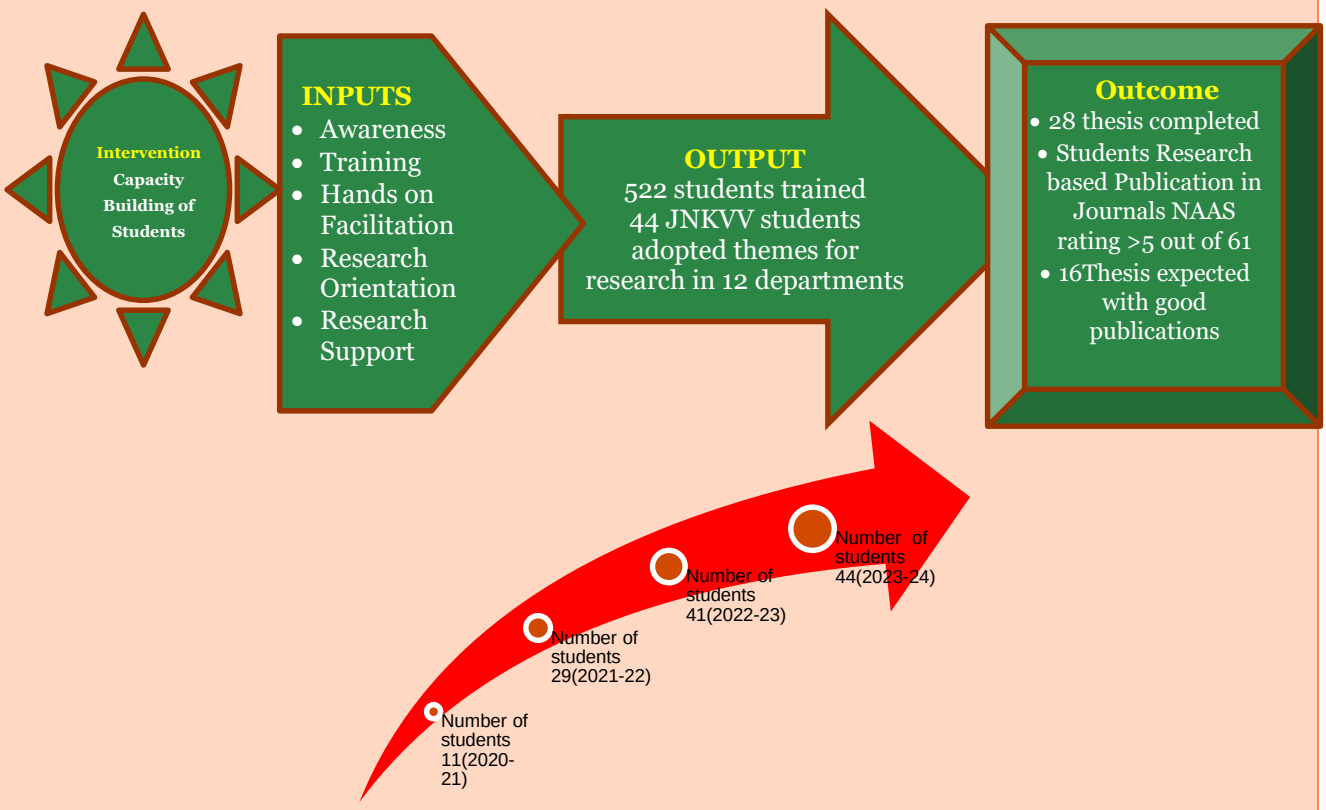
3. Faculty Development in Research Effectiveness

Most of the faculty members at JNKVV were unaware of the capabilities to utilize the spatial data using Remote Sensing (RS) and Geographic Information Systems (GIS). The intervention of capacity-building in form of awareness campaign, training, workshops, hands-on exposure, research orientation and instrumentation have yielded significant positive results. Out of 613 faculty trained under capacity building program, only JNKVV faculty (123) resulted in 41 publications of research in high-quality peer-reviewed journals. The curricular research initiated in 12 agriculture departments on the application of spatial data. There has been a significant increase of 8 percent in the overall h-index of the university. The success of the initiative demonstrates the significance of the capacity building in agriculture research, which can lead to revolutionary changes in the field.



4. Skill Development in PG and PhD Students

Students of JNKVV Jabalpur had limited or no understanding of RS and GIS capabilities to use spatial data for agriculture research. Through the project interventions, 472 students were trained by conducting awareness programs, hands-on training, departmental research orientation, experimental support and research assistantship. As a result, 41 JNKVV students have adopted research topics on spatial data utilization using RS & GIS techniques in 12 different agriculture departments. Students have acquired knowledge and skills and conducted high quality research. 16 students have completed their thesis and 25 students research work is in progress. Capacity building of students to use spatial data in agricultural research has had a substantial impact on publications of research in reputed journals. It is anticipated that 25 additional theses will be concluded with high-quality publications in the coming months.



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

Challenges	
1	Delegation of financial powers and procurement rules different than VV
2	Conducting trainings and capacity building online and guiding students online
3	Conducting evaluation –network connectivity was not available at all places
4	Conducting in-person training during COVID-19 pandemic situation was biggest challenge
5	Insufficient responsive vendors for high cost items
6	Non-compliance of contract signed in GeM and open market
7	Hesitation in purchasing of costly items up to 70 lakhs using RFQ process due to present practice of purchases of more than 1 lakh on tender basis.
8	Non availability training slots in international institutes due to lower norms of financial support from NAHEP
9	Failure to complete the supply of computer items HPC, Geo-server, drone, studio instruments due to time needed to import them by the venders before end of Dec rather than usual financial closure on March. Purchase process was delayed due to Model code of Conduct in M P assembly election.
Lessons learned	
1	We must be prepared to teach and learn online and offline hybrid mode to combat the unforeseen situations
2	Training material and practical manual should be capable to instruct online, how to use geospatial data and software using open source available on internet
3	The training instructors and technical resource person must also be prepared to adopt open source material online for teaching and conducting capacity building programs in a situation like COVID-19 pandemic.
4	Blended learning ecosystem is a must to support online program for Enhancing learning using hands-on research applications using geospatial data
5	Use of government electronic market GeM even for customized bids and reverse bid options for specified technical items.
6	Planning of activities and funds required should be based on actual conditions in University rather than uniform norms on country basis.
7	Contacts are now ready to approach and fix the slots for National and International Institutes and Experts as per requirement of the Students and Faculty belonging to the University.
8	Training and capacity building of the students in the beginning of the degree program has to be followed by hand holding of them up to applications in their field at least in their research program
9	Advanced research initiatives requires a continual presence of learned human resource which is not in the case of Skill development center where students are continuously trained and replaced by new students
10	There is a continuous involvement of Technical and Supporting staff for execution of the project successfully, which is possible only when they are appointed for the project or allowed fully or at least partially to spare time from regular duties for this additional activity

5. Sustainability Plan

5.1. Sustainability plan of the AU

- *Does the AU have any sustainability plan for to make AU future ready and globally recognized? Yes*
- *If yes, details thereof?*

1	**Advancing Agriculture through Modern Techniques:** Continuing to prepare for adopting modern techniques for advancement in Agriculture including digitalization, automation, remote monitoring and operation, sensor based mechanization, soil & water measurements and monitoring, distant learning including Hands-on training using blended learning platform.
2	**Collaboration with Other Institutions:** The Vishwa Vidyalaya will form partnerships and collaborations with other institutions, universities, and organizations that offer similar programs to share best practices and expertise in the field of spatial data analysis.
3	**Research and Innovation:** The Vishwa Vidyalaya plan to focus on research and innovation in the field of spatial data analysis. The center would collaborate with researchers and experts in the field to develop novel spatial analysis methods and techniques.
4	**Continuation of the Capacity Building Programs:** The Vishwa Vidyalaya plan to continue capacity-building programs to students, faculty, scientists, KVK staff, administrators and professionals who are looking to upgrade their skills
5	**Sustainability of Equipment and Infrastructure:** The Vishwa Vidyalaya would ensure the sustainability of its equipment and infrastructure by developing a maintenance plan that ensures that all machines equipment is well-maintained and functional.
6	**Invest in Marketing and Communication:** The Vishwa Vidyalaya plan to invest in marketing and communication strategies to promote the facilities and infrastructure created under the project.

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

1	**Revenue Generation through Paid Skill Development Programs**: The sustainability plan for Jawaharlal Nehru Krishi Vishwa Vidyalaya's (JNKVV) internal revenue generation involves utilizing the facilities and infrastructure created under the CAAST project for organizing paid skill development programs.
2	**Diversify the Use of Infrastructure:** The facilities and infrastructure created under the project would be made available for use by other departments and organizations within and outside the institution.
3	**Product development on commercial basis:** The facilities and infrastructure created under the project would be used for user-friendly spatial product development on commercial basis.
4	**Increase Partnerships:** The institution can form partnerships with other organizations and institutions to promote joint research projects, student exchange programs, and other collaborations. These partnerships can bring in additional funding and resources, which can be used to improve the facilities and infrastructure created under the project.
5	**Development of Skill Building Programs:** The center is planning to continue capacity building programs that cater the needs of professionals in various industries. These programs can be offered online or in-person and they can be marketed to professionals who are looking to upgrade their skills.

6. Contribution of each individual in project

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

Dr. Pradeep Kumar Bisen
Vice Chancellor, JNKVV, Jabalpur
(23 Nov 2017- 22 Nov 2022)

Prof. P.K. Mishra
Vice Chancellor, JNKVV, Jabalpur
(23 Nov 2022- Continue)

Name	Gender	Designation in AU and contact details (email, mobile)	Role in project (PI/Co-PI/RA/SRF etc.)	Major contribution/output
Dr. R. K. Nema	Male	 Designation: Professor & Head, SWE, CAE Email: rknema1977@gmail.com Mobile: 9407001170	PI	• Coordinating between PIU and JNKVV to plan work and execution with time line given • Creating environment to coordinate among scientist and students of various departments • Preparation of reports • Guiding research work to 4 students

Dr. M.K. Awasthi	Male	 Designation: Professor, SWE, CAE Email: mka6@rediffmail.com Mobile: 9424371761	Co-PI Skill Development-National	Planning, scheduling, conducting, monitoring and evaluation of trainings at Vishwa Vidyalaya as well as at national level Guiding research work to 5 students
Dr. S.K. Sharma	Male	 Designation: Professor, SWE, CAE Email: sharmashailesh501@gmail.com Mobile:9425387567	Co-PI Research	Providing research environment on use of spatial data in mapping and monitoring of soil, water and crop resources by students and faculty and undertake hands-on training on different aspects Guiding research work to 3 students
Dr. Y.K. Tiwari	Male	 Designation: Professor, SWE, CAE Email: yt07@rediffmail.com Mobile: 9301215177	Co-PI Procurement and Finance	Preparing specifications of the items required for the project as per DPR, conducting procurement process, maintaining financial accounts, budgeting and preparing financial reports Audits of accounts through CA & statutory auditors from PIU and World bank Guiding research work to 2 students
Dr. A.K. Rai	Male	 Designation: Director Instrumentation Email: akrai_jnau@yahoo.co.in Mobile: 9425383344	Co-PI Product Development	Facilitating students and project staff for preparing decision making products with spatial inputs and web & mobile based applications Providing information and submitting to PMTS

Dr. S.B. Nahatkar	Male	 Designation: Professor, Agri. Economics Email: sbnahatkar@rediffmail.com Mobile: 9424676748	Co-PI Skill Development-International	Contacting the institutions and preparing students and faculty for International exposures Selecting, scrutinizing and recommending students and faculty through Vishwa Vidyalaya monitoring committee for the advancements of subject specific knowledge related to spatial data applications
Dr. Sourabh Nema	Male	 Email: sourabh.nema@gmail.com Mobile: 9930081190	RA (NRM)	• Coordination and management of 18 programs of 21 days capacity building trainings, 4- educative learning programs, and different 30+ awareness programs • Delivered lectures on various specialized subjects related to RS & GIS • Involved in the development of thematic maps like Geology map, Soil map, Lineament map, Geomorphology map, Rainfall map, Drainage Density map, Slope map, Drainage) for all the major river basin (i.e. Narmada, Chambal, Sindh, Ken, Tons, Tapti, Sone, Chambal, Wainganga, Mahanadi) of Madhya Pradesh • Involved in research of Ground water potential zones of different major basins of MP.
Dr. Popat Shivaji Pawar	Male	 Email: pspawar71@gmail.com Mobile: 8329652041	RA (NRM)	• Prepared hands-on training modules on RS & GIS using QGIS software. • Delivered lectures on georeferencing of map, digitization of spatial data, GIS operations and map layout creation in GIS environment as part of Hands-on training programs on RS & GIS. • Developed three web applications for interactive visualization of rainfall data & drought index, potential evapotranspiration, and surface waterbodies for Madhya Pradesh state. • Developed a geospatial database to assess agricultural drought in Madhya Pradesh state using 21 years of MODIS satellite data and derived drought indices such as VCI, TCI, and VHI. • Analyzed spatiotemporal dynamics of potential evapotranspiration over Madhya Pradesh using MODIS satellite data from 2000 to 2020. • Developed surface waterbody map for Madhya Pradesh state using Landsat-8OLI

				data (2014-2020) and Google Earth Engine cloud platform. • Collaborated with team members to compile and prepare detailed quarterly and annual progress reports. • Developed R and Python programming codes for processing and analyzing big earth observation data. • Created digital content in the form of time-lapse and GIF animations of spatial data to promote its use in agriculture.
Dr. Umakant Rawat	Male	 Email: umakant.rawat6@gmail.com Mobile: 7275241578	RA (RS & GIS)	• Prepared Hands-on training module on Satellite data and image processing. • Delivered lectures on land use/land cover classification using satellite data in GIS environment as part of Hands-on training programs on RS & GIS. • Conducted land use and land cover mapping of Jabalpur district using LISS-III, Sentinel-2, and Landsat-8 data. • Estimated wheat acreage in Jabalpur using Sentinel-2 satellite imagery. • Compared the classification accuracies of land cover/use maps created from LISS-III, Sentinel-2, and Landsat-8 data.
Dr. Devendra Vasht	Male	 Email: devendravasht02@gmail.com Mobile: 7772011981	RA (Spatial Data in Agriculture)	• Prepared Hands-on training module on Crop classification and crop yield estimation. • Delivered lectures on crop classification using satellite data as part of Hands-on training programs on RS & GIS. • Conducted land use/land cover mapping and wheat crop classification using Sentinel-2 satellite data for Jabalpur district. • Monitored and assisted NAHEP project PhD and PG students in their research work and prepared progress reports.
Aniket Rajput	Male	 Email: aniketdocument04@gmail.com Mobile: 7000279241	SRF (Agril.Engg)	• Developed Ground water potential zones map for Jabalpur District. • Developed *Kharif* Rice map using SAR data for Jabalpur district. • Prepared hands-on training modules on DEM data processing for watershed delineation and thematic map preparation. • Delivered lectures on DEM data downloading, processing, and thematic map preparation as part of capacity building programs on RS & GIS. • Assisted in procurement of items by finding specifications and preparing quotations. • Field data collection for ground truthing • Monitored and assisted PhD and PG students of faculty of Agricultural Engineering in their research work under

				NAHEP project and prepared their progress reports.
Dr. Sumit Kakade	Male	 Email: sumitkakade@jnkvv.org Mobile: 9340087788	SRF (Plant Protection)	• Involved in organizing awareness and training programs to promote sustainable practices under Environmental Sustainability Plan (ESP). • Conducted field demonstrations and training on the use of proximal remote sensing instruments to trainees as part of capacity building programs on RS and GIS. • Assisting the process for student's assistantship/fellowship process. • Delivered lectures in capacity building programs on RS & GIS application. • Assisted in the research trial of a PhD scholar • Facilitated and collected spectral signatures using spectroradiometer of different crops for developing spectral library, including Wheat, Chickpea, Linseed, Lentil, Soybean, and Field pea crop.
Mr. Om Prakash Prajapati	Male	 Email: omprakashcoae@jnkvv.org Mobile: 8462814361	SRF (Crop Production)	• Involved in organizing and conducting sustainability training programs under Equity Action Plan (EAP). • Conducted field demonstrations and training on the use of proximal remote sensing instruments to trainees as part of capacity building programs on RS and GIS. • Collected spectral signature data for Wheat, Chickpea, Linseed, Lentil, Soybean and Field pea crops at JNKVV campus. • Conducted ground truth data collection for Pea crops in Patan & Shahpura block. • Conducted farmer survey on the transition of agriculture and future farmers in Katni & Jabalpur District.
Dr. Deepak Patle	Male	 Email: deepak.patle12@gmail.com, Mobile: 7566998815	SRF (Agril. Engg.)	• Assisted in the hands-on training on "Groundwater Potential Zones Mapping and Identification of Sites for AGR". • Delivered lectures on Watershed Delineation using DEM data processing as part of 21-day Capacity Building Programs on RS & GIS. • Created eight thematic layers such as geology, geomorphology, lineament density, land use/land cover, soil texture, slope, soil texture, drainage density, and rainfall for all the river basins. • Completed project of Groundwater Potential Zones Mapping of River Basins in MP, including digitization and rectification of River Basin Maps, Collection of Conventional maps, published data, and satellite imageries from different sources.

Er. Krishna Kumar Singh	Male	 Email: singh.krishna@jnkvv.org Mobile: 7999414050	YP-II(IT)	• Assisted to manage and maintain the nahep-jnkvv.org website and developed mobile applications "Field Survey" and "Groundwater Survey." • Assisted to manage computer hardware and networking, including software installation and technical support. • Assisted to finalize specifications and procurement of computer equipment and accessories.
Er. Anjali Patel	Female	 Email: anjalipatel.iirs@gmail.com Mobile: 8770189513	YP-II(IT)	• Assisted on basics of Remote sensing, satellite sensors & its resolutions, preprocessing of satellite and crop yield estimation as part of capacity building programs. • Assisted in procurement process Thermal Imaging Camera, Digital Planimeter & Chartometer, and HSR etc. • Assisted to prepare manuals for hands-on training in remote sensing software. • Assisted in organizing various awareness programs on modern agriculture and uses of RS and GIS in Big Data Analytics. • Digitized Soil Map for Wainganga River Basin.
Er. Rachit Nema	Male	 Email: nema.rachit@jnkvv.org Mobile: 9424330655	YP-II(IT)	• Assisted to manage and maintain NAHEP JNKVV's website and social media platforms. • Assisted to develop and operate a Field Survey mobile application for data collection. • Assisted to manage computer hardware and networking, including software installation on computer systems. • Assisted in procurement of Digital Planimeter and Chartometer, Interactive LED and Digital Podium, Public Address System etc.
Pratima Pathak	Female	 Email: taxdost@gmail.com Mobile: 9826210339	YP-I (Office Assistant)	• Assisted in correspondence with team at JNKVV CO-PI's and Nodal Officers regarding project activities. • Assisted in compiling weekly, quarterly and annual progress reports. • Monitored and managed networking messages and instructions. • Monitored official email of the project. • Maintenance receive and dispatch and project files. • Assisted in processing of bills
Mukesh Vishwakarma	Male		YP-I (Office Assistant)	• Assisted in correspondence with team at JNKVV CO-PI's and Nodal Officers regarding project activities. • Managed office work for different sections. • Maintained files for regular correspondence and managed official mail.

		Email: mkvish2007@gmail.com Mobile: 9425385831		• Processed contingent and accounts related work • Assisted in official correspondence to authorities. • Responsible for stock and store and maintained required documents. • Responsible to provide equipment to students and maintain issue and return documents.
Prakash Kumar Mishra	Male	 Email: pkmraga@gmail.com Mobile: 9300272995	YP-I (Accounts)	• Responsible for project accounts in the prescribed format • Preparation of all expenditure bills and inward/outward entries in the cash book and ledger book. • Maintained bank statements and reconciled them with the project's accounts. • Prepared annual and quarterly accounts, managed payment vouchers, and performed accounting in Tally software. • Uploading of data in STEP for procurement activities • Prepared various procurement-related documents.

6.2. Details of visits of PIU-NAHEP officials

6.2.1 Visit of National Director, NAHEP Dr. R. C. Agrawal

Dr. R. C. Agrawal, National Director, NAHEP visited ICAR-NAHEP-CAAST at JNKVV on 15th February 2023. National Director inaugurated the capacity building center and spatial data laboratory. A novel program "Interaction with students ***(Chatron Se Samvad)*** was organized in the SV Arya Memorial Conference hall to get the student views and interact with them on modern technologies in Agriculture and Role of NAHEP.

The National Director interacted with students about the role and achievements of the NAHEP project. He explained how the project provides opportunities to students to upscale their skill and enhance their education by giving exposure to international institutes. He also discussed about the career opportunities and scope for innovation in Agriculture. The National Director also guided the students about the importance of yoga in life. He explained how yoga can help individuals to overcome stress and maintain good health. He advised the students to include yoga in their daily routine to improve their physical and mental health.



6.2.2 Visit of National Co-ordinator, NAHEP-CAAST Dr. Anuradha Agrawal

Agricultural Education Fair 2023 was organized at JNKVV, Jabalpur on 1st Oct 2023 on the occasion of foundation day. Dr. Anuradha Agrawal, National Coordinator delivered foundation day lecture on 60th foundation day of JNKVV and stressed the need of relevance and quality of higher education in developing agriculture in the state and country. Principals, teachers and boys and girls students from 33 higher secondary schools in and around Jabalpur and Narsinghpur district participated.

The Agri Education Fair was attended by more than 262 students belonging to 33 school, 3 under control of State Govt., 8 Kendriya Vidhyalaya Sangathan, 9 Under Vidya Bharati located at different corners of urban and rural sector of Jabalpur and Narsingpur districts. Renowned private schools namely Maharishi Vidya Mandir, Hitkarni School, Chirst Church School, CM rise school, Maharishi Baora Mission School, Guru Govind Singh Khalsa School, Mangalaytan University School from Jabalpur and Nehru School Narsingpur have also participated.





History of Agriculture










Annexure- I

Knowledge Management Collaterals

S.No.	Training Manuals (6)	
1.	Practical Manual on “Hands on Training on Remote Sensing & GIS Using QGIS”	
2.	Practical Manual on “Fundamentals of Geographical Information System”	
3.	Practical Manual on “Satellite Data and Image Processing”	
4.	Practical Manual on “Thematic Map Preparation”	
5.	Practical Manual on “Application of Remote Sensing in Agriculture”	
6.	Crop classification using RS and GIS techniques	
Souvenir and Book of Abstracts (2)		
1.	Souvenir book: National Conference on Production, Processing and Marketing of Millets: Issues & Solutions 2023. Jointly organised by JNKVV and NAHEP	
2.	Book of Abstracts National Conference on Production, Processing and Marketing of Millets Issues & Solutions 2023. Jointly organised by JNKVV and NAHEP	
3.	Souvenir : National Seminar on Emerging Technologies for Advances in Agriculture and Hrticulture 2023. Jointly organised by JNKVV and Institute of Engineers India	
4.	Abstract book : National Seminar on Emerging Technologies for Advances in Agriculture and Hrticulture 2023. Jointly organised by JNKVV and Institute of Engineers India	
Technical Bulletin (3)		
1.	Spatial Groundwater prospects of Madhya Pradesh	
2.	MP Rain: An interactive web app for visualization of long term (1901-2019) spatiotemporal variability of rainfall and drought over the Madhya Pradesh state	
3.	MP Water Account	
2. Research Articles (38) and Review Articles (23)		**NAAS Rating**
1.	Trivedi A, Awasthi MK, Gautam VK, Pande C and Md Din N. 2023. Evaluating the groundwater recharge requirement and restoration in the Kanari river, India, using SWAT model. Environment, Development and Sustainability. https://doi.org/10.1007/s10668-023-03235-8	10.08
2.	Patle D, Nema S, Awasthi MK, Sharma SK and Tiwari YK. 2022. Groundwater vulnerability assessment using DRASTIC model in Niwari District of Bundelkhand Region, Madhya Pradesh, India. Arabian Journal of Geosciences 15:1590	7.83
3.	Sharma A, Nair R, Pandey SK, Awasthi MK, Nishant, Prassana HG, and Uikey P. 2022. Influence of irrigation scheduling based on IW:CPE ratio and stress mitigating chemicals on growth and yield of coriander	6.14

	(Coriandrum sativum L.) var Jawahar Dhaniya-10. AMMA. 53(8):9421-9436.	
4.	Patle D, Awasthi MK, Sharma SK and Tiwari YK. 2022. Application of Geoinformatics with frequency ratio (FR) model to delineate different groundwater potential zones in Ken Basin, India. Indian Journal of Ecology. 49(2):313-323.	5.79
5.	Trivedi A and Awasthi MK. 2021. Runoff estimation by integration of GIS and SCS-CN method for Kanari River Watershed. Indian Journal of Ecology 48(6): 1635-1640.	5.79
6.	Awasthi MK and Patle D. 2020. Reweigh Temperature as Estimator for Evaluation and Prediction. Current Journal of Applied Science and Technology. 39(43):66-71.	5.38
7.	Pawar PS, Rawat U, Yadav A, Rajput A, Vasht D. and Nema S. 2020. Long Term Trend Analysis of Rainfall, Rainy Days and Drought for Sindh River Basin, Madhya Pradesh, India. Int.J.Curr.Microbiol.App.Sci.9(12): 2738-2749	5.38
8.	Suman S, Sharma A and Trivedi A. 2020. Bioactive phytochemicals in rice bran: processing and functional properties: a review. International Journal of Current Microbiology and Applied Sciences Special Issue-11:2954-2960.	5.38
9.	Gautam VK, Awasthi MK. 2020. Evaluation of water resources demand and supply for the districts of central Narmada valley zone. International Journal of Current Microbiology and Applied Sciences. 9(2):3043-3050.	5.38
10.	Trivedi A, Pyasi SK, Galkate RV and Gautam VK. 2020. A Case Study of rainfall runoff modelling for Shipra River Basin. International Journal of Current Microbiology and Applied Sciences Special Issue-11:3027-3043.	5.38
11.	Awasthi MK and Patle D. 2020. Trend Analysis of Ground Water Recharge in Tikamgarh district of Bundelkhand using Geospatial Technology. International Journal of Chemical Studies. Special Issue. 8(4):417-420	5.31
12.	Singh SK, Tripathi SK, Mishra KP, Pandya AK and Awasthi MK. 2020. Water quality evaluation for drinking purpose of Rewa Block, district-Rewa, Madhya Pradesh, India. International Journal of Chemical Studies 8(2): 2473-2480	5.31
13.	Gautam VK, Awasthi MK and Trivedi A. 2020. Optimum allocation of water and land resource for maximizing farm income of Jabalpur District, Madhya Pradesh. International Journal of Environment and Climate Change 10(12):224-232.	5.29
14.	Kumari P, Das SB and Kakade S. 2022. Role of abiotic factors and crop age on FAW infestation in maize. The Pharma Innovation Journal. SP-11(9): 1603-1605	5.23
15.	Shah AK, Bajpai R, Singh RB, Awasthi MK, Kulhade PS. 2022. Nutrient uptake of mustard crop in different fertilizer levels under Gmelina arborea and Dalbergia sissoo-based agroforestry systems. The Pharma Innovation Journal. SP-11(6): 1231-1234.	5.23
16.	Kumari P, Das SB and Kakade S. 2022. Prediction of FAW infestation level in kharif maize. The Pharma Innovation Journal. SP-11(9): 1599-1602	5.23

17.	Trivedi A and Gautam VK. 2022. Decadal analysis of water level fluctuation using GIS in Jabalpur district of Madhya Pradesh. Journal of Soil and Water Conservation 21(3): 250-259	5.20
18.	Barela A, Shrivastava MK, Mohare S, Rahangdale S, Jawarkar S, Amrate PK and Singh Y. 2022. Morphological Characterization and Recognition of New Traits of Soybean [Glycine max (L.) Merrill]. International Journal of Environment and Climate Change 12(12): 1497-1504	5.13
19.	Bunkar N, Nema RK and Awasthi MK. 2022. Contribution of Spatial Maps in Groundwater Potential Zones using Remote Sensing and Geographic Information System. International Journal of Environment and Climate Change. 12 (10): 763-774	5.13
20.	Rao JH, Sharma SK, Awasthi MK, Pyasi SK and Pandey SK. 2022. Land use land cover classification of Burhner river watershed using remote sensing and GIS technique. International Journal of Environment and Climate Change, 12(7): 119-132. DOI: 10.9734/IJECC/2022/v12i730707.	5.13
21.	Trivedi A and Awasthi MK. 2020. A Review on River Revival. International Journal of Environment and Climate Change 10(12): 202-210	5.13
22.	Debnath S, Ramakrishnan RS, Kumawat RK, Ghogare M, Singh PP, Kumar A, Sharma S, Sharma R, Nayak PS, Tiwari G and Samaiya RK. 2022. Plant Growth Regulators Application on Biomass Partitioning in Source and Sink Tissues under Timely Sown and high Temperature Stress Condition in Chickpea. Biological Forum – An International Journal 14(4a): 318-327	5.11
23.	Thakur S, Sharma S, Pachori S, Nagre SP, Anand KJ, Tiwari P and Pathak N. 2022. Understanding Genetic Variability Parameters of Greengram (Vigna radiata L. Wilczek) Germplasm for Agro-Morphological Traits. International Journal of Plant & Soil Science 34(23): 1411-1417,	5.07
24.	Tomar S, Sharma S, Thakur S, Pathak N and Tiwari P. 2022. The Nature of Diversity in Yield Influencing Traits of Lentil Genotypes. International Journal of Plant & Soil Science 34(23): 1665-1671	5.07
25.	Tiwari S, Koutu GK, Singh Y and Pathak N. 2021. Phenotypic Characterization of Diverse Rice Fertility Restorers. International Journal of Plant & Soil Science. 33(16): 220-231	5.07
26.	Patle D, Rao JH and Dubey S. 2020. Morphometric Analysis and Prioritization of Sub-Watersheds in Nahra Watershed of Balaghat District, Madhya Pradesh: A Remote Sensing and GIS Perspective. Journal of Experimental Biology and Agricultural Sciences. 8(4):447-455.	5.07
27.	Rawat U, Yadav A, Pawar PS, Rajput A, Vasht D and S. Nema. 2021. Wheat Crop Acreage Estimation Based on Remote Sensing and GIS in Jabalpur (Madhya Pradesh, India) Asian Journal of Agricultural Extension, Economics & Sociology39(2): 88-94	4.86
28.	Rajput A, Rawat U, Yadav A, Pawar PS, Vasht D. 2021. Hydrological Modelling of Banjar River Watershed using HEC-HMS. Chem Sci Rev Lett 2021, 9 (33), 1-5	4.75
29.	Rao JH, Patle D and Dubey S. 2020. Implementation of Morphometric analysis in prioritizatizing sub-watersheds: A remote sensing and GIS aspect. Indian Journal of Pure & Applied Biosciences. 8(4):318-329.	4.74

30.	Rao JH, Patle D and Sharma SK. 2020. Remote Sensing and GIS Technique for Mapping Land Use/Land Cover of Kiknari Watershed. India. Indian Journal of Pure and Applied Biosciences 8(6): 455-463.	4.74
31.	Dubey S, Rao JH and Patle D. 2020. Morphometric Analysis and Prioritization of Sub watersheds of Umar Nala Watershed, Madhya Pradesh Using Geospatial Technique. International Journal of Agriculture, Environment and Biotechnology. 13(3):269-274.	4.69
32.	Patle D, Rao J H and Sharma SK. 2020. Land Use / Land Cover Mapping of Nahra Nala Watershed Using SENTINEL-2B Imagery. International Journal of Agriculture, Environment and Biotechnology. 13(4):439-446.	4.69
33.	Nigam A, Awasthi MK and Bunkar N. 2020. Assessment of groundwater potential zones of tons basin using spatial data. International Journal of Agriculture, Environment and Biotechnology, 13(3):261-268.	4.69
34.	Barela A, Rahangdale S and Singh P. 2023. Variability Analysis and Correlation in Mutant Genotypes of Pea (Pisum sativum L.). Frontiers in Crop Improvement. 11(1) : 44-47	4.67
35.	Rao JH, Sharma SK, Awasthi MK, Pyasi SK and Pandey SK. 2021. Morphometric analysis of Burhner river watershed using remote sensing and GIS technique. International Journal of Agriculture, Environment and Biotechnology, 14(04): 585-599. DOI: 10.30954/0974-1712.04.2021.13	4.54
36.	Kumawat R, Samaiya RK, Singh Y and Rahangdale S. 2021. Physiological response of post emergence application of herbicides in maize [Zea mays (L.)]. International Journal of Chemical Studies 9(1): 1460-1463	-
37.	Singh BP, Srivastava P, Trivedi A, Singh D. 2021. Application of Geospatial techniques for Hydrological Modelling. International Journal of Multidisciplinary Research and Analysis: 181-192.	-
38.	Trivedi A, Singh BP and Nandeha N. 2020. Flood forecasting using the Avenue of Models. JISET - International Journal of Innovative Science, Engineering & Technology 7(12):299-311.	-
Review Articles (23)		
1.	Thakur S, Sharma S, Barela A, and Nagre SP. 2023. Plant phenomics through proximal remote sensing: A review for improved crop yield. The Pharma Innovation Journal 12(3): 2432-2442	5.23
2.	Aherwar P, Tiwari YK, Nema S, Awasthi MK and Dhage PM. 2023. A review of integrated RS and GIS technique in groundwater potential zone mapping. The Pharma Innovation Journal 12(3): 3308-3313	5.23
3.	Barela A, Thakur S, Pachori S, Rahangdale S, Goyal VK, Kakade S and Shrivastava MK. 2023. Applications of proximal remote sensing in agriculture: A review. The Pharma Innovation Journal 12(2): 1124-1130	5.23
4.	Madariya G, Pandey SK and Sharma SK. 2022. A comparative study on supervised and unsupervised techniques of land use and land cover classification. The Pharma Innovation Journal SP-11(3): 517-521	5.23
5.	Pal S, Pandey SK and Sharma SK. 2022. Applications of remote sensing and GIS in fruit crops: A review. The Pharma Innovation Journal SP-11(2): 186-	5.23

	191	
6.	Bunkar N, and Nema RK. 2022. A review on groundwater potential zone. The Pharma Innovation Journal SP-11(6): 156-159	5.23
7.	Sahu DK, Homeshvari, Rai V, Singh V and Upadhyay SK. 2023. Use of hyperspectral remote sensing as advanced tools for study in soil characteristics: A review. The Pharma Innovation Journal; SP-12(9): 2426-2431	5.23
8.	Upadhyay SK, Kulhare PS, Jatav SS, Tiwari R, Singh S, Rai V and Sahu D. 2023. Performance of chickpea (Cicer arietinum L.) in soil assessing spectral reflectance under different nutrient gradient levels. The Pharma Innovation Journal. 12(10): 312-322	5.23
9.	Kumawat RK, Tiwari G, Ramakrishnan RS, Bhayal D, Debnath S, Thakur S and Bhayal L. 2023. Remote Sensing Related Tools and their Spectral Indices Applications for Crop Management in Precision Agriculture. International Journal of Environment and Climate Change. 13 (1): 171-188	5.13
10.	Katkani D, Babbar A, Mishra VK, Trivedi A, Tiwari S and Kumawat RK. 2022. A review on applications and utility of remote sensing and geographic information systems in agriculture and natural resource management. International Journal of Environment and Climate Change 12(4): 1-18	5.13
11.	Transformative Role of Remote Sensing in Advancing Horticulture: Optimizing Sustainability, Efficiency and Resilience. International Journal of Environment and Climate Change. 13(10): 3559-3567	5.13
12.	Patel T, Babbar A, Behera K, Katara VK, Anand KJ, Vyshnavi RG, Pachori S and Bichewar N. 2023. Exploring the Potential of Proximal Remote Sensing in Plant Stress Phenotyping: A Comprehensive Review. International Journal of Environment and Climate Change. 13(9): 2602-2621	5.13
13.	Rai V, Singh S, Tekam Y, Upadhyay SK and Sahu DK. 2023. Enhancing Soil Degradation Assessment through the Integration of GIS and RS: A Comprehensive Review. International Journal of Environment and Climate Change. 13(9): 2622-2632	5.13
14.	Dhage P, Sahu ML, Nema RK, and Awasthi MK. 2023. Evaluation of Groundwater Potential Mapping: A Review. Biological Forum – An International Journal 15(1): 82-87	5.11
15.	Pachori S, Thakur S, Barela A, Tomar A, Nagre SP, Anand KJ, Patel T and Sharma SK. 2023. Remote Sensing for Crop Management: A Comprehensive Review. Biological Forum An International Journal 15(2): 382-387	5.11
16.	Raghuwanshi M, Jain N, Agrawal KK and Gajbhiye M. 2023. Exploring Effective Weed Management through UAV Application. Biological Forum – An International Journal 15(9): 743-752	5.11
17.	Karada MS, Bajpai R, Singh M, Singh AK, Agnihotri D and Singh BK. 2023. A Review on Advances in Agriculture and Agroforestry with GPS and GIS. International Journal of Plant & Soil Science 35(6): 150-160	5.07
18.	Lohare J, Nair R, Sharma SK and Pandey SK. 2023. Review on Yield Sensing Technologies for Horticultural crops. International Journal of Plant & Soil Science 35(17): 280-289	5.07

19.	Singh S, Rai V, Upadhyay SK and Singh S. 2023. Geo-spatial Tools for Assessing Soil Fertilty: A Review. International Journal of Plant & Soil Science 35(18): 1386-1394	5.07
20.	Anand KJ, Nagre SP, Shrivastava MK, Amrate PK, Patel T and Katara VK. 2023. Enhancing Crop Improvement through Synergistic Integration of Advanced Plant Breeding and Proximal Remote Sensing Techniques: A Review. International Journal of Plant & Soil Science 35(19): 121-138	5.07
21.	Verma B, Porwal M, Jha AK, Vyshnavi RG, Rajpoot A and Nagar AK. 2023. Enhancing Precision Agriculture and Environmental Monitoring Using Proximal Remote Sensing. Journal of Experimental Agriculture International. 45(8): 162-176	4.89
22.	Gigaulia P, Tantwai K, Nema S, Sapre S and Nema S. 2023. Advancing Crop Productivity Assessment through PGPR Analysis in Agriculture using Advanced GIS and Remote Sensing Techniques: A Comprehensive Review. Frontiers in Crop Improvement. Vol 11: 681-696.	4.67
23.	Rop D, Pyasi SK, Awasthi MK, Shrivastava RN and Pandey SK. 2020. A review of the effect of deficit irrigation and mulching on yield and water productivity of drip irrigated onion. International Journal of Science and Research. 9 (12):1675–1681.	-
3. Annual Reports (3)		
1.	NAHEP-CAAST-CSDA, JNKVV, Annual Report (2020-21)	
2.	NAHEP-CAAST-CSDA, JNKVV, Annual Report (2021-22)	
3.	NAHEP-CAAST-CSDA, JNKVV, Annual Report (2022-23)	
4. Success Stories (5)		
1.	Awards for Excellence to student Miss Ayushi Trivedi, a Ph.D. scholar, received the Best Paper Award for research paper on “Determination of Quantum Recharge Requirement by Utilizing Spatial Data for Revival of Kanari River’ at the National Web-Conference on Technological Approaches for Resource Conservation and Management for Environmental Sustainability, Aug.16-17, 2020 at the Academy of Natural Resource Conservation and Management (ANRCM).	
2.	Er. Deepak Patle, Ph.D. Scholar, received the Best Poster Award for research paper on "Wetlands Change Detection using Geospatial Techniques in Kanha National Park, Madhya Pradesh, India. 2nd Feb 2022, JNU ENVIS Resource Partner Centre on ‘Geodiversity & Impact on Environment ‘New Delhi.	
3.	Mr. Makhan Singh Karada, Second Year Ph.D. Scholar, Forestry Student of Agroforestry College of Agriculture JNKVV, Jabalpur, received M.P. Young Scientist Award and the Fellowship for Training of Young Scientists in the 38th M.P. Young Scientist Congress, organized by M.P. Council of Science and Technology (MPCST), Bhopal at Samrat Ashok Technological Institute, Vidisha during March 17 - 19, 2023	
4.	Dr. Deepak Patle received the Fellowship for Training of Young Scientists in the 38th M.P. Young Scientist Congress, organized by M.P. Council of Science and Technology (MPCST), Bhopal at Samrat Ashok Technological Institute, Vidisha during March 17 - 19, 2023	
5.	Dr. Ayushi Trivedi received the Fellowship for Training of Young Scientists in the 38th M.P. Young Scientist Congress, organized by M.P. Council of Science and Technology (MPCST), Bhopal at Samrat Ashok Technological Institute, Vidisha during March 17 -	

	19, 2023
5. Newsletter (3): NAHEP CAAST JNKVV Newsletter January to March 2023.	
6. Poster magazines (2: 64 pages)	
1.	Skill Development to use Spatial Data for Natural Resource Management in Agriculture
2.	Landsat-7 Satellite image of Jabalpur District, Madhya Pradesh (February 2000)
3.	Sentinel-2 Satellite image of Jabalpur District, Madhya Pradesh (February 2020)
4.	Land Use/Land Cover Map of Jabalpur District, Madhya Pradesh (February-2000)
5.	Land Use/Land Cover Map of Jabalpur District, Madhya Pradesh (February-2010)
6.	Land Use/Land Cover Map of Jabalpur District, Madhya Pradesh (February-2020)
7.	Crop Classification Map of Jabalpur district, Madhya Pradesh (February-2020)
8.	Different Satellite image of Jabalpur District (Sentinel-2 February 2020, Landsat-8 February-2020 & Resourcesat February-2019)
9.	Satellite image, Land Use/Land Cover Map and Crop Classification Map of Jabalpur district, Madhya Pradesh (February-2020)
10.	Change detection of LULC in Jabalpur District from 2000 to 2020
11.	Land Use/Land Cover Map of Narsinghpur District, Madhya Pradesh (February-2020)
12.	Crop Classification Map of Narsinghpur district, Madhya Pradesh (February-2020)
13.	Satellite image, Land Use/Land Cover Map and Crop Classification Map of Narsinghpur district, Madhya Pradesh (February-2020)
14.	Soil Map of Narsinghpur district, Madhya Pradesh
15.	Sentinel-2 Satellite image of Dindori District, Madhya Pradesh (February 2020)
16.	Land Use/Land Cover Map of Dindori District, Madhya Pradesh (February-2020)
17.	Sentinel-2 Satellite image of Katni District, Madhya Pradesh (February 2020)
18.	Land Use/Land Cover Map of Katni District, Madhya Pradesh (February-2020)
19.	Geomorphology Map of Jabalpur district, Madhya Pradesh
20.	Drainage Density Map of Jabalpur district, Madhya Pradesh
21.	Lineament Density Map of Jabalpur district, Madhya Pradesh
22.	Lithology Map of Jabalpur district, Madhya Pradesh
23.	Soil Map of Jabalpur district, Madhya Pradesh
24.	Slope Map of Jabalpur district, Madhya Pradesh
25.	Rainfall Map of Jabalpur district, Madhya Pradesh
26.	Ground Water Potential Zone Map of Jabalpur district, Madhya Pradesh
27.	Mean Annual Rainfall Map of Madhya Pradesh (1901- 2019)
28.	Mean monsoon, winter, post monsoon, and Summer Rainfall Maps of Madhya Pradesh (1901- 2019)
29.	Mean Annual Potential Evapotranspiration Map of Madhya Pradesh (2000-2020)
30.	Mean monsoon, winter, post monsoon, and Summer Potential Evapotranspiration Map of Madhya Pradesh (2000-2019)
31.	Surface Waterbody Map of Khandwa District of Madhya Pradesh (2014-2020)
32.	Diagnostic Analysis and Planning of Rejuvenation of Kanari River in Jabalpur District
33.	Identification of Suitable Sites for Artificial Groundwater Recharge Using Geoinformatics in Ken River Basin, India
34.	Land Use Land Cover Mapping for Identification of Irrigated Areas in Betwa River Basin Using Spatial Data
35.	Study on Prioritization of Sub-watersheds through Integration of Land Use Land Cover Factors with Morphometric Parameters

36.	Morphometric Study for Prioritization of Sub-watersheds of Banjar River using Geospatial Technique
37.	Spatial mapping and Characterization of Mango orchard using Remote sensing and GIS in Jabalpur district of Madhya Pradesh
38.	Computation of carbon sequestration of mango (Mangifera Indica L.) orchards of Jabalpur district using geoinformatics
39.	Characterization of the efficacy of plant growth regulators for mitigation of high-temperature stress Impact on growth and productivity in chickpea (Cicer arietinum L.)
40.	Characterization of the plant growth regulators for alteration of growth, physiology and high temperature stress tolerance mechanism in wheat (Triticum aestivum L.) through ground based proximal remote sensing
41.	Application of Proximal Remote Sensing based on Plant Phenomics Approaches and Characterization of Chilli Genotype for Heat Stress Tolerance
42.	Deciphering the Mechanism of Resistance for Dry Root Rot and Terminal Heat Stress in Chickpea applying Genetic, Genomic and Proximal Remote Sensing based Phenomics Approaches
43.	Characterisation of Fall Army Worm (FAW) damage in maize crop through ground based hyperspectral remote sensing
44.	To build basic capacity for using RS & GIS techniques applied for betterment of Natural Resource Management particularly in Agriculture and allied sectors
45.	To identify appropriate techniques for integration of spatial and ground data to realize problems related to land, water and vegetation
46.	To develop user friendly spatial data products using identified technologies for policy makers, researchers, field workers and farmers
47.	Evolution of Surveying
48.	Electromagnetic Spectrum & Spectral Reflectance Signature of Vegetation, Soil & Water
49.	Navigation Systems Global Positioning System vs. Indian Regional Navigation Satellite System
50.	Quantum of Satellite Data in India
51.	Data Products from Indian Remote Sensing Satellites
52.	Landsat Remote Sensing Satellite Data
53.	MODIS Satellite Data
54.	Very High-Resolution Satellite, European Remote Sensing Satellite
55.	Awareness Programme for Students
56.	Attracting Talented Students to Agriculture
57.	Capacity Building for Scientists and Teachers
58.	Acquaintance of Cutting-Edge Technology for Students &Faculties
59.	Capacity Building Programmes for Social Safeguard
60.	Capacity Building Programmes for sustainable Environment
61.	Awareness Program for sustainable Environment
62.	Understanding Big Data and Mobile Apps
63.	Clarity of features in high-resolution Satellite Images JNKVV Campus Jabalpur
64.	Precise and Accurate mapping through fine-resolution satellite images
7. Article Published in Magazine (7)	
1.	Trivedi A and Awasthi MK. 2020. Aquifer overexploitation: causes of river drying.

	Agri-India Today
2.	Trivedi A and Awasthi MK. 2021. Aquifer mapping and management for river revival. Agriculture & food: e newsletter
3.	Trivedi A and Awasthi MK. 2021. River Revival: A step towards nourishment of villages. Kheti
4.	Trivedi A and Awasthi MK. 2022. Analysis of LULC Matrix Change. Kheti.
5.	Trivedi A and Awasthi MK. 2022. Scientific approaches for non-monsoon flow revival in Kanari River. Indian Farming. 72(05):17-20.
6.	एम. के. अवस्थी, दीपक पटले. 2022. टीकमगढ़ जिले में निर्मित जल संरक्षण संरचनाओं का दो दशकीय भूजल स्तर पर अध्ययन. अभियंता बंधु वार्षिक पत्रिका, प्रकाशक दि इंस्टीटूशन ऑफ़ इंजीनियर कोलकाता. 85-87.
7.	आर. के. नेमा. 2022. जबलपुर जिले में कनारी नदी का कायाकल्प. अभियंता बंधु वार्षिक पत्रिका, प्रकाशक दि इंस्टीटूशन ऑफ़ इंजीनियर कोलकाता. 88-90.

8. Blogs (18 posts)

- Groundwater survey app: NAHEP JNKVV Center developed Groundwater survey app, it helps users to digitally store the water resource information along with GIS spatial attributes
- Field Survey Mobile app: NAHEP JNKVV Center developed Field Survey app to take surveys on their smartphone and helps users to store the various information of feature along with its photograph.
- Inauguration programme: National Director NAHEP Dr. R. C. Agrawal inaugurated the capacity building center and spatial data laboratory at JNKVV on 15th February 2023.
- 10 Days training on Entrepreneurship Development among the students on Innovative technologies in Horticulture production. 13-03-2023 to 22-03-2023
- National seminar on “Opportunity in Agri-Entrepreneurship for Women Empowerment” on 9th Feb 2023 for PG and PhD students of Agriculture universities.
- Hands-on Training on Spatial Data Analysis using R and GeoDa, 24-01-2023 to 14-02-2023
- Hands-on Training on Remote Sensing and GIS is scheduled to be held from 03-01-2023 to 23-01-2023
- Photo of 21 days offline "Hands on Training on Remote Sensing and GIS"
- Awareness program for peer learning groups of PG & PhD students to be held from 27th to 29th September 2022
- Special lecture on Identification of major insect pests & natural enemies of Kharif crops 21 Aug 2022
- 21-days offline training entitled as "Hands-on Training on Remote Sensing and GIS" is scheduled to be held from 31st Aug 2022 to 20th Sep 2022 from 10.30 am - 5.30 pm at NAHEP training lab, College of Agricultural Engineering, JNKVV, Jabalpur
- Special lecture entitled Growth and Development of Environment Management System is scheduled to be held on 26 July 2022.
- Special Lecture on Technological Interventions for sustained Agriculture to be held on 13th June 2022
- World Environment Day is celebrated 5 June 2022 to raise awareness about the current

conditions of the Environment around us. • Special lecture on Creating rural employment by monetizing waste from Agriculture A road ahead to be held on 26 May 2022 • Online Workshop on Pedagogy to improve the performance of weak students, to be held from May 30th to June 3rd, 2022. only for Faculty • NAHEP organize 21 Days Hands-on Training on RS & GIS using QGIS to be held from 19 May to 11 June 2022 • NAHEP organize 21 Days Hands-on Training on RS & GIS to be held from 23rd March to 22nd April 2022	
Additional Publications	
9. Short Communication (1)	
1.	Katkani D, Babbar A, Upadhyay S and Patel V. 2022. Identification of chickpea (Cicer arietinum) breeding lines tolerant to high temperature. Indian Journal of Agricultural Sciences 92 (11): 1391–1394
10. Abstract/Paper presented in National/ International conferences (8)	
1.	Trivedi A and Awasthi MK. 2020. Groundwater Recharge Estimation using SWAT Model. National Web Conference on Sustainable Soil and Water Management for Bio-diversity Conservation, Food Security and Climate Resilience.
2.	Trivedi A. 2020. River basin modeling using SWAT model. International Web-Conference on Resource Management and Biodiversity Conservation to Achieve Sustainable Development Goals.
3.	Trivedi A. 2020. Determination of Quantum Recharge Requirement by Utilizing Spatial Data for Revival of Kanari River. National Web-Conference on Technological Approaches for Resource Conservation and Management for Environmental Sustainability.
4.	Singh M, Tiwari YK, Awasthi MK and Trivedi A. 2020. Analysis of geospatial causes for lowering discharge in kanari river. Conference on Global Approaches in Natural Resource Management for Climate Smart Agriculture. GNRSA-2020/787.
5.	Singh M, Tiwari YK, Awasthi MK and Trivedi A. 2020. Analysis of land use land cover change matrix. Conference on Global Approaches in Natural Resource Management for Climate Smart Agriculture. GNRSA-2020/787.
6.	Gautam VK, Yadav KK, Raju JT and Trivedi A. 2020. Analysis of Groundwater Quality Parameters Using Gis Technique For Chittorgarh District, Rajasthan. Conference on Global Approaches in Natural Resource Management for Climate Smart Agriculture.GNRSA- 2020/787.
7.	Patle D and Awasthi MK. 2021. Identification of Drought Presumable Zones Using Geographic Information System: A Case Study of Niwari District of Bundelkhand Region, Madhya Pradesh. International Conference on Soil and Water Resource Management (ICSWRM), Maharana Pratap University of Agriculture and Technology, Udaipur, (Rajasthan), India.
8.	Patle D. 2023. Identification of Suitable Sites for Artificial Groundwater Recharge Using Geoinformatics in Ken River Basin. 38 M.P. Young Scientist Congress organized by Samrat Ashok Technological Institute, Vidisha during March 17 - 19, 2023
11. Poster Presentation (5)	
1.	Ayushi Trivedi (2020). Determination of Quantum Recharge Requirement by Utilizing Spatial Data for Revival of Kanari River. National Web-Conference on Technological

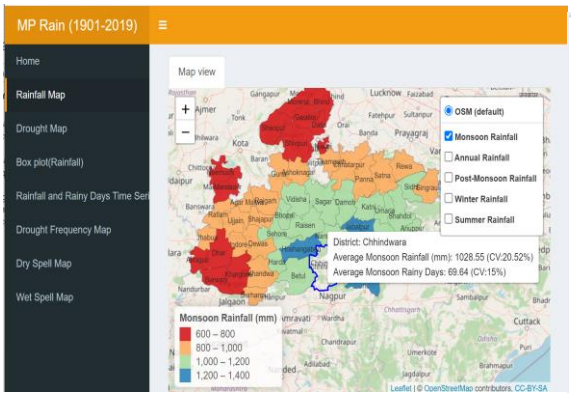
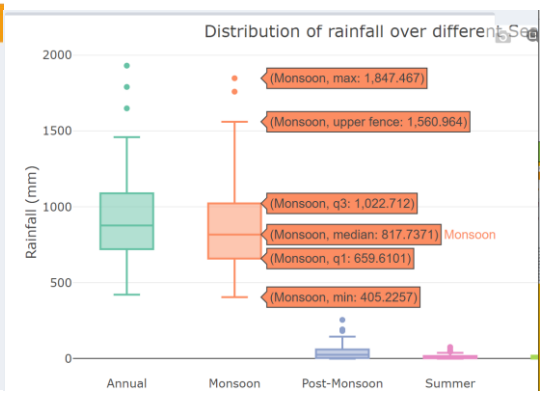
	Approaches for Resource Conservation and Management for Environmental Sustainability by Academy of Natural Resource Conservation and Management (ANRCM) Lucknow (U.P)
2.	Ayushi Trivedi Has secured 1st Position in Poster Competition for Theme "Application of Geoinformatics" in Post Graduate / Research Scholar Category organized by M.Sc. Geoinformatics Department, ISTAR College, Vallabh Vidyanagar on 10th June 2020, 'River Revival : Assessing Spatial Features For Determination Of Quantum Recharge Requirement'
3.	Deepak Patle Has Participated in Poster Competition for Theme "Application of Geoinformatics" In Post Graduate / Research Scholar Category Organized by M.Sc. Geoinformatics Department, ISTAR College, Vallabh Vidyanagar on 10th June 2020
4.	Ayushi Trivedi (2020) has secured best poster award for the topic "Estimation of rainfall-runoff by integration of SCS-CN and ArcGIS Approaches" in International Conference: Global Perspective in Agricultural and Applied Sciences for Food and Environmental Security.
5.	Deepak Patle has secured 1st position in poster competition on the theme 'Wetlands Action for People & Nature' held on the occasion of the World Wetlands Day on 2nd February 2022 organized by JNU ENVIS Resource Partner Centre on 'Geodiversity & Impact on Environment' & SCST ECOTOURISM ENVIS.
12. Book Chapter (12)	
1.	Sharma A, Suman S and Trivedi A. 2022. Food security and nutrition and sustainable agriculture: key points for achieving SDGs. New Dimension of Agricultural Sciences: 11-21.
2.	Trivedi A, Nandeha N, Sharma A and Gautam VK. 2022. Artificial intelligence and geospatial analysis in disaster management. New Dimension of Agricultural Sciences: 62-81.
3.	Raju JT, Gautam VK and Trivedi A. 2022. Role of conservation agriculture in increasing crop yields. New Dimension of Agricultural Sciences: 92-103.
4.	Patle D and Awasthi MK. 2021. Identification of drought presumable zones using Geographic information system: A case study of Niwari district of Bundelkhand region Madhya Pradesh. Soil and Water Conservation & Management.1:63-68.
5.	Trivedi A and Awasthi MK. 2021. Runoff estimation by integration of GIS and SCS-CN method for Kanari River Watershed. Soil and Water Conservation & Management: 121-126.
6.	Rawat U, Yadav A, Pawar PS, Rajput A, Vasht D and Nema S. 2021. Determining wheat crop acreage based on Remote sensing & GIS technique in Jabalpur, India. Current Topics in Agricultural Sciences. B P International Publisher. 3: 63-69.
7.	Trivedi A, Awasthi MK and Singh M. 2021. Application of RS and GIS for determination of various criteria causing drying of Kanari River System. Water Resources Management and Sustainability Springer Nature. Chapter 16.
8.	Trivedi A and Nandeha N. 2020. Indigenous water conservation techniques. Organic farming in 21st century: Concept, Innovation and Perspectives. Agrobios (India):221-241.
9.	Tiwari S, Rahangdale S, Singh Y and Sharma S. 2020. Next Generation Sequencing: An Emerging Tool. Advances in Biological Sciences and Biotechnology. Chapter 9.

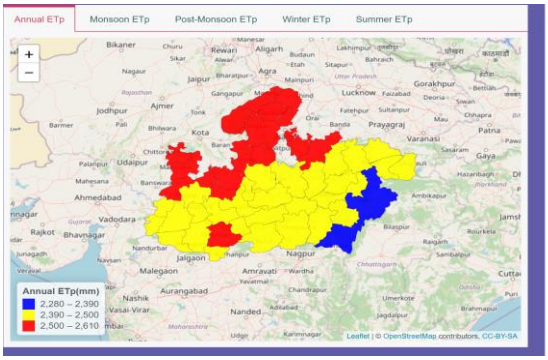
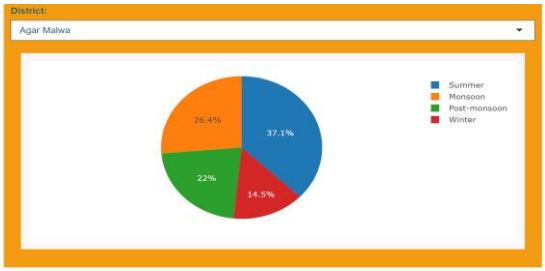
10.	Trivedi A. 2020. River rejuvenation: an innovative and logistic approach. Recent Trends in Agricultural Sciences & Technology. weser Book Germany. Chapter-29
11.	Sharma SK and Baghel SS. 2023. Site Map of the JNKVV University Campus. Agro-biodiversity Exploration. Chapter 2.
12.	Awasthi MK, Nema RK and Shrivastav RN. 2023. Irrigation Audit. Agro-biodiversity Exploration. Chapter 3.

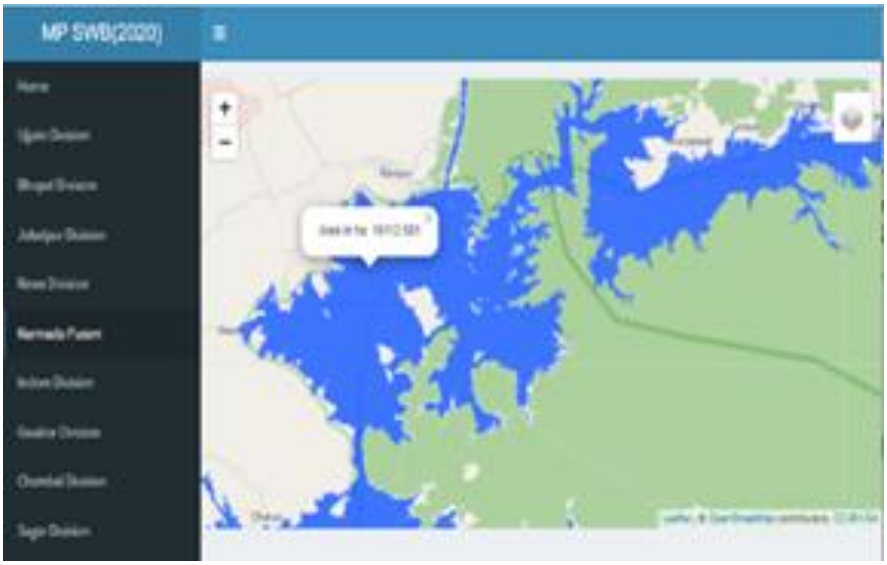
Annexure-II

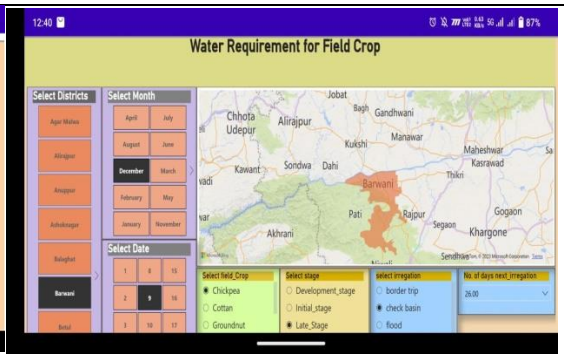
Mobile and web application

II. Mobile and Web Applications	Apr'2018 to Dec'2023
1. Web Applications Developed	5
2. Mobile Applications Developed	4

S.N.	Web application
1	**MP Rain (1901-2019)** MP Rain (1901-2019) is a web application developed using R programming language and the "Shiny" web framework. It serves as a comprehensive resource for visualizing historical rainfall patterns, rainy days, drought conditions, and dry/wet spells across various districts of Madhya Pradesh. The application leverages 119 years of daily gridded (0.25 x 0.25 degree) rainfall data spanning from 1901 to 2019. It has been designed with a user-friendly interface that requires no specialized coding skills or software expertise, making it accessible to a wide range of stakeholders. The application addresses a critical issue of providing long-term spatio-temporal rainfall and drought data to end users for informed decision-making. By offering historical insights into rainfall and drought pattern, it empowers state agricultural departments, water resource agencies, disaster management organizations and academic researchers to make effective decisions and develop strategies for mitigating the impact of climate-related challenges in the region. App link: https://pspawar71.shinyapps.io/Myapp/  

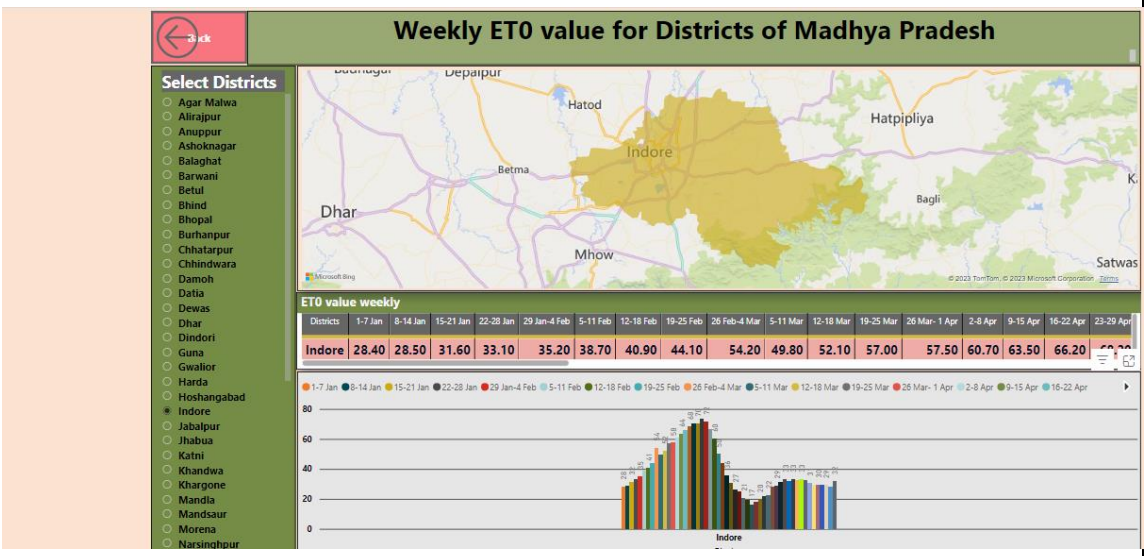
2	**MP ETp (2000-2020)** MP ETp (2000-2020) is an interactive web application developed using the R programming language and the "Shiny" web framework. Its primary objective is to provide an accessible platform for visualizing the spatio-temporal variation of Potential Evapotranspiration (ETp) at the district level within the Madhya Pradesh state. The application employs data from MODIS Terra (MOD16A2GF), offering 21 years of 8-day composite potential evapotranspiration data at a 500m spatial resolution, spanning from 2000 to 2020. The application is designed to be user-friendly and requires no specialized coding skills or software expertise. The data and insights provided are invaluable for various applications, including calculating the water requirement of crops, effective crop and water resource management, water-balance assessments, in-depth drought studies, investigations related to climate change, and projections of future ETp trends. This platform empowers decision-makers and researchers with essential information for sustainable water resource management in Madhya Pradesh. You can access this application through the following link: https://pspawar71.shinyapps.io/MP_ETp/  
3	**MP SWB (2020)** The "MP SWB (2020)" is an interactive web application designed to provide a visual representation of surface waterbodies and their areas for different divisions within Madhya Pradesh for the year 2020. Developed using the R programming language and the "Shiny" web framework, the surface waterbody map extracted from Landsat 8 OLI imagery. Users can access this application through the following link https://pspawar71.shinyapps.io/my_app/. The application simplifies the process of understanding the distribution of surface waterbodies and their spatial characteristics, making it an essential tool for informed decision-making. Additionally, it aids relevant

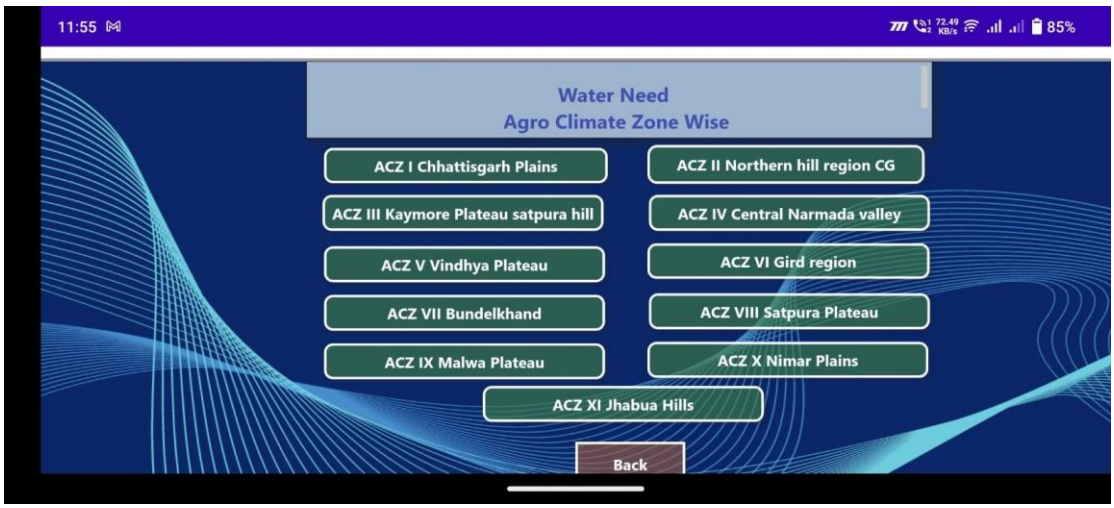
	departments in formulating effective policies to address potential flood and drought disasters. Moreover, it assists in assessing the influence of surface water areas on groundwater resources, making it a valuable resource for sustainable water resource management in the region. 
4	**Crop Water Requirement Web App** The "Crop Water Requirement" web application is a versatile tool that provides interactive visualization of crop water requirements across Madhya Pradesh state. Developed using a combination of Java, HTML, CSS, and the Power BI platform, this application holds immense significance in the field of agriculture. This application provides choice for users to select three distinct crop categories: field crops, vegetable crops, and fruit crops. Subsequent pages of web application offer various choices such as districts, months, and dates, which provide the necessary values for evapotranspiration. Users can further customize their inputs by specifying their crop type, preferred irrigation method, and the number of irrigation days. The application is thoughtfully designed to accurately implement these inputs, ensuring the reliability of its results. As a powerful tool, it empowers farmers and agricultural enthusiasts to make informed decisions regarding water management. This, in turn, leads to elevated agricultural productivity and sustainability.

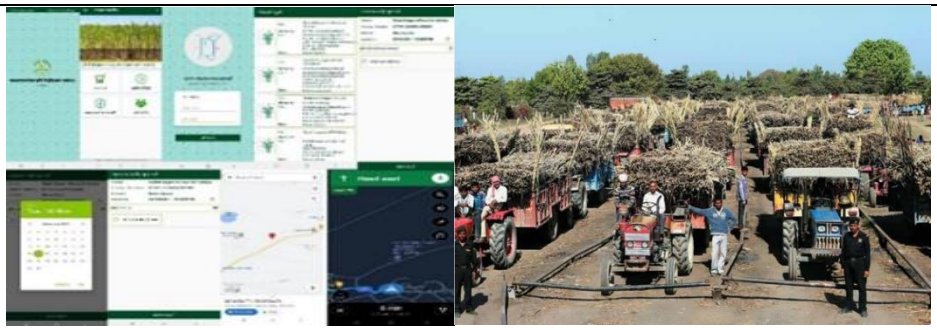
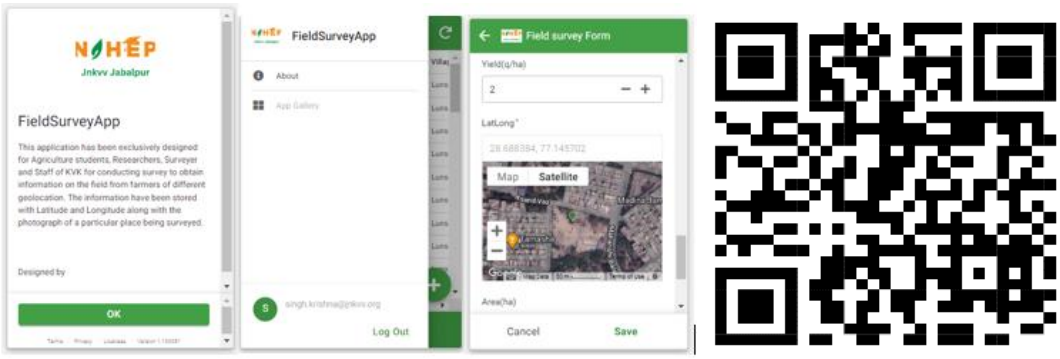
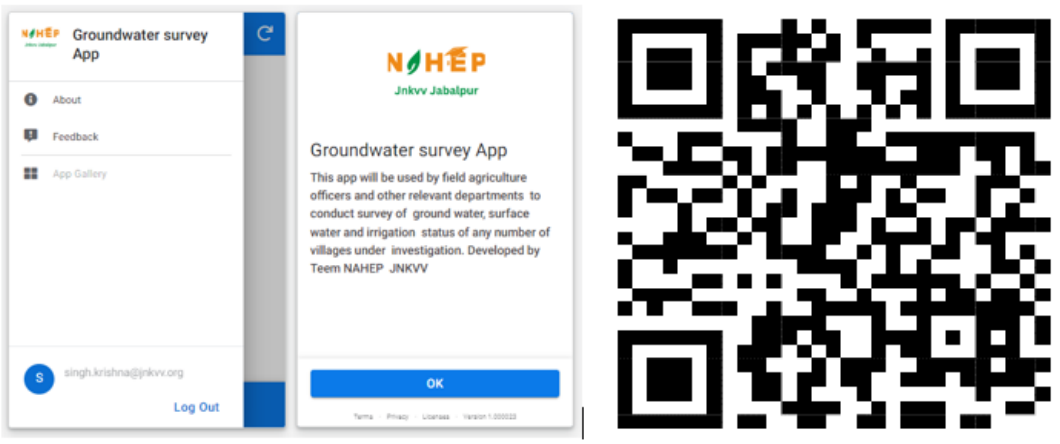


5 **ET_0 Values web app**

The "ET0 Values for Districts of MP" web application plays a pivotal role in visualizing evapotranspiration (ET) values for districts within Madhya Pradesh. The value of ET varies dynamically, both spatially and temporally, spanning daily, monthly, and yearly intervals. To access specific ET values for a location and timeframe, users typically require weather data or specialized instruments and models capable of ET estimation. These estimates draw from meteorological parameters such as temperature, relative humidity, wind speed, solar radiation, and vegetation attributes. The "ET0 Values for Districts of MP" application is thoughtfully developed using the Microsoft Power BI platform. It empowers users, particularly agricultural researchers and farmers, to seamlessly visualize ET data within Madhya Pradesh, offering district-level insights and enabling exploration of daily, weekly, and monthly ET views. Access to the application is conveniently available via the JNKVV-NAHEP website at https://nahep-jnkvv.org/.



Mobile applications	
1	**Water budget app** Water, an indispensable agricultural resource, requires comprehensive management, considering its availability, distribution, and demands across the state. Agriculture faces mounting challenges such as climate change, depleting groundwater, and evolving crop patterns. The water budget app aids in crop selection, efficient water management, and understanding its impact on associated inputs, ensuring prudent water utilization. This mobile app spatially presents Madhya Pradesh's water budget through maps categorized by river basins, agroclimatic zones and districts. It offers insights into essential water budgeting aspects, including Domestic Water Requirement, Animal Water Requirement, Crop Water Requirement, Industrial Water Requirement, Total Water Requirement, Water Available for Utilization, Surplus or Deficit of Water, Utilizable Surface Water, Utilizable Groundwater and Total Utilizable Surface & Groundwater. The Water Budget App is a valuable tool for planners, researchers, extension workers, and water resource management professionals, empowering them to navigate the complex landscape of sustainable agricultural development. 
2	***Ganna Mitra* (Sugarcane)** It is an innovative mobile application to address the issues of farmers to locate nearby mills using GIS spatial maps. The App is also having useful information and guidelines in the form of text and video regarding sugarcane cultivation.

	
3	**Field Survey App** It is an innovative mobile application to address the issues of spatial information gathering by helping the user to digitally store the various crop information of villages along with GIS spatial attributes. 
4	**Ground Water survey App** It is an innovative mobile application to help users to digitally store the locations of water resource information along with GIS spatial attributes. This app will help researchers as well as policymakers for efficient planning and management of water resources. 

Annexure-III

Number of IPR (Intellectual Property Rights) Registered/Obtained

III. Number of IPR (Intellectual Property Rights) Registered/Obtained	Apr'2018 to Dec'2023
4. Copyrights applied for apps	5
5. Patents	5
6. Others (Patents in pipeline)	5

Details of the of Patents

S. N.	Item	Authors	Year	Patent No.	Status
1	Precision hill seeder with urea deep placement applicator for rice (Germany)	Prabhat Kumar Guru, Dr. Suryakanta Khandai, Dr. Virender Kumar, Dr. Atul Kumar Shrivastava, Dr. Sudhanshu Singh.	2020	2020 22103192	Granted
2	Pedal-Operated Low-Cost Minor Millet Thresher (Germany)	Dr.Shalini Chaturvedi, Dr. Atul Kumar Shrivastava	2020	2020 22103867	Granted
3	Electric Machine for Seeding Pre Germinated Paddy Seeds in Puddled Soil Conditions (Germany)	Prabhat Kumar Guru, Dr. Suryakanta Khandai, Dr. Virender Kumar, Dr.Pardeep Sagwal, Dr. Atul Kumar Shrivastava, Dr.Sudhanshu Singh	2020	2020 22105647	Granted
4	Roto Till Raised Bed Cum Plastic Mulch and Drip Laying Machine for the Vertisol (Germany)	Rohit Namdeo, Dr. Atul Kumar Shrivastava	2020	2020 22104148	Granted
5	Grain Dryer (Govt. of India)	Dr. S.V.H. Nagendra, Dr. R. Y. Kshirsagar, Dr. Atul Kumar Shrivastava	2022	3605 38-001	Granted
6	Pressurized Aqua Fertilizer Metering Device for the Tractor Drawn Seed-cum-Fertilizer drill	Dr. Atul Kumar Shrivastava, Dr. Avinash Kumar Gautam	2020	202011 056668	Filed
7	Pedal-Operated Low-Cost Minor Millet Thresher	Dr.Shalini Chaturvedi, Dr. Atul Kumar Shrivastava,	2022	2022 21010827 A	Filed

8	Precision hill seeder with urea deep placement ap plicator for rice	Prabhat Kumar Guru, Dr. Atul Kumar Shrivastava	2022	2022 21018768	Filed
9	Roto Till Raised Bed Cum Plastic Mulch and Drip Laying Machine for the Vertisol	Rohit Namdeo, Dr. Atul Kumar Shrivastava	2022	2022 21035190	Filed
10	Electric Seeder for rice	Prabhat Kumar Guru, Dr. Suryakanta Khandai, Dr. Virender Kumar, Dr.Pardeep Sagwal, Dr. Atul Kumar Shrivastava, Dr.Sudhanshu Singh	2022	2022 21038962	Filed

Bundesrepublik Deutschland

Urkunde

über die Eintragung des
Gebrauchsmusters Nr. 20 2022 103 192

Bezeichnung:
Einzelkornsämaschine mit Harnstoff-Tiefausbringung für Reis

IPC:
A01C 7/04

Inhaber/Inhaberin:
Guru, Prabhat Kumar, Chhindwara, Madhya Pradesh, IN
Khandai, Suryakanta, Dr., Jaipur, Odisha, IN
Kumar, Virender, Dr., Raipur, Haryana, IN
Shrivastava, Atul Kumar, Dr., Jabalpur, Madhya Pradesh, IN
Singh, Sudhanshu, Dr., Varanasi, Uttar Pradesh, IN

Tag der Anmeldung:
06.06.2022

Tag der Eintragung:
27.06.2022

Die Präsidentin des Deutschen Patent- und Markenamts

Cornelia Rudloff-Schäffer

München, 27.06.2022

Die Voraussetzungen der Schutzfähigkeit werden bei der Eintragung eines Gebrauchsmusters nicht geprüft.
Den aktuellen Rechtsstand und Schutzumfang entnehmen Sie bitte dem DPMAregister unter www.dpma.de.

Bundesrepublik Deutschland

Urkunde

über die Eintragung des
Gebrauchsmusters Nr. 20 2022 105 647

Bezeichnung:
Elektrische Maschine für die Aussaat von vorgekeimtem Paddy-Saatgut in pfützenartigem Boden

IPC:
A01C 7/02

Inhaber/Inhaberin:
Guru, Prabhat Kumar, Chhindwara, Madhya Pradesh, IN
Khandai, Suryakanta, Dr., Jajpur, Odisha, IN
Kumar, Virender, Dr., Hisar, Haryana, IN
Sagwal, Pardeep, Dr., Karnal, Haryana, IN
Shrivastava, Atul Kumar, Dr., Jabalpur, Madhya Pradesh, IN
Singh, Sudhanshu, Dr., Varanasi, Uttar Pradesh, IN

Tag der Anmeldung:
06.10.2022

Tag der Eintragung:
27.10.2022

Die Präsidentin des Deutschen Patent- und Markenamts

Cornelia Rudloff-Schäffer

München, 27.10.2022

Die Voraussetzungen der Schutzfähigkeit werden bei der Eintragung eines Gebrauchsmusters nicht geprüft.
Den aktuellen Rechtsstand und Schutzumfang entnehmen Sie bitte dem DPMAregister unter www.dpma.de.

Bundesrepublik Deutschland

Urkunde

über die Eintragung des
Gebrauchsmusters Nr. 20 2022 104 148

Bezeichnung:
Kunststoffmulchgerät für das Vertisol

IPC:
A01B 33/02

Inhaber/Inhaberin:
Namdeo, Rohit, Jabalpur, Madhya Pradesh, IN
Shrivastava, Atul Kumar, Dr., Jabalpur, Madhya Pradesh, IN

Tag der Anmeldung:
22.07.2022

Tag der Eintragung:
28.07.2022

Die Präsidentin des Deutschen Patent- und Markenamts

Cornelia Rudloff-Schäffer

München, 26.07.2022

Die Voraussetzungen der Schutzfähigkeit werden bei der Eintragung eines Gebrauchsmusters nicht geprüft.
Den aktuellen Rechtsstand und Schutzumfang entnehmen Sie bitte dem DPMAregister unter www.dpma.de.

Bundesrepublik Deutschland

Urkunde

über die Eintragung des
Gebrauchsmusters Nr. 20 2022 103 867

Bezeichnung:
Kostengünstige pedalbetriebene Hirsedreschmaschine für Kleinhirse

IPC:
A01F 12/00

Inhaber/Inhaberin:
Chaturvedi, Shalini, Dr., Satna, Madhya Pradesh, IN
Shrivastava, Atul Kumar, Dr., Jabalpur, Madhya Pradesh, IN

Tag der Anmeldung:
08.07.2022

Tag der Eintragung:
22.08.2022

Die Präsidentin des Deutschen Patent- und Markenamts

Cornelia Rudloff-Schäffer

München, 22.08.2022

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ORIGINAL

No. 113981

भारत सरकार
GOVERNMENT OF INDIA
पेटेंट कार्यालय
THE PATENT OFFICE

CERTIFICATE OF REGISTRATION OF DESIGN

Design No.	360538-001
Date	12/03/2022 18:00:22
Reciprocity Date*	
Country	

Certified that the design of which a copy is annexed hereto has been registered as of the number and date given above in class 15-03 in respect of the application of such design to GRAIN DRYER in the name of 1.GYAN GANGA INSITUTE OF TECHNOLOGY & SCIENCES, P.O. TILWARA GHAT, NEAR BARGI HILLS, JABALPUR 482003 M.P. INDIA 2. DR. S.V.H. NAGENDRA, GGITS, JABALPUR, M.P. INDIA 3. DR. R.V. KSHIRSAGAR, PRINCIPAL, GGITS, JABALPUR M.P INDIA 4. DR. ATUL KUMAR SHRIVASTAVA, PROF. & HEAD, F.M.P.E, C.A.E, J.N.K.V.V, JABALPUR , ET AL.

In pursuance of and subject to the provisions of the Designs Act, 2000 and the Designs Rules, 2001

Controller General of Patents, Designs and Trade Marks

*The reciprocity date (if any) which has been allowed and the name of the country.
Copyright in the design will subsist for ten years from the date of Registration, and may underthe terms of the Act and Rules, be extended for a further period of five years.
This Certificate is not for use in legal proceedings or for obtaining registration abroad

VIKAS ASAWAT,
3/183 GANESH TALAB, BASANT VIHAR, KOTA
RAJASTHAN PIN 324009, INDIA

Date of Issue 23/05/2022 12:41:57

(12) PATENT APPLICATION PUBLICATION — (21) Application No 202011056668 A

(19) INDIA

(22) Date of filing of Application :28/12/2020 — (43) Publication Date : 26/03/2021

(54) Title of the invention : PRESSURIZED AQUA FERTILIZER METERING DEVICE FOR THE TRACTOR DRAWN SEED-CUM-FERTILZER DRILL

(51) International classification	:A01B0049060000, A01C0005060000, G06K0009000000, A01C0007060000, A01C0015000000	(71)Name of Applicant : 1)DR. ATUL KUMAR SHRIVASTAVA Address of Applicant :DEPARTMENT OF FORM MACHINERY AND POWER ENGINEERING, COLLEGE OF AGRICULTURAL ENGINEERING, JNKVV, JABALPUR, MADHYA PRADESH, (INDIA)-482004 Madhya Pradesh India 2)DR. AVINASH KUMAR GAUTAM
(31) Priority Document No	:NA	
(32) Priority Date	:NA	
(33) Name of priority country	:NA	(72)Name of Inventor :
(86) International Application No	:NA	1)DR. ATUL KUMAR SHRIVASTAVA
Filing Date	:NA	2)DR. AVINASH KUMAR GAUTAM
(87) International Publication No	: NA	
(61) Patent of Addition to Application Number	:NA	
Filing Date	:NA	
(62) Divisional to Application Number	:NA	
Filing Date	:NA	

(57) Abstract :

The present invention relates to a Pressurized Aqua Fertilizer Metering Device for the Tractor Drawn Seed-cum-Fertilizer drill to determine the requirement and placement Of aqua fertilizer under laboratory conditions for germination of wheat crop. It also investigates the design values of pressurized aqueous fertilizer for metering mechanism. Further, the design and development of tractor drawn seed cum pressurized aqua fertilizer drill is determined. It also performs evaluation of a tractor drawn seed cum pressurized aqua fertilizer drill for sowing of wheat crop under vertisol.

No. of Pages : 29 No. of Claims : 10

(12) PATENT APPLICATION PUBLICATION (21) Application No.202221010827 A

(19) INDIA

(22) Date of filing of Application :28/02/2022 (43) Publication Date : 15/04/2022

(54) Title of the invention : PEDAL OPERATED LOW-COST MINOR MILLET THRESHER

(51) International classification	:A01F0007040000, A01F0007000000, B63H0016080000, A01F0005000000, A01F0007020000
(86) International Application No Filing Date	:NA :NA
(87) International Publication No	: NA
(61) Patent of Addition to Application Number Filing Date	:NA :NA
(62) Divisional to Application Number Filing Date	:NA :NA

(71)**Name of Applicant :**
1)Dr. Shalini Chaturvedi
Address of Applicant :Phd Scholar, Ph.D Scholar, CSIR (SRF), Dept. of Farm Machinery & Power Engineering , CAE, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur (M.P.), India
---------- ----------
2)Dr. Atul Kumar Shrivastava
Name of Applicant : NA
Address of Applicant : NA
(72)**Name of Inventor :**
1)Dr. Shalini Chaturvedi
Address of Applicant :Phd Scholar, Ph.D Scholar, CSIR (SRF), Dept. of Farm Machinery & Power Engineering , CAE, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur (M.P.), India ---------- ----------
2)Dr. Atul Kumar Shrivastava
Address of Applicant :Professor & Head, Department of Farm Machinery and Power Engineering, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur (M.P.), India ---------- ----------

(57) Abstract :

The present invention relates to pedal operated low-cost minor millet thresher (100). The objective of the present invention is to solve the problems in the prior art technologies related to pedal operated threshing machine. The invention present a low cost pedal operated thresher is designed, fabricated especially for women operators. The pedal operated low-cost minor millet thresher (100) is comprised with several components viz. feeding chute (1), threshing unit (2), Drum pulleys (3), straw outlet (4), cleaning unit (5), blower (6), oscillating unit (7), seat (8), operating pedal (9), handle (10) and main frame (11).

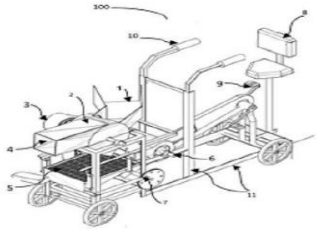

FIGURE 1

6/20/22, 3:16 PM PATENT eFiling

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Tel No. (091)(022) 24137010,24141020 Fax No. 022 24130387
E-mail: mumbai-patent@nic.in
Web Site: www.ipindia.gov.in

सत्यमेव जयते

G.A.R.6
[See Rule 22(1)]
RECEIPT

INTELLECTUAL PROPERTY INDIA
PATENTS DESIGNS TRADE MARKS GEOGRAPHICAL INDICATIONS

Docket No 36058 **Date/Time 2022/06/20 12:27:00**

To **UserId: balrambme**
ROHIT NAMDEO
PhD Research Scholar, College of Agricultural Engineering, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, MP. 482 004.

CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	E-12/1674/2022/MUM	202221036190	2600	16809	FORM 9	
2	202221036190	TEMP/E-1/38025/2022-MUM	1600	16809	FORM 1	ROTOTILL RAISED BED CUM PLASTIC MULCH AND DRIP LAYING MACHINE FOR THE VERTISOL

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0000981523	Online Bank Transfer	2006220008040	4100.00	1475001020000001

Total Amount : ₹ 4100.00
Amount in Words: Rupees Four Thousand One Hundred Only

Received from Balram Singh Yadav the sum of ₹ 4100.00 on account of Payment of fee for above mentioned Application/Forms.
* This is a computer generated receipt, hence no signature required.

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3/30/22, 3:28 PM PATENT eFiling

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[See Rule 22(1)]
RECEIPT

INTELLECTUAL PROPERTY INDIA
PATENTS DESIGNS TRADE MARKS GEOGRAPHICAL INDICATIONS

Docket No 18591 **Date/Time 2022/03/30 15:26:27**

To **UserId: balrambme**
DR ATUL KUMAR SHRIVASTAVA
Dean, Faculty of Agricultural Engineering, Jawaharlal Nehru Krishi Viswavidyalaya, Jabalpur, MP. 482 004.

CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202221018768	TEMP/E-1/20891/2022-MUM	3040	8487	FORM 1	PRECISION HILL SEEDER WITH UREA DEEP PLACEMENT APPLICATOR FOR RICE
2	R20222011997	202221018768	4000	8487	FORM 18	---

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0000944150	Online Bank Transfer	3003220013395	7040.00	1475001020000001

Total Amount : ₹ 7040
Amount in Words: Rupees Seven Thousand Forty Only

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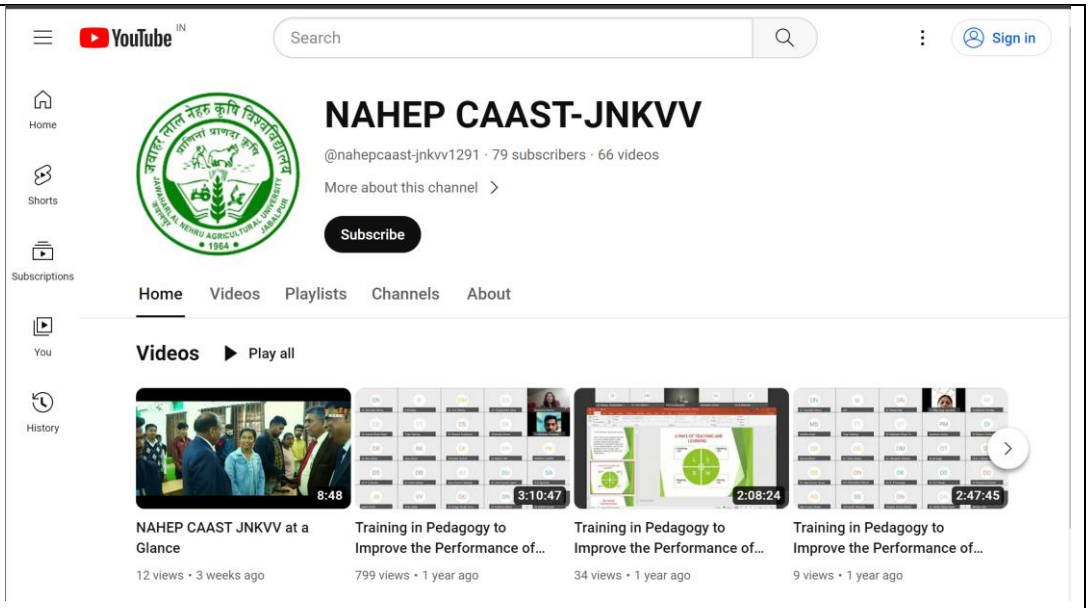
Annexure- IV
Dissemination and Outreach

IV. Dissemination and Outreach	Apr'2018 to Dec'2023
1. No. of Posts on Social Media	65
2. No. of Posts on Newspaper	168
3. No. of Posts on Magazines	7
4. No. of Unique Promotional or Outreach Collaterals	1

S.N	Particular	Brief summary
1	Project Website	The project website provides a brief overview of the project, including its objectives and the scientists and team members involved in the project. It serves as a platform to publish all ongoing activities of the project and provides information on all the training programs being conducted. Visitors to the website can access a wealth of information on the project and stay up-to-date on its progress.  Web Link: https://nahep-jnkvv.org
2	Social Media	**YouTube channel:** The NAHEP CAAST JNKVV YouTube channel is a platform where the project can upload recordings of important training programs, success stories, and other student welfare activities. Number of videos: 65, Subscriber: 77



Link: https://www.youtube.com/@nahepcaast-jnkvv1291

Facebook:

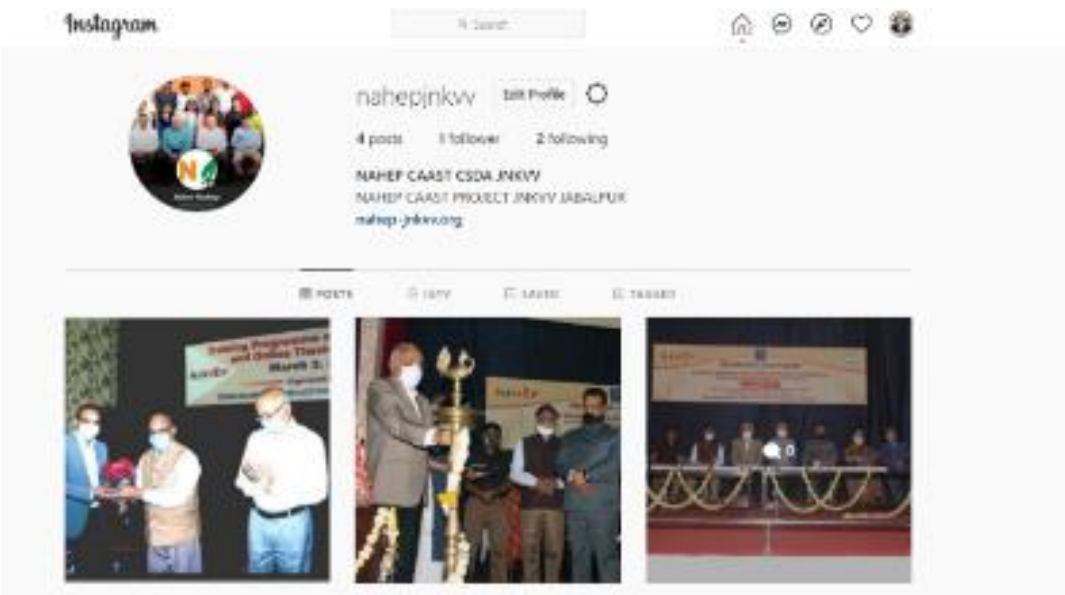
The NAHEP CAAST JNKVV Facebook page has been used to share information about training schedules, awareness programs, project initiatives, and other student welfare activities. This platform is ideal for building a communication around the organization and engaging the young followers through comments, likes and shares. Number of post:52, Followers: 391

Facebook: https://facebook.com/Jnkvvnahep

Instagram:

The NAHEP CAAST JNKVV Instagram account is used to share visual content related to training programs, success stories, and other student welfare activities.

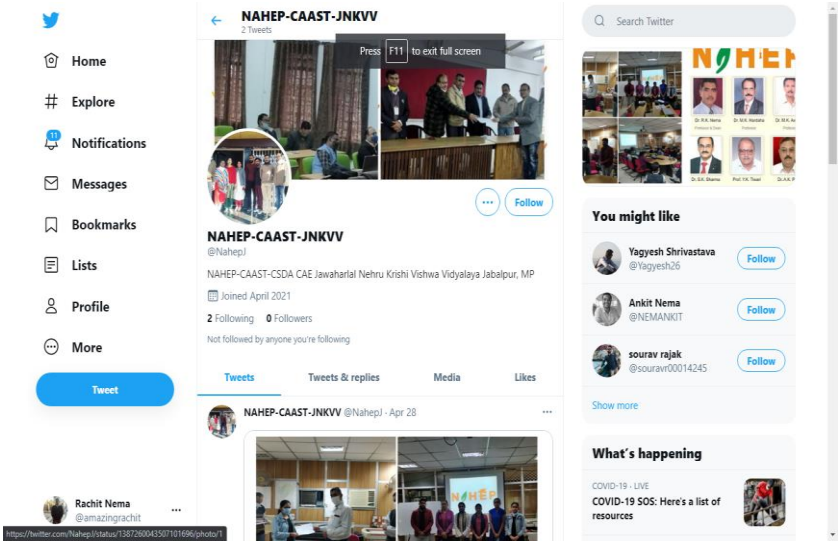
This platform is ideal for reaching a younger demographic and engaging with followers through likes, comments, and direct messages.
Number of post:52, Followers: 155



Instagram: https://www.instagram.com/nahepjnkvv/

Twitter:

The NAHEP CAAST JNKVV Twitter account is used to share quick updates and news related to training programs, success stories, and other student welfare activities.
Number of post:52, Followers: 14



Twitter: https://www.twitter.com/nahep

3	**Press Media**	

S.N.	Name of Newspaper	Activities Published Under CAAST-CSDA			
		2020-21	2021-22	2022-23	2023-24

1	Dainik bhaskar	5	7	8	1
2	Patrika	2	1	6	3
3	Hitavada	1	5	5	2
4	Nai Duniya	1	5	2	4
5	Agniban	1	-	-	-
6	Haribhumi	2	8	6	3
7	Navbharat	1	7	3	2
8	Raj Express	3	6	7	2
9	JNKVV News	1	-	1	-
10	Peoples Samachar	2	6	6	5
11	Yash Bharat	1	-	-	-
12	Tripuri Times	1	-	-	-
13	See Times	3	-	-	-
14	Swatantra mat	3	5	3	-
15	Deshbandhu	-	6	8	2
Total		**27**	**56**	**56**	**24**

कृषि विवि में आर्टिफिशियल इंटेलिजेंस और मशीन लर्निंग पर प्रशिक्षण

जबलपुर। टिकाऊ खेती के लिये नई आर्टिफिशियल इंटेलिजेंस और मशीन लर्निंग तकनीक महत्वपूर्ण सबित होगी। इस तकनीक से यह बात अधिष्ठाता कृषि अभियांत्रिकी संकाय डॉ. आर.के. नेमा एवं विशेषज्ञों ने जवाहरलाल नेहरू कृषि विश्वविद्यालय स्थित कृषि अभियांत्रिकी महाविद्यालय में 10 दिनी प्रशिक्षण के दौरान व्यक्त किये। इसमें 300 से अधिक छात्रों एवं शोधकर्ताओं ने शिरकत की। प्रमुख वैज्ञानिक डॉ. मनोज कुमार अवस्थी ने संचालन एवं आभार व्यक्त किया। ज्ञात हो कि वर्तमान में दुनिया गंभीर संकटों का सामना कर रही है जैसे की अनियमित जलवायु परिवर्तन, तेजी से बढ़ती जनसंख्या, पानी की कम उपलब्धता, भूजल में कमी सिकुड़ते खेत, घटते प्राकृतिक संसाधन और बाजार की मांग में बदलाव। इस सब तथ्यों को देखते हुये भविष्य के लिये टिकाऊ कृषि हेतु नई तकनीक आर्टिफिशियल इंटेलिजेंस और मशीन लर्निंग के उपयोग काफी महत्वपूर्ण है क्योंकि इस तकनीकों की मदद से फसल की निगरानी, मौसम की स्थिति, तापमान, जल का उपयोग, मिट्टी की स्थिति, फसल स्वास्थ्य, पोषक तत्वों की कमी, रोगों का पता लगाना, खाद्य सुरक्षा, गुणवता का आकलन, कीटनाशकों का कुशल उपयोग जैसे अनेक अनुप्रयोग भी किये जा सकेंगे। इन मुद्दों पर प्रशिक्षण के साथ ही गहन विचार विमर्श किया गया।

जनेकृविवि में सुंदर संवेदन एवं भौगोलिक सूचना यंत्र विषय पर हुआ प्रशिक्षण

जबलपुर। जनेकृविवि में कृषि अभियांत्रिकी महाविद्यालय अंतर्गत संचालित राष्ट्रीय कृषि उच्च शिक्षा परियोजना के तहत 14वीं 21 दिवसीय प्रशिक्षण सुंदर संवेदन एवं भौगोलिक सूचना यंत्र का कृषि में अनुप्रयोग विषय पर आयोजित प्रशिक्षण का समापन हुआ। कुलपति डॉ. प्रदीप कुमार बिसेन के मार्गदर्शन में डॉ. जी.के कौतु के मुख्य आतिथ्य में हुआ। डॉ. कौतु ने कहा कि देश में कृषि क्षेत्र हेतु रिमोट सेंसिंग एवं जीआईएस तकनीक से अभूतपूर्व बदलाव व गुणवत्ता में सुधार हो पायेगी।

प्रक्षेत्र में यह तकनीक मॉनिटरिंग हेतु मील का पत्थर का साबित होगी। अध्यक्षता कर रहे डॉ. अतुल श्रीवास्तव ने बताया कि वर्तमान में यह तकनीक आने वाले भविष्य में शोध व दैनिक दिनचर्या में महत्वपूर्ण साबित होगी। संचालन इंजी. सौरभ नेमा, डॉ. शैलेष शर्मा सह समन्वयक द्वारा किया गया, आभार प्रदर्शन नाहेप परियोजना के प्रमुख समन्वयक डॉ. आरके नेमा ने किया। डॉ. शैलेष शर्मा, डॉ. एमके अवस्थी, डॉ. बाएके तिवारी, डॉ. आरएन श्रीवास्तव डॉ. एमएल साहू, का सहयोग प्राप्त हुआ।

अध्यक्ष मोनिका चौकसे, नीता अग्रवाल उपस्थित रहीं।

कृषि कॉलेज में हुई कार्यशाला

भास्कर संवाददाता | नर्मदापुरम

कृषि महाविद्यालय पवारखेड़ा में कृषि, उद्यानिकी व कृषि अभियांत्रिकी विभाग के मैदानी अधिकारियों के लिए एक दिवसीय सुदूर संवेदन एवं भौगोलिक सूचना प्रणाली पर कार्यशाला हुई। जबलपुर से आए प्रशिक्षक डॉ. आरएन श्रीवास्तव और ओम प्रजापति ने फसल सर्वे, किट जांच एवं बांध के कमाण क्षेत्र में सिंचाई जल के बचाव के लिए कारगर तरीके से अवगत कराया। अधिकारियों को सुदूर संवेदन (रिमोट सेंसिंग) और जीआईएस तकनीक का उपयोग करने के लिए प्रेरित किया गया। इस मौके पर महाविद्यालय के अधिष्ठाता डॉ. केके मिश्रा ने सुदूर संवेदन तकनीकी का अनाज आयात निर्यात में उपयोगिता बताई। कार्यक्रम में डॉ. संजय सिंह चौहान, डॉ. धनंजय कटहल, डॉ. विजय अग्रवाल, डॉ. अनसिंह निनामा व अन्य वैज्ञानिकों ने फसल उत्पादन वह किसानों की आय बढ़ाने की उपाय दिए।

Media coverage of project activities and achievements (2020-21):

Sr No.	Social Media Post	Facebook, Instagram & Twitter	Date and year
1.	We are Centre for Advanced Agricultural Science and Technology (CAAST) under National Agricultural Higher Education Project (NAHEP) at College of Agricultural Engineering, JNKVV Jabalpur.	All	13th December 2020

(2021-22):

Sr No.	Social Media Post	Facebook, Instagram & Twitter	Date and year

1.	NAHEP CAAST CSDA JNKVV Team	All	April 28th 2021
2.	Awareness Program on Human Rights for Agricultural Students	All	April 28th 2021
3.	Team NAHEP CAAST	All	30th March 2022

(2022-23):

Sr No.	Social Media Post	Date and year
4.	Awareness program at College of Agriculture Balaghat	4th April 2022
5.	RS and GIS Online Training using QGiS	4th April 2022
6.	Training lab under NAHEP CAAST CSDA JNKVV Jabalpur	6th April 2022
7.	Time-lapse animation of MODIS Terra NDVI 16-Day Global 1km dataset for Madhya Pradesh using R package	11th April 2022
8.	Time-lapse animation of MOD11A2.006 Terra Land Surface Temperature 8-Day Global 1Km dataset for Madhya Pradesh using R package.	26th April 2022
9.	Staff and students taking observations with spectroradiometer of different crops.	11th May 2022
10.	The time-lapse animation of Landsat satellite data using Google Earth Engine Python API for visualizing the changes in waterbody	17th May 2022
11.	21 Days Hands-on training on Remote sensing and GIS using QGIS	20th May 2022
12.	(A special lecture on Creating Rural Employment by Monetizing Waste from Agriculture- a road ahead by Dr. R.C. Shrivastava.	25th May 2022
13.	Ongoing training news in different news publications	25th May 2022
14.	Programme postponed	25th May 2022
15.	Actual evapotranspiration gif: Time-lapse animation of MODIS Terra 8 day composite Net Evapotranspiration data at 500m spatial scale using “rgee” R package for visualizing the spatio-temporal pattern of monthly net evapotranspiration data over the Madhya Pradesh	06th June 2022
16.	(Online Quiz on the eve of World Environment Day.)	06th June 2022
17.	(CBT FOOD SAFETY 2021 07 23)	06th June 2022
18.	(A special lecture on Technological Interventions for Sustained Agriculture by Dr. Narendra Kumar Gontia	10th June 2022
19.	Celebrated World Environment Day with Awareness Session "nukkad natak" , Quiz competition & Plantation programme.	14th June 2022
20.	A special lecture on Technological Interventions for Sustained Agriculture delivered by Dr. Narendra Kumar Gontia	14th June 2022
21.	GSMaP Operational: Global Satellite Mapping of Precipitation data #Google Earth Engine #JAXA Earth Observation Research Center #Madhya Pradesh#Time-05:30 am – 07:30 pm #Python #googleearth	16th June 2022

	#googleearthengine #rainfall #remotesensing #research #monsoon #python #madhyapradesh)	
22.	Dear Students, Please go through the schedule of training starting from July 2022 to Mar 2023. The student may register the relevant training program as per their research requirements.	17th June 2022
23.	NDVI at a 30m spatial scale for JNKVV, Jabalpur campus using Harmonized Landsat Sentinel-2 (HLS) dataset.	17th June 2022
24.	International Yoga Day	21st June 2022
25.	Glimpse of Yoga Day Celebration.	27th June 2022
26.	Advertisement for Tender Notice of Hyper Spectral Radiometer. For More information visit our website https://nahep-jnkvv.org	4th July 2022
27.	A special lecture on DNA Barcoding of Insects by Dr. T. Venkatesan, Principal Scientist ICAR-NBAIR	8th July 2022
28.	A special lecture entitled "GROWTH AND DEVELOPMENT OF ENVIRONMENT MANAGEMENT SYSTEM"	22nd July 2022
29.	A special lecture entitled "GROWTH AND DEVELOPMENT OF ENVIRONMENT MANAGEMENT SYSTEM"	25th July 2022
30.	A 21-days offline training entitled as "Hands-on Training on Remote Sensing and GIS"	4th August 2022
31.	Parthenium Awareness Week 16-22 August 2022 at NAHEP CAAST JNKVV Jabalpur.	22nd August 2022
32.	CONTACTUAL SERVICES REQUIRED Please refer J.N.K.V.V. website http://jnkvv.org	25th August 2022
33.	Inauguration of 21 day training programme. @icarindia @IcarNahep	20th September 2022
34.	Field Visit During 21 days training programme.	20th September 2022
35.	Lectures of Dr. R. K. Nema (PI) & Dr. S. K. Sharma (Co-PI) during 21 days training programme. #training #lecture	20th September 2022
36.	Successfully completed 21 days offline training program. #news #headlines #JNKVV	22nd September 2022
37.	Awareness program for peer learning groups of PG & PhD students . #AwarenessPost #students #agriculture	26th September 2022
38.	A 21-days offline training entitled as "Hands-on Training on Remote Sensing and GIS" is scheduled to be held from 9th November 2022 to 29th November 2022 from 10.30 am - 5.30 pm at NAHEP training lab, College of Agricultural Engineering, JNKVV, Jabalpur.	1st November 2022
39.	Inauguration of 21 day training programme	9th November 2022
40.	Field Visit During 21 days training programme. #farm #field #training	29th November 2022
41.	Valedictory program of 21days training programme.	29th November

		2022
42.	Inauguration of 16th "21 day training programme" #agriculture	2nd December 2022
43.	Manage, Analyze, Visualize and Simulate Hyperspectral Data using R software with few lines of code. hsdar r package used for transforming of reflectance spectra, #rprogramming #hsdar #spectra #plotly #apogreereader #asdreader #vegetation indices #NAHEP-CAAST-CSDA #SPATIAL DATA ANALYSIS LAB	2nd December 2022
44.	Field Visit During 16th "21 days training programme". #farm #field #training	22nd December 2022
45.	Hands-on practical of Area Estimation through Digital Planimeter. #training #agriculture #instrument	22nd December 2022
46.	One day Awareness Program for Administrators at College Of Agriculture Powarkheda, Hoshangabad. #agriculture #awareness	28th December 2022
47.	One day Awareness Program for Administrators at College of Agriculture, Ganjbasoda, Vidisha. #agriculture #awareness	28th December 2022
48.	National seminar on "Opportunity in Agri-Entrepreneurship for Women Empowerment on 9th Feb 2023 for PG and PhD students of Agriculture universities.	1st February 2023
49.	Reminder for Online form to assess the female interest in agri higher education.	2nd February 2023
50.	National Seminar on Opportunity in Agri-Entrepreneurship for Women Empowerment for PG and PhD female students, Please follow this link to register yourself: https://forms.gle/1CJcemGahhNyj11D6	7th February 2023
51.	National seminar on "Opportunity in Agri-Entrepreneurship for Women Empowerment"	11th February 2023
52.	Newspaper Media on "Opportunity in Agri-Entrepreneurship for Women Empowerment"	14th February 2023
53.	16th convocation ceremony to be organised after 2 years on 15th February 2023.	14th february 2023
54.	Media coverage of 16th convocation ceremony.	17th february 2023
55.	Registration link for 10 Days training on "Entrepreneurship Development among the students on Innovative technologies in Horticulture production"	3rd March 2023

3. No. of Posts on Magazines: 7

S. N.	Article Published in Magazine
1	Trivedi A and Awasthi MK. 2020. Aquifer overexploitation: causes of river drying. Agri-India Today
2	Trivedi A and Awasthi MK. 2021. Aquifer mapping and management for river revival. Agriculture & food: e newsletter

3	Trivedi A and Awasthi MK. 2021. River Revival: A step towards nourishment of villages. Kheti
4	Trivedi A and Awasthi MK. 2022. Analysis of LULC Matrix Change. Kheti.
5	Trivedi A and Awasthi MK. 2022. Scientific approaches for non-monsoon flow revival in Kanari River. Indian Farming. 72(05):17-20.
6	एम. के. अवस्थी, दीपक पटले. 2022. टीकमगढ़ जिले में निर्मित जल संरक्षण संरचनाओं का दो दशकीय भूजल स्तर पर अध्ययन. अभियंता बंधु वार्षिक पत्रिका, प्रकाशक दि इंस्टीटूशन ऑफ़ इंजीनियर कोलकाता. 85-87.
7	आर. के. नेमा. 2022. जबलपुर जिले में कनारी नदी का कायाकल्प. अभियंता बंधु वार्षिक पत्रिका, प्रकाशक दि इंस्टीटूशन ऑफ़ इंजीनियर कोलकाता. 88-90.

4. No. of Unique Promotional or Outreach Collaterals: 1

Annexure V

International trainings

Oversea Training on "Intelligent Technologies for Modern Agriculture Smart Agriculture" at Can Tho University, Vietnam

Duration: 05.12.2023 to 27.12.2023

Host Institution: Can Tho University, Vietnam

The training program on "Intelligent Technologies for Modern Agriculture Smart Agriculture" at Can Tho University, Vietnam, spanning from December 5 to December 27, 2023, emerged as a transformative journey commencing from Jabalpur and culminating in Can Tho University, Vietnam. Designed with a purposeful intent, the program aimed to empower participants with a comprehensive understanding of modern agricultural practices. As the journey unfolded from Delhi to Kolkata and eventually Can Tho, participants found accommodation at Dormitory B, Can Tho University. The programs impactful nature lay in its holistic modules, covering diverse disciplines such as crop science, soil science, plant protection, remote sensing, climate-smart aquaculture and more. Noteworthy were the immersive field trips, including visits to laboratories, agritech startups and farmlands, providing firsthand experiences in cutting-edge agricultural technologies. The mentorship dynamics, where each Ph.D. student was paired with a CTU professor, fostered meaningful interactions and collaboration within research teams and laboratories. Beyond academics, the inclusion of local sightseeing opportunities enriched participants perspectives. The training schedule, featuring diverse learning

experiences from high-tech horticulture to entrepreneurship, was complemented by practical sessions, emphasizing real-world applications of the acquired knowledge. The program impactful conclusion was evident in the profound transformation it brought about in participants understanding and application of smart agricultural practices. As a forward-looking recommendation, future programs could consider augmenting hands-on activities and incorporating more real-world case studies to deepen the lasting impact on participants. This report encapsulates the purposeful and impactful contribution of the Smart Agriculture training program to the advancement of agricultural knowledge and practices.

Details of International Exposure on Intelligent Technologies for Modern Agriculture Smart Agriculture

S.N.	Name and Designation	Department	Area of priority / training	Place	Host Instt.	Duration
1.	 **Priyamda Vaidya** (Ph.D. Scholar)	Soil and Water Engineering	Intelligent Technologies for Modern Agriculture Smart Agriculture	Vietnam	Can Tho University	05.12.2023 to 27.12.2023

2.	 **Anoop Patel** (M.Tech. Student)	Soil and Water Engineering	Intelligent Technologies for Modern Agriculture Smart Agriculture	Vietnam	Can Tho University	05.12.2023 to 27.12.2023
3.	 **Sangya Singh** (Ph.D. Scholar)	Soil Sci. and Agril. Chemistry	Intelligent Technologies for Modern Agriculture Smart Agriculture	Vietnam	Can Tho University	05.12.2023 to 27.12.2023
4.	 **Yagini Tekam** (Ph.D. Scholar)	Soil Sci. and Agril. Chemistry	Intelligent Technologies for Modern Agriculture Smart Agriculture	Vietnam	Can Tho University	05.12.2023 to 27.12.2023
5.	 **Deeksha Gupta** (Ph.D. Scholar)	Silviculture and Agroforestry	Intelligent Technologies for Modern Agriculture Smart Agriculture	Vietnam	Can Tho University	05.12.2023 to 27.12.2023
6.	 Jyoti Sengar (Ph.D. Scholar)	Horticulture	Intelligent Technologies for Modern Agriculture Smart Agriculture	Vietnam	Can Tho University	05.12.2023 to 27.12.2023
7.	 Deepak Singh	Horticulture	Intelligent Technologies for Modern Agriculture Smart Agriculture	Vietnam	Can Tho University	05.12.2023 to 27.12.2023

	(Ph.D. Scholar)					
8.	 Vishesh Patel (Ph.D. Scholar)	Horticulture	Intelligent Technologies for Modern Agriculture Smart Agriculture	Vietnam	Can Tho University	05.12.2023 to 27.12.2023
9.	 R. G. Vyshnavi (Ph.D. Scholar)	Plant Physiology	Intelligent Technologies for Modern Agriculture Smart Agriculture	Vietnam	Can Tho University	05.12.2023 to 27.12.2023
10.	 Satyendra Thakur (Ph.D. Scholar)	Plant Physiology	Intelligent Technologies for Modern Agriculture Smart Agriculture	Vietnam	Can Tho University	05.12.2023 to 27.12.2023
11.	 Madhana Keerthana S (Ph.D. Scholar)	Plant Physiology	Intelligent Technologies for Modern Agriculture Smart Agriculture	Vietnam	Can Tho University	05.12.2023 to 27.12.2023
12.	 Pushplata Dawar (Ph.D. Scholar)	Entomology	Intelligent Technologies for Modern Agriculture Smart Agriculture	Vietnam	Can Tho University	05.12.2023 to 27.12.2023

13	 Shubham Mishra (Ph.D. Scholar)	Plant Pathology	Intelligent Technologies for Modern Agriculture Smart Agriculture	Vietnam	Can Tho University	05.12.2023 to 27.12.2023
14.	 Gaurav Singh Rathore (Ph.D. Scholar)	Molecular Biology and Biotechnology	Intelligent Technologies for Modern Agriculture Smart Agriculture	Vietnam	Can Tho University	05.12.2023 to 27.12.2023

Training on "Advanced Technologies for Modern Agriculture"

at HUE University of Agriculture and Forestry, Hue city, Vietnam

Duration: 30.10.2023 to 28.11.2023

Host Institution: University of Agriculture and Forestry, Hue University, Vietnam

The journey, commencing from Jabalpur on 28th October, unfolded as an enriching exploration of agriculture and culture in Vietnam. After reaching Delhi on 29th October, the flight departed for Hanoi at 11:35 pm, making a brief stop before reaching the picturesque city of Hue on 30th October at 9:15 am. The stay extended from 30th October to 28th November 2023.

Upon arrival, a city tour on 31st October introduced participants to the historical and cultural marvels of Hue. The training, hosted at Hue University of Agriculture and Forestry (HUAF),

commenced with an orientation program on 1st November. The students presented their research, fostering dialogue and knowledge exchange between JNKVV and HUAF.

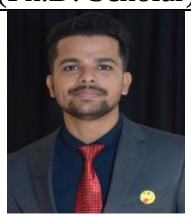
The technical sessions, held from Monday to Friday, covered a spectrum of topics, including experimental methodology, genetic diversity, in-vitro culture, salt tolerance, agriculture value chain analysis, remote sensing applications, drone usage in agriculture and location mapping. Weekends were dedicated to farm and lab visits, offering practical insights into various aspects of modern agriculture.

Mr. Pham Huu Ty, our gracious host, provided an immersive introduction to Vietnamese culture, food, language and history. Co-curricular activities, including dance, guitar and flute classes, enhanced cultural exchange. Interactions with local students further enriched the experience.

This training served as a conduit for cross-cultural learning, exposing participants to innovative agricultural practices. The return journey commenced on 28th November, from Hue to Ho Chi Minh and then to Delhi, with participants reaching Jabalpur on 30th November around 8 am.

The program not only imparted valuable insights into Vietnamese agriculture but also provided a platform for the exchange of ideas, skills, and cultural experiences. The knowledge gained and relationships forged during this training have proven invaluable, enhancing the participants research endeavors and contributing to their personal and professional growth.

Details of International Exposure on Advanced Technologies for Modern Agriculture

S.N.	Name and Designation	Department	Area of priority / training	Place	Host Instt.	Duration
1.	 Monika Raghuwanshi (Ph.D. Scholar)	Agronomy	Advanced Technologies for Modern Agriculture	Vietnam	HUE University of Agriculture and Forestry, Hue city	30.10.2023 to 28.11.2023
2	 Mrinali Gajbhiye (Ph.D. Scholar)	Agronomy	Advanced Technologies for Modern Agriculture	Vietnam	HUE University of Agriculture and Forestry, Hue city	30.10.2023 to 28.11.2023
3	 Rahul Kumbhare (Ph.D. Scholar)	Agronomy	Advanced Technologies for Modern Agriculture	Vietnam	HUE University of Agriculture and Forestry, Hue city	30.10.2023 to 28.11.2023
4	 Kumar Jai Anand (Ph.D. Scholar)	Genetics and Plant Breeding	Advanced Technologies for Modern Agriculture	Vietnam	HUE University of Agriculture and Forestry, Hue city	30.10.2023 to 28.11.2023
5	 Shivangi Rahangdale (Ph.D. Scholar)	Genetics and Plant Breeding	Advanced Technologies for Modern Agriculture	Vietnam	HUE University of Agriculture and Forestry, Hue city	30.10.2023 to 28.11.2023

6	 Shivani Jawarkar (Ph.D. Scholar)	Genetics and Plant Breeding	Advanced Technologies for Modern Agriculture	Vietnam	HUE University of Agriculture and Forestry, Hue city	30.10.2023 to 28.11.2023
7	 Teena Patel (Ph.D. Scholar)	Genetics and Plant Breeding	Advanced Technologies for Modern Agriculture	Vietnam	HUE University of Agriculture and Forestry, Hue city	30.10.2023 to 28.11.2023
8	 Akash Barela (Ph.D. Scholar)	Genetics and Plant Breeding	Advanced Technologies for Modern Agriculture	Vietnam	HUE University of Agriculture and Forestry, Hue city	30.10.2023 to 28.11.2023
9	 Karishma Behera (Ph.D. Scholar)	Genetics and Plant Breeding	Advanced Technologies for Modern Agriculture	Vietnam	HUE University of Agriculture and Forestry, Hue city	30.10.2023 to 28.11.2023

Oversea trainings for Faculty:

Table: Faculty received overseas training (Till December 2023)

S. N.	Programs	Category			Gender		Total
		SC	ST	Others	M	F	
1	Advanced Technologies for Modern Agriculture	-	-	8	7	1	8
2	Training in thematic of Molecular Plant Pathology and applied Plant Protection at University of Arkansas Fayetteville, AR 72701, USA	-	-	1	1	-	1
Total		**-**	**-**	**9**	**8**	**1**	**9**
Contribution (%)		**-**	**-**	**100**	**89**	**11**	**100**

Training on "Advanced Technologies for Modern Agriculture" at Hue University of Agriculture and Forestry, Vietnam.

Duration: 26.11.2023 to 26.12.2023

Host Institution: University of Agriculture and Forestry, Hue University, Vietnam

The international training exchange program on "Advanced Technologies for Modern Agriculture" hosted by Hue University of Agriculture and Forestry in Vietnam had a profound impact on the participating faculty from Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV) in India. The extensive training, spanning from November 26th to December 26th, 2023, facilitated a deep dive into a diverse range of crucial research topics in modern agriculture. The program not only broadened the knowledge base of the participants but also had tangible implications for the advancement of agricultural practices. Hue University's expertise in areas such as remote sensing and machine learning applications, geographic information systems (GIS), and biofertilizers provided valuable insights for the visiting faculty from JNKVV. These technologies, when applied to agriculture, hold the potential to revolutionize farming practices, making them more efficient, sustainable, and resilient.

Participating faculty had the opportunity to explore the cutting-edge research conducted at Hue University, with specific emphasis on topics like soil mapping, the use of biological controls for post-harvest diseases, and the development of small-scale mobile dryers for paddy grains. The exchange also shed light on the status of agroforestry systems and their policy implications, offering a comprehensive understanding of the socio-economic and environmental considerations in agriculture.

The impact of the training program extended beyond academic knowledge exchange. Collaborative possibilities between JNKVV and Hue University were actively explored, with discussions on bilateral projects and potential funding avenues. The endorsement of these collaborative

efforts by Dr. Pham Huu Ty, Head of International Cooperation and Science at Hue University, underscored the commitment to fostering international partnerships for agricultural innovation.

Moreover, the exposure to Hue's historical sites and tourist attractions complemented the academic endeavors, providing a holistic cultural experience for the participants. Visits to places of historical significance and natural wonders, such as Bana Hills and Paradise Caves, added a unique dimension to the exchange program.

As the participating faculty returned to their respective institutions on December 27th, the impact of the training was evident in the enriched knowledge base, the potential for collaborative projects and the establishment of a robust academic network between JNKVV and Hue University. The program served as a catalyst for the application of advanced agricultural technologies, emphasizing sustainability and innovation in modern farming practices.

Details of International Exposure on Advanced Technologies for Modern Agriculture for faculty

S.N.	Name and Designation	Department	Area of priority / training	Place	Host Instt.	Duration
1	 Dr Pradeep Mishra Assistant Professor	Statistics, College of Agriculture, Rewa, JNKVV	Advanced Technologies for Modern Agriculture	Vietnam	HUE University of Agriculture and Forestry, Hue city	26.11.2023 to 26.12.2023
2	 Dr. K. N. Gupta Scientist	Plant Pathology, Project Coordinating Unit (Sesame & Niger) ICAR, JNKVV	Advanced Technologies for Modern Agriculture	Vietnam	HUE University of Agriculture and Forestry, Hue city	26.11.2023 to 26.12.2023
3	 Dr. Anita Babbar Principal Scientist	Plant Breeding and Genetics, JNKVV	Advanced Technologies for Modern Agriculture	Vietnam	HUE University of Agriculture and Forestry, Hue city	26.11.2023 to 26.12.2023

4	 Dr. V. S. Gaur Assistant Professor	Agriculture Biotechnology COA, Balaghat, JNKVV	Advanced Technologies for Modern Agriculture	Vietnam	HUE University of Agriculture and Forestry, Hue city	26.11.2023 to 26.12.2023
5	 Dr. Gyanendra Tiwari Professor	Plant Physiology , JNKVV	Advanced Technologies for Modern Agriculture	Vietnam	HUE University of Agriculture and Forestry, Hue city	26.11.2023 to 26.12.2023
6	 Dr. Lalit Mohan Bal Asst. Prof.	PHP and FE, College of Agriculture, Tikamgarh, JNKVV	Advanced Technologies for Modern Agriculture	Vietnam	HUE University of Agriculture and Forestry, Hue city	26.11.2023 to 26.12.2023
7	 Dr. S. S. Sarvade Assistant Professor	Agroforestry College of Agriculture, Jabalpur, JNKVV	Advanced Technologies for Modern Agriculture	Vietnam	HUE University of Agriculture and Forestry, Hue city	26.11.2023 to 26.12.2023
8	 Dr. B. S. Dwivedi Assistant Prof./ Scientist	Soil Sci. & Agril. Chemistry, COA, Jabalpur, JNKVV	Advanced Technologies for Modern Agriculture	Vietnam	HUE University of Agriculture and Forestry, Hue city	26.11.2023 to 26.12.2023


WARMLY WELCOME HIS EXCELLENCY MR. SHAWN STEIL, AMBASSADOR EXTRAORDINARY
AND PLENIPOTENTIARY OF CANADA TO VIETNAM AND THE DELEGATION


KHOA LÂM NGHIỆP

Training in thematic of Molecular Plant Pathology and applied Plant Protection at University of Arkansas, USA

Duration: 05.11.2023 to 29.12.2023

Host Institution: University of Arkansas, Fayetteville, USA

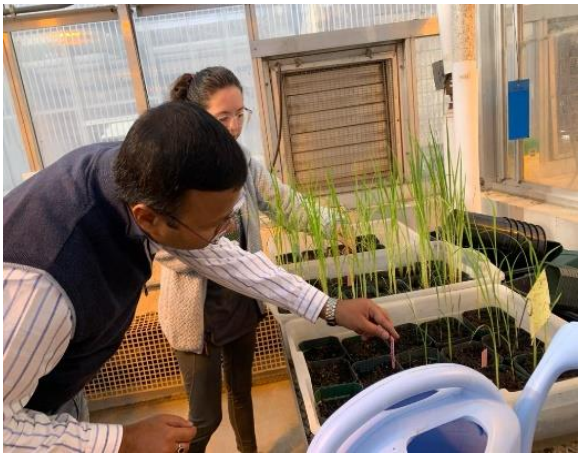
As per the approved program, the tour commenced on November 4, 2023, from Jabalpur, India, with the ultimate destination being the University of Arkansas, Fayetteville, USA. The purpose of this training was to gain valuable insights into various techniques in Plant Pathology, field activities, teaching methodologies, and active participation in seminars. The core training activities at the University of Arkansas focused on advancing skills in Plant Pathology, encompassing hands-on experiences, seminars, and collaborative research projects. Under the guidance of Dr. Martin Egan, the participant engaged in the development of knockout mutants in Magnaporthe oryzae, the causal agent of blast disease in rice. This research aimed to identify key genes responsible for pathogenesis, utilizing live cell image analysis to study modulations in hyphal structure during appressoria formation. Additionally, exposure was provided to various bioinformatics software for marker-trait association analysis, enhancing the participant's computational skills in the field.

Integral to the training was the integration with the ongoing activities of the NAHEP-CAAST project at JNKVV, Jabalpur, focusing on developing spectral signatures for various traits in crops, particularly soybean. The generated data will contribute to marker-trait association analysis, specifically for YMV in soybean, following successful genotyping of characterized lines through hyperspectral characterization.

The impact of this exposure visit extends beyond the immediate training period. The gained expertise will play a pivotal role in the identification of promising QTLs for selected traits, contributing to the development of improved crop varieties with resistance to biotic and abiotic stresses. The participant's involvement in Scanning Electron Microscopy, bioinformatics software for meta-QTL analysis, Next Generation Sequencing, and field visits during the remaining period further enhances the overall impact of the training.

In conclusion, training at University of Arkansas has not only broadened the participant knowledge and skills in Molecular Plant Pathology but has also facilitated active participation in cutting-edge research activities. The impact is evident in the participant enhanced capabilities and contributions to ongoing projects, positioning them as a valuable asset in advancing plant sciences and agricultural research.




Details of International Exposure on Molecular Plant Pathology and applied Plant Protection for faculty

S.N.	Name and Designation	Department	Area of priority / training	Place	Host Instt.	Duration
1	 Dr. Ashish Kumar Scientist	Plant Breeding and Genetics, JNKVV	Molecular Plant Pathology and applied Plant Protection	USA	University of Arkansas Fayetteville	05.11.2023 to 29.12.2023

International Short Visit:

Table: International Short Visit (Till December 2023)

S. N.	International Short Vis	Category			Gender		Total
		SC	ST	Others	M	F	
1	Faculty Delegation's Visit to the Australian River Institute, Griffith University and Queensland University, Australia	-	-	4	4	-	4
2	Participation of Faculty and Ph.D. Student in the 4th International Conference on Natural Resource Management and Sustainability at Udayana University, Bali, Indonesia.	-	-	2	1	1	2
Total		**-**	**-**	**6**	**5**	**1**	**6**
Contribution (%)		**-**	**-**	**100**	**83**	**17**	**100**

Faculty Delegation's Visit to the Australian River Institute, Griffith University and Queensland University

Duration: 24.10.2023 to 01.11.2023

Host Institution: Australian River Institute, Griffith University and Queensland University, Australia

As per approved program the journey started from Jabalpur and reached Delhi on 29th October 2023. Flight started from Delhi at 11:00 pm on 29th October 2023 and reached Hanoi at 5:20 am and after a gap of 3 hrs again started to fly and reached Hue on 25th October morning at 9:15 am.

Stayed at Sweet home guest house from 30th October to 27th November 2023. Visited the Hue university of Agriculture & Forestry and Mushroom production company, Acacia plant, discussed the research work on drone application for herbicide and insecticide spray, crop classification and monitoring using remote sensing tools, land evaluation and land suitability assessment in Vietnam using ARCGS going on both at JNKVV and at Hue, Vietnam. Cell physiology study of salt tolerance in poaceae Study Possibilities were explored to collaborate among these universities to jointly work on some common points of studies through faculty and students. Mr. David Hamilton, Director, Australian River Velly Institute, Griffith University and Mr. A. ping, Executive of Board of studies at Queensland University agreed to the proposal. Further discussion on topics for research will be finalized through online communication and things may be initiated to send a faculty and student of PG for doing research work at these universities.

The campaign of both the universities was visited in length. The points of historical importance at Brisbane in and around Brisbane river were also visited to quaint with culture of the country. The return journey started on 31st October 2023 and Via Singapore and Delhi, reached Jabalpur at 4:00 pm on 1st November 2023.

Details of International Exposure on short visit to the Australian River Institute, Griffith University and Queensland University for faculty

S.N.	Name and Designation	Department	Area of priority / training	Place	Host Instt.	Duration
1	 Dr. R. K. Nema Professor & Head	Soil & Water Engineering, CAE, JNKVV	Short Visit	Australia	Visit to the Australian River Institute, Griffith University and Queensland University	24.10.2023 to 01.11.2023
2	 Dr. M. K. Awasthi Professor	Soil & Water Engineering, CAE, JNKVV	Short Visit	Australia	Visit to the Australian River Institute, Griffith University and Queensland University	24.10.2023 to 01.11.2023
3	 Dr. S. K. Sharma Professor	Soil & Water Engineering, CAE, JNKVV	Short Visit	Australia	Visit to the Australian River Institute, Griffith University and Queensland University	24.10.2023 to 01.11.2023
4	 Dr. Abhishek Shukla Director Instruction, JNKVV	Director Instruction, JNKVV	Short Visit	Australia	Visit to the Australian River Institute, Griffith University and Queensland University	24.10.2023 to 01.11.2023


SIR SAMUEL GRIFFITH CENTRE
N76
Samsung Quad Camera
By RKNema


GRIFFITH UNIVERSITY
Samsung Quad Camera
By RKNema


UQ ST LUCIA
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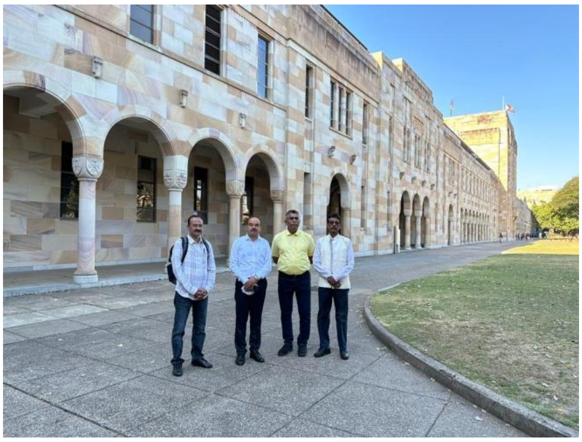
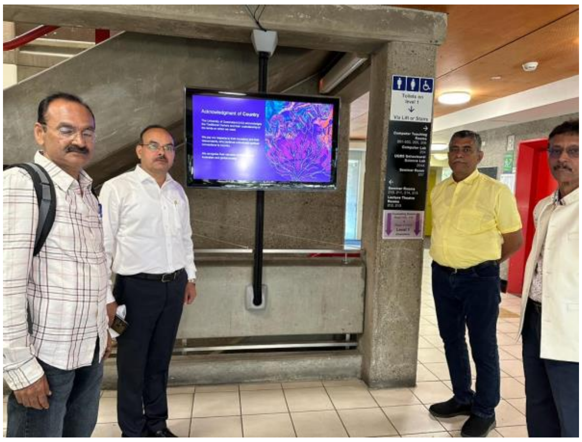
STEELE BUILDING






A Network-Based Framework for Assessing Stakeholder Engagement in Water Resources Governance




Participation of Faculty and Ph.D. Student in the 4th International Conference on Natural Resource Management and Sustainability at Udayana University, Bali, Indonesia.

Miss Jyoti Lohare, a Ph.D. Research Scholar from JNKVV, Jabalpur and Dr. S. K. Pandey, Dean Faculty of Horticulture, JNKVV Jabalpur attended the International Conference on Natural Resource Management and Sustainability at Udayana University, Bali, Indonesia, from November 26th to 30th , 2023.

Started journey from Jabalpur on 24 November 2023 to Bali, Indonesia. Reached Bali, Indonesia on 26 November 2023. Attended inaugural session of International Conference of "Natural Resource Management and Sustainability" on 27 November 2023. Presented research paper entitled "Geospatial based Vegetable Pea Yield Estimation of Jabalpur District, Madhya Pradesh, India" in the theme of "Innovation in Allied Sciences i.e. Fishery, Forestry, Horticulture, Post-Harvest Management, Value Addition, Nanotechnology, Veterinary Science". On 28 November 2023, attended technical session of other theme i.e. Interdisciplinary Innovation in Basic Science, Medical Science, Engineering and Technology and New Dimensions and Innovations in Extension, Education, Arts and Humanities.

Details of International Exposure to attend International Conference for student and faculty

1	 Ms. Jyoti Lohare (Ph.D. Scholar)	Horticulture	4th International Conference on Natural Resource Management and Sustainability at Udayana	Indonesia	University, Bali	24.11.2023 to 02.12.2023
2.	 Dr. S. K. Pandey, Dean Faculty of Horticulture	Horticulture, JNKVV Jabalpur	4th International Conference on Natural Resource Management and Sustainability at Udayana	Indonesia	University, Bali	24.11.2023 to 02.12.2023

Visit of Udayana University, Bali, Indonesia was held on 29 November 2023. It is the largest university of Bali. Udayana University has a variety of Programs i.e. diploma program, master program, international program, professional program, undergraduate program, doctoral program, e-learning program etc that can be selected by prospective students according to their interests and academic potential. The Doctoral Program of Agricultural Sciences of Graduate Program at Udayana University was opened with the objective of yielding scientists having the capabilities of developing new concepts in the field of agricultural science and technology through independent research.

The Major Concentrations of Doctoral Study Program of Agricultural Sciences

1. Management of Agricultural Biological Resources
2. Water Resources Management and Agricultural Land
3. Agro eco technology
4. Agribusiness
5. Agricultural Technology

The field and farms were visited on 30 November 2023. The most important crop is wet-rice and much of the culture and myths have developed around rice as the important social force. Rice is the life-blood of Bali. They rotate Rice with cash crops such as Peanuts, Soya beans, Chili peppers, Tapioca and Corn. It is native of tropical fruits like Snake fruit, Durian and Rambutan, Indonesia has been producing more Banana, Orange and Mango.

Departure from Bali, Indonesia on 1st December 2023 to Hyderabad. Reached Jabalpur on 2nd December 2023.

International Conference, Bali

Oral Presentation

Udayana University, Bali, Indonesia

Field Visit

Annexure VI

National trainings for students and faculties

1. National trainings for students

S. No.	Name of Program	Date	No. Students
A. Hands-on training on RS & GIS , 21 Days, 10 Training			
A. Hands-on training on RS & GIS			
1.	Hand on training of Remote Sensing and GIS using QGIS & Saga GIS	03rd to 23rd June 2021	17
2.	Application of RS & GIS in NRM for Outgoing Students	22th June to 12th July 2021	84
3.	Hand on Training of Remote Sensing and GIS using QGIS	9th to 29th November 2021	14
4.	Basic fundamental application of remote sensing and GIS.	16th December to 13th January 2021	32
5.	NRM through RS and GIS Applications	23rd March to 22nd April 2022	93
6.	Hands on training of remote sensing and GIS using QGIS 19 May to 11 June 2022	19 May to 11 June 2022	60
7.	Hands on Training on Remote sensing and GIS Software	31 Aug to 20 Sep 2022	14
8.	Hands-on training on Remote Sensing & GIS software	November 9th to 29th, 2022	18
9.	Hands-on training on Remote Sensing & GIS software	December 02nd to 22nd, 2022	22
10.	Hands-on Training on Remote sensing and GIS software"	January 03rd to 23rd, 2023	44
11.	Hands-on training on Remote Sensing & GIS software	July 3rd to 24th 2023	23
12.	Hands-on training on Remote Sensing & GIS software	Sep 15th to oct 5th 2023	32
	Total		**458**
B. Artificial Intelligence & Machine Learning 10 Days, 1 Training, 261			
13.	Fundamentals of Artificial Intelligence and Machine Learning	21th to 30th Jan 2021	261
14.	Hand on Training on Artificial Intelligence in Agriculture	24th July to 21st Aug 2023	35
15.	Hand on Training on Artificial Intelligence in Agriculture	23rd Aug to 12th Sep 2023	30
	Total		**326**
C. Spatial data processing and analysis using R and Python programming languages 10 – 21 Days, 9 Training 535 participants			
16.	Training on Basics of Satellite Image Processing	5th to 12th Nov 2020	6
17.	Training on Python Programme	8th to 17th Dec 2020	195+79
18.	Image processing using python	11th to 15th Jan 2021	106+39

19.	Lectures on Spatial Data use in Agriculture	8th to 12th Feb 2021	144+57
20.	Introduction to Spatial Data Applications	24th June 2021	13
21.	Hands-on training programme on spatial data analysis with R and GeoDa	Jan 24th to Feb 17th 2023	25
22.	Training Program on Chemical & Microbiological Analysis in Food	13th to 17th March, 2023	10
23.	Training program on Non-destructive Phenotyping for Abiotic Stress Tolerance in Crops and Agroforestry	6th to 15th February 2023	20
24.	Training program on "Application of geo-spatial tools in soil Science	27th Feb to 5th Mar 2023	16
	Total		**705**
D. Training on introduction to Mobile based Application development 3 Days, 1 Training 211 participants			
25.	Introductory course on Mobile Based App	09th to 11th Feb, 2021	211
	Total		**211**
E. Improving Language Competency 10 Days, 5 Training 1132 participants			
26.	Improving Language Competency through Capacity Building in Spoken English	23rd Nov to 2nd Dec 2020	463
27.	Improving Language Competency through Capacity Building in Writing Skill	7th to 18th Dec 2020	149
28.	Improving Language Competency through Capacity Building in Spoken English & Writing Skills	22nd Nov to Dec 01st 2021	190
29.	National Unity Day Quiz registration	31st Oct 2021	287
30.	Awareness Program for Peer Learning Groups of PG & PhD students	September 27th to 29th, 2022	43
	Total		**1132**
F. Thesis Writing and online Thesis Evaluation 1 Day, 1Taining 492 participants			
31.	Thesis Writing and online Thesis Evaluation	3rd March, 2021	325+167
	Total		**492**
G. Personality Development & Soft Skills 10 Days, 5 Training, 656 participants			
32.	Personality development & soft skills.	06th to 15th December 2021	245
33.	Orientation Programme on Career Opportunities for Agricultural Students in India	7th December 2021	128
34.	Workshop on "Strengthening industries-academia relationship for promoting entrepreneurship among students"	April 12, 2022	102
35.	Workshop on excel the ICAR-ARS main exams	20th November 2021	87
36.	Special lecture for the ICAR-ARS main exams	26th November 2021	94
37.	Workshop on How to Excel JRF SRF NET and ARS Examination	20.04.2023	132
38.	Workshop on Opportunities in Hi-Tech Farming and Agro-Based Start-ups	10.05.2023	128
39.	Seminar on Emerging Challenges in Higher Education	31.05.2023	40
	Total		**956**

H. Yoga for Sustainable life Style 21 Days, 2 Training 651 participants			
40.	Awareness on usefulness of Yoga in Covid 19 Environment	21st June 2021	527
41.	21 Days Training Camp on Yog for Sustainable life Style	1st to 21st, June 2022	124
42.	Seminar on Emerging Challenges in Higher Education	31.05.2023	40
43.	Training on Yoga for Sustainable life Style	01.06.2023 to 21.06.2023	175
44.	Three Day Workshop on Arham Dhyan Yoga	07.06.2023 to 09.06.2023	76
45.	Workshop on Mental Concentration and Stress Management	16.06.2023	50
46.	Workshop on Prescribed Yoga	17.6.23	49
	Total		**959**
I. Holistic Development Programme for students 7 - 21 Days, 7 Training 2517 participants			
47.	21 Days workshop on Holistic development of students	28th February to 28th March 2022	1103
48.	11 Days cultural workshop "Abhivyakti - 2022"	August 26th to 06th September, 2022	223
49.	9 Days Preparation of Cultural Events and National Competition	02nd to 10th January 2022	317
50.	7 Days' workshop on Sports and Physical Education	02nd to 09th January 2022	221
51.	Awareness program on plagiarism for master & Ph.D. Degree students	28th June 2021	96
52.	Entrepreneurship Development for Agriculture Graduates	16th May to 03rd June 2021	529
53.	Training program on Entrepreneurship Development among the students on Innovative Technologies in Horticulture Production	March 13th to 22nd, 2023	28
54.	Agri-Vision for Empowering Sustainable Agriculture and Entrepreneurship for a Self-Reliant Bharat	23.09.2023 to 24.09.2023	500
55.	Industry-Startup-Students Interface towards Agri- entrepreneurship	21.09.2023	106
56.	Workshop on Digital Marketing in Agriculture: Verticals and Variations	22.09.2023	47
	Total		**3170**
J. Grievance Redressal Mechanism 1 Day, 2 Trainings 292 participants			
57.	Awareness on Grievance Redressal Mechanism (GRM)	5th Feb 2021	168
58.	Online Awareness programme on Grievance Redressal Mechanism	29th July 2021	124
	Total		**292**
K. Human Rights for Agricultural Students 1 Day, 1 Training 96 participants			
59.	Awareness on Human Rights for Agricultural Students	20th Feb 2021	96
	Total		**96**

L. Environmental sustainability 7 Days, 3Trainings 950 participants			
60.	One-week Awareness Program on Honeybee Keeping	15.05.2023 to 22.05. 2023	128
61.	One Day Workshop on "Life style for Environment"	05.06.2023	131
62.	Parthenium Awareness Week 2023	16.08.2023 to 22.08 2023	691
	Total		**950**

2. National trainings for faculty

A. Hands-on training on RS & GIS , 21 Days, 10 Training, 222 Participants			
S. N.	**Name of Program**	**Date**	**Faculty**
A. Hands-on training on RS & GIS			
1.	Faculty training on Remote Sensing & GIS using QGIS	29th July to 19th August 2021	43
2.	Faculty training on Remote Sensing & GIS using QGIS	25th August to 15th September 2021	40
3.	Hand on Training of Remote Sensing and GIS using QGIS	21th September to 11th October 2021	48
4.	Hand on Training of Remote Sensing and GIS using QGIS	9th to 29th November 2021	24
5.	Basic fundamental application of remote sensing and GIS.	16th December to 13th January 2021	2
6.	Hands-on training on Remote Sensing & GIS using QGIS. (For Faculty & students)	14th February to16th March 2022	25
7.	Hands on training of remote sensing and GIS using QGIS 19 May to 11 June 2022	19 May to 11 June 2022	8
8.	Hands on Training on Remote sensing and GIS Software	31 Aug to 20 Sep 2022	10
9.	Hands-on training on Remote Sensing & GIS software	November 9th to 29th, 2022	6
10.	Hands-on training on Remote Sensing & GIS software	December 02nd to 22nd, 2022	3
11.	Hands-on Training on Remote sensing and GIS software"	January 03rd to 23rd, 2023	13
12.	Hand on Training on Artificial Intelligence in Agriculture	24th July to 21st Aug 2023	2
13.	Hand on Training on Artificial Intelligence in Agriculture	23rd Aug to 12th Sep 2023	3
14.	Hands-on training on Remote Sensing & GIS software	Sep 15th to oct 5th 2023	19
	Total		**246**
B. Artificial Intelligence & Machine Learning 10 Days, 1 Training, 86			
15.	Fundamentals of Artificial Intelligence and Machine Learning	21th to 30th Jan 2021	86
	Total		**86**

C. Spatial data processing and analysis using R and Python programming languages 10 – 21 Days, 9 Training 208 participants			
16.	Training on Python Programme	8th to 17th Dec 2020	79
17.	Image processing using python	11th to 15th Jan 2021	39
18.	Lectures on Spatial Data use in Agriculture	8th to 12th Feb 2021	57
19.	Introduction to Spatial Data Applications	24th June 2021	33
	Total		**239**
D. Training on introduction to Mobile based Application development 3 Days, 1 Training 211 participants			
20.	Introductory course on Mobile Based App	09th to 11th Feb, 2021	73
	Total		**73**
E. Educative learning for agricultural Executives 7 Days, 4 Training 113 participants			
21.	Educative learning for agricultural Executives (Batch-I)	31st January to 05th February 2022	25
22.	Educative learning for agricultural Executives (Batch-II)	14th to 19th February 2022	26
23.	Educative learning for agricultural Executives (Batch-III)	28th February to 05th March 2022	24
24.	Hands-on training on "Groundwater Potential Zoning and identification of suitable sites for Groundwater Recharge	December 23rd to 30th 2022	38
25.	Agri-Vision for Empowering Sustainable Agriculture and Entrepreneurship for a Self-Reliant Bharat	23.09.2023 to 24.09.2023	38
26.	Industry-Startup-Students Interface towards Agri- entrepreneurship	21.09.2023	9
27.	Workshop on Digital Marketing in Agriculture: Verticals and Variations	22.09.2023	9
	Total		**169**
F. Pedagogy to Improve the Performance of Weak Students & Peer Learning 5Days, 2 Training 232 participants			
28.	Workshop on Pedagogy to Improve the Performance of weak Students	May 30th to June 3rd, 2022	194
29.	Awareness Program for Peer Learning Groups of PG & PhD students	September 27th to 29th, 2022	38
	Total		**232**
G. Yoga for Sustainable life Style 21 Days, 2 Training 125 participants			
30.	Awareness on usefulness of Yoga in Covid 19 Environment	21st June 2021	110
31.	21 Days Training Camp on Yog for Sustainable life Style	1st to 21st, June 2022	15
32.	Training on Yoga for Sustainable life Style	01.06.2023 to 21.06.2023	23
33.	Three Day Workshop on Arham Dhyan Yoga	07.06.2023 to 09.06.2023	5
34.	Workshop on Mental Concentration and Stress Management	16.06.2023	6
35.	Workshop on Prescribed Yoga	17.6.23	8

	Total		**167**
H. Grievance Redressal Mechanism 1 Day, 2 Trainings 120 participants			
36.	Awareness on Grievance Redressal Mechanism (GRM)	5th Feb 2021	43
37.	Online Awareness programme on Grievance Redressal Mechanism	29th July 2021	77
	Total		**120**
H. Thesis Writing and online Thesis Evaluation 1 Day, 1Taining 167 participants			
38.	Thesis Writing and online Thesis Evaluation	3rd March, 2021	167
	Total		**167**
	Environmental sustainability 1 -7 Day, 38 Trainings 2514 participants		
39.	Green technology theme- Plantation / Green taken up- Horticultural crops	29th Aug 2020	30
40.	Biosafety & Waste Disposal	18th Sept 2020	29
41.	Road to Reach for NABL ACCREDITATION as Per ISO 17025:2017	3rd Oct 2020	44
42.	Rain water harvesting & its efficient use	1st Dec 2020	22
43.	Promotion of soil health	3rd Dec 2020	31
44.	Food Safety & Standard Act 2006	8th Dec 2020	13
45.	Process of Registration of FASSAI License	11st Dec 2020	16
46.	Integrated Farming System	26th Dec 2020	20
47.	Integrated Nutrient Management	8th Jan 2021	19
48.	Enhancing Water Use Efficiency Through Installation, Maintenance & Monitoring of Sprinkler and Drip Irrigation System	14th to 22nd Jan 2021	230
49.	Biodiversity conservation	30th Jan 2021	22
50.	NABL guidelines for accreditation of laboratories	1st March 2021	47
51.	Integrated Management of Insects pest, mites and diseases	8th March 2021	37
52.	CB program on Agroforestry	05th June 2021	81
53.	Biosafety and waste disposal	26th June 2021	43
54.	Food Safety a Shared Responsibility	24th July 2021	128
55.	Impact of Climate change on Insect Pests	25th July 2021	39
56.	Good Laboratory Practices for safety & estimation procedure of pesticides residues and nutrient in soil & plants	26th July 2021	28
57.	Management in organic farming	11th August 2021	51
58.	Integrated Disease Management	29th September 2021	19
59.	Capacity Building programme on safe use of pesticides	13th Nov 2021	36
60.	Removal of pesticides from vegetables	13th Nov 2021	36
61.	Crop Protection Equipment's	4th Dec 2021	36
62.	Integrated Pest Management (IPM)	15th Dec 2021	37
63.	Integrated Nutrient Management for Sustainable Agriculture & Ecosystem	17th Dec 2021	37
64.	Bio pesticides and their use	27th Nov 2021	34
65.	Safe use of Pesticides	21st Dec 2021	30

66.	Awareness Program on Safe Use of pesticides	30th June, 2022	101
67.	Technological Intervention for Sustainable Agriculture	13th June 2022	52
68.	Online Quiz Program on World Environment Day	5th June 2022	103
69.	A special lecture on “DNA Barcoding of Insects”	8th July 2022	45
70.	Special lecture on Growth and Development of Environment Management System"	26th July 2022	71
71.	Special lecture on Identification of major insect pests & natural enemies of Kharif crops	23rd July 2022	41
72.	Awareness program on Parthenium Awareness WEEK	16-22 Aug2022	25
73.	Awareness Program on Management of pesticides containers	28th Aug 2022	38
74.	One-week Awareness Program on Honeybee Keeping	15.05.2023 to 22.05. 2023	128
75.	One Day Workshop on “Life style for Environment”	05.06.2023	131
76.	Parthenium Awareness Week 2023	16.08.2023 to 22.08 2023	691
	Total		**1691**

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Skill Development to Use Spatial Data for Natural Resources Management in Agriculture
Project Report (up to Dec 31, 2023)

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