

# IT & GREEN INITIATIVES



**UNIVERSITY OF AGRICULTURAL SCIENCES  
BANGALORE**

[www.uasbangalore.edu.in](http://www.uasbangalore.edu.in)



## UNIVERSITY OF AGRICULTURAL SCIENCES, BANGALORE

### IT & GREEN INITIATIVES

University of Agricultural Sciences, Bangalore is a premier university acknowledged globally for its variety of impetus. It has drew the attention of the international educational community to its recognition in terms of both quality and quantity. UASB's curriculum, science, and extension programmes are taking advantage of the digital revolution, changing how stakeholders learn, experts teach, and higher education functions. With personalised learning experiences at the forefront, interactive classrooms, artificial intelligence, the internet of things, and other topics are receiving more attention at UASB. The university has introduced new methods for effective teachings, such as online resources, applications, virtual classes, dedicated software, the National Academic Depository (NAD), DigiLocker, and others, supporting the Digital India initiative of the Government of India. Introduction of digital evaluation of answer booklets by UASB for all UG degree programs is an exploratory transparent evaluation system. The payment gateway module of the Undergraduate Academic Management (UGAM) software allows students to conduct cashless transactions and register, as well as monitor their academic progress.

Digital green's use of IT tools for disseminating agricultural technologies information, advanced tools in aggregating all the FPO's digitally and e-SAP solutions for addressing the issues related to pest management have made a greater impact. A new initiative, the Package of Practices is made available online on the [e-krishiuasb.karnataka.gov.in](http://e-krishiuasb.karnataka.gov.in) web portal. The UASB - Package of Practices in Agriculture" is also available as a mobile app for easy access. The first of its kind in India is a Web-based online fertiliser recommendation for the Tumkur District using the STCR method to help the rural populace. BeejAadha App by UASB and 'Thanthramsha Aadharitha Mannu Parikshe' App developed are two more unique platforms to help farmers.

The UASB has adopted the ICAR's Agro-advisories service provider, which is available to farmers through various service providers and the mKisan portal. The mKisan portal is a web-based mobile advisory network for farmers, with technical support from Research

Institutes and Agricultural Universities. Weather, market, various farm operations, a pest and disease outbreak, and their control measures are given to farmers through Short Message Service (SMS). Every KVK has about 35000 farmers connected to the mKisan Portal, sending SMS messages about agriculture, horticulture, animal husbandry, weather forecasts, and pest and disease control. Through the Agmarknet portal, all KVKs will provide agri-commodity prices.

The GKVK campus of the University of Agricultural Sciences covers 559 hectares, of which 167 hectares have been designated as a biodiversity heritage site by the State Biodiversity Board. The campus is considered one of Bengaluru's greenest regions. As part of the university's Green programme, the campuses strive to minimise waste through reuse, reduction, and recycling, ensuring cleanliness and environmental sustainability. Wet waste, such as kitchen waste, animal waste, and agriculture waste, is managed by the university by composting, vermi-composting, piggery, biogas and for biodigester. The kitchen waste obtained from the hostels is used to make biogas used for cooking and electricity generation.

To eliminate plastic waste, the Green Campus Campaign authorities (NSS coordinators) ensure that the green protocol is followed in all programmes on campus. Single-use plastic is prohibited on campus, and alternatives, such as cloth bags, are marketed to sell University merchandise (seeds). On campus, innovative approaches such as pyrolysis are being used to eliminate plastic and agricultural waste. The paperless office programme, which included office automation and continuous measures to eliminate plastic carry bags and public address systems, helped reduce different solid waste types. E-waste is hazardous to both human health and the environment. Electronic goods are used to their full potential thanks to regular upgrades and repairs performed by the manufacturers. A periodic inspection ensures that non-working electronic devices are properly disposed off. Computers, printers, and other ICT equipment are bought back, and E-Waste produced on campus is collected and disposed of by dealers by inviting tenders. With the aid of ITC India Ltd, used papers from each office are recycled. The university has implemented a one-of-a-kind model.



The university places a greater emphasis on water conservation. On the campus, 4.0 lakh litres of waste water are treated per day and reused for landscaping and irrigating experimental plots and plantations. The campus also has a 395.5 lakh litre water harvesting structure and bore well recharging systems. A rooftop harvesting system has been adopted in every campus building used for irrigation and field experiments. Water harvesting in the campus has been developed to collect the rainwater at the vantage points of the campus. This programme is also adopted in the other sub-campuses of the University.

The University's energy conservation programme includes renewable energy sources such as solar energy and biofuel. On the main campus, 100 kW of solar energy is produced every day, while other sub-campuses produce 50 kW. Solar water heating systems have been built in all of the University's hostels.

Another renewable energy source is biodiesel, which is generated in the demonstration plant at a rate of 3000 litres per year. With Hindustan Aeronautics Limited's support, the biodiesel quality assurance laboratory will be further strengthened. Solar street lights are installed on all of the university's campuses.

To further reduce the university's carbon footprint, the University has implemented an eco-friendly transportation system on campus. To get to various departments, experimental areas, and other locations on campus, students and staff use campus bicycles, battery powered cars, and e-vehicles. Rainwater collection, waste water treatment, and growing green cover on campus by planting more saplings are all ways that the university reduces its reliance on groundwater.

In this context, the noteworthy IT and green initiatives of UASB are as follows:

## IT INITIATIVES IN EDUCATION

### Under Graduate Academic Management (UGAM) Software:

The entire study-cycle of all UG students has been automated through Under Graduate Academic Management (UGAM) software in 2013-14 to minimise human interference because ICT ensures compact storage and fast data retrieval and the maintenance of secured centralised databases. Full automation contributes to efficient tracking of all activities of students (Library, Hostel, Academic Fees, Dues, Miscellaneous Fees), minimization of errors while improving the accuracy, pace, and clarity of the operation, cost reduction of 30-40%. It also aids in the generation of all kinds of academic reports of students.



Homepage of UGAM Software



### Centralized Examinations Using ICT:

From the academic year 2011-12, the University adopted a standardised assessment system for undergraduate degree programmes to ensure uniformity in teaching and evaluation while increasing accountability, confidentiality, and cost effectiveness. The system also aids in the reduction of duplication of examination processes among constituent colleges, lowering examination costs significantly.



### Bar Coding of Answer Booklets:

Barcoding of answer booklets was implemented to protect students' identities during the assessment and cross-checking processes. Each bar code has six features: an ID number, a name, a degree programme, an academic year, a semester, and a course number, all of which are unique from one student to the next and from one course to the next. This aids in the secrecy of the assessment process while also reducing the tedium of manual coding.

### OMR Technique for UG External Examinations:

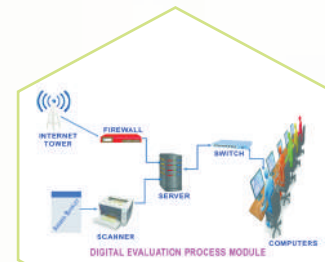
From the academic year 2016-17, the University implemented an OMR answer scheme for answering objective type questions in exams. Students are given a copy of the OMR sheet after the examination to crosscheck the objective type answers written in the OMR answer sheets with the main answers posted to the University website, ensuring greater examination transparency. This method streamlined the inspection process by reducing drudgery, manpower

requirements, time, and expense associated with it. Integration of OMR software with UGAM software increased the evaluation process's speed, performance, and clarity.

### Digital Evaluation System:

The university has set up a Digital Evaluation Hall that includes 30 PCs, biometric devices and other infrastructure. The response booklets are bar-coded, scanned, shuffled, uploaded to the system, and randomly assigned to the evaluators using UGAM software during the Digital Evaluation Process. For authentication and security of the process, the evaluators are given a User ID, Password, and biometric protection. The digital evaluation is a simple, convenient, accurate, economical, and highly secure; it saves time when tabulating marks and speeds up the generation of grade reports; scanned response scripts can be archived for future reference; It's easier to keep track of the assessment process, and it's also easier to re-evaluate and issue photocopies of response sheets.

In the 2016-17 academic year, the University of Agricultural Sciences in Bengaluru became the first of 64 farm universities to introduce the 'Digital Evaluation Process successfully.' The University saves valuable resources such as time, money, and manpower by implementing the digital assessment process.



### Web based Announcement of Results:

The results of UG degree programmes are published on the University website for greater transparency and broader dissemination of results, which can be viewed by students' parents or guardians.



### SMS Alert System:

For mass communication, SMS warning software has been integrated with UGAM software. On a real-time basis, an automated warning system is used to communicate academic, examination, and other alerts to the staff and students.

### National Academic Depository (NAD) Cell:

During the academic year 2017-18, the university formed a National Academic Depository (NAD) Cell in accordance with UGC and MHRD guidelines. Initially, a Service Level Agreement was signed with CVL Ventures Ltd., Mumbai, in order to obtain depository facilities in accordance with the recommendations of the MHRD, GOI, New Delhi. The UEC staff participated in a series of training programmes and workshops on uploading and creating academic databases hosted by the UGC in New Delhi and CVL Ventures Ltd.

The benefits derived out of NAD are 1) providing students with digitally protected and online verifiable academic certificates, 2) removing false and forged certificates, 3) minimising the drudgery of clerical / administrative work in the issuance of certificates, 4) attending to the issuance of duplicate copies of certificates, and 5) checking employer or student demands.

Academic certificates (OGPA cards, PDCs, and degree certificates) of students who graduated from UAS, Bangalore during 2015-16, 2016-17, 2017-18, 2018-19, and 2019-20 have been uploaded to the NAD. Subsequently, the University has registered with the National e-Governance Division (NeGD), Ministry of Electronics and Information Technology (Meity), GOI's DigiLocker, and academic certificates pertaining to 2020-21 are being uploaded.

### UGAM App:

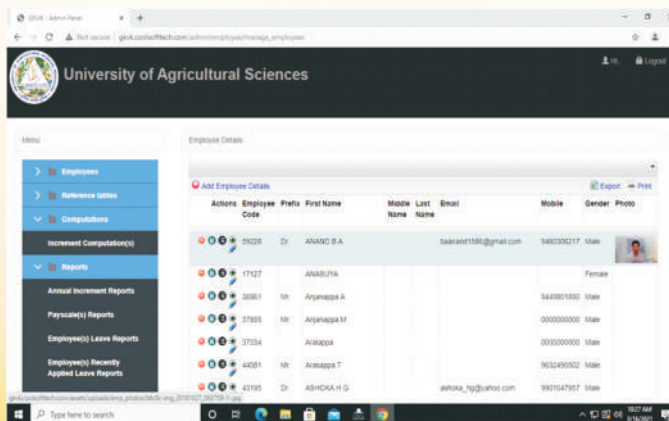
The android and IOS based mobile App namely "UGAM" has been developed for the benefit of students from the academic year 2017-18. Students can update their profiles at any time using the UGAM App. They can pay all forms of fees online 24 hours a day, seven days a week, from any bank, using a debit card, credit card, or net banking facility; even their parents can pay fees from their homes. Students may provide input on classes, course instructors, teaching methodologies, and other topics through the UGAM App, which aids in student assessment of teacher rankings. The UGAM App is safe against hacking because it relies on an OTP sent to the registered mobile number. Students pay all forms of fees through the UGAM app online, including

semester enrolment, re-evaluation, re-totalling, receiving a photocopy, and miscellaneous fees. It saves time by allowing students to pay their fees, clear their hostel and library dues all at once, and prevent cash transactions at any time during the registration period. The use of physical registration cards and slips is entirely avoided, resulting in a paperless and environmentally friendly registration process.



### Service Database Software:

College of Agriculture, GKVK has a software for maintaining the details of all the staff. This software titled gkvkcoolsofttech.com developed by COOLSOFT LLC, Bangalore was implemented during 2018. This is used for maintaining service database of teaching and non-teaching staff of the College. The data base consists of staff position, employee details, service register details, leave accounts, increment details, duty reports and relief order for each employee. As on data, the database of 135 teaching and 150 non-teaching staff has been updated and maintained using this software.





### CCTV system in Class Rooms and Examination Halls:

During 2011-12, the UASB installed CCTV systems in all classrooms and examination halls to monitor the classes and examinations. The installation of CCTV systems in exam halls resulted in cent per cent malpractice prevention, simultaneous examinations on all teaching campuses, and the maintenance of strict discipline among students, invigilators and supporting staff, in addition to the smooth conduct of the examination process.



### Biometric Operated Door

The biometric system is installed at the entrance of University Examination Centre to limit people's entry and exit, but it only lets approved people in for security purposes. Owing to the confidential nature of exam work, this helps control workers entry and exit.

### E - Notice Boards:

The College of Agriculture, as a green initiative has installed E-notice boards for display of information for the students. The information related to Academics, Examinations, Accounts and Administration will be displayed regularly. This not only reduces the paper usage cutting down carbon foot print, but also improves the aesthetics of the premises.



E-Notice Boards at College of Agriculture UAS, GKV, Bangalore

### Virtual Classes, Exams, Webinars, Conferences, etc.

- Online classes / examinations were conducted for UG and PG students through online platforms during COVID-19 Lockdown.
- Online / virtual Krishimela-2020 was conducted during COVID-19 pandemic, wherein around 95,000 participants have participated in three days, which was the first of its kind among SAUs in the country.
- Online Foundation Day-2020 and Convocation-2020 were conducted through online during the COVID-19 pandemic situation.
- Conference / symposia / Training programmes / short courses / skill development training programmes were conducted through online-cum-offline mode during COVID-19 pandemic situation.
- Virtual Research Council and Extension Council meetings were held to take the stock situation in the research and extension activities during 2019-20 and the action plan drawn for 2020-21.



28<sup>th</sup> Annual Conference of Agricultural Economics Research Association (AERA) – Virtual Mode



**28<sup>th</sup> Annual Conference of Agricultural Economics Research Association (AERA) – Virtual Mode**

#### **Antiplagiarism Software:**

The Antiplagiarism programme detects plagiarised text in academic research articles. In contrast to the larger data available globally, it looks for any duplicate or copied material. It is an efficient repository system (upload previous and current year papers into the repository to prevent duplication within the Institution) that also detects hidden characters or symbols, small fonts between words, grammar search, and other features.

#### **Thesis/Project Report Management Software:**

The Directorate of Post Graduate Studies uses Project Report Management Tools to circulate, process, and evaluate Post Graduate students' theses. It supports the latest thesis submission workflow. It operates in combination with the Drillbit plagiarism detection and correction programme to identify and correct plagiarism automatically. It has several levels of approvers for each student and sends auto mail responses to them.

#### **Smart Classrooms:**

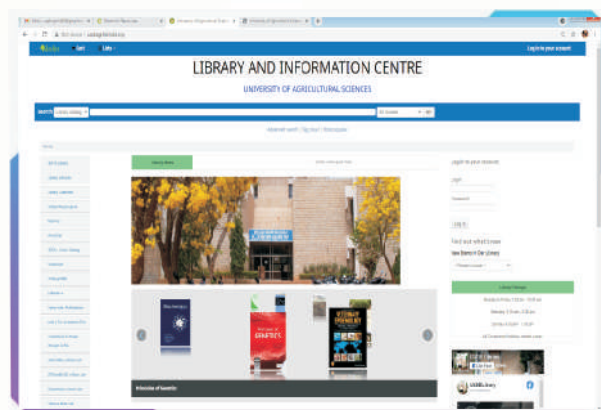
Smart classrooms have been established in all teaching campuses for better efficiency and quality delivery of teaching material.

## **IT INITIATIVES IN THE LIBRARY**

The University Library has adopted recent developments using information communication technology (ICT) such as softwares such as RFID Technology, Institutional Repository DSpace, Vidwan faculty profile database, Krishikosh, Krishi Chitralaya, EZproxy, CeRA, e-books and OPAC (Online Public Access Catalogue) were implemented for the better utilization of e-resources by the students and faculty. The brief details of library automation software's are as below:

#### **Koha Library Management System:**

Koha is the library automation software that was installed in 2012 and upgraded in 2019. This software has been implemented to adopt new technologies to keep pace with the growing information needs of the user community in order to provide better information services such as acquisition, serials, members, circulation, cataloging, reporting and tools. The University Library is available 24/7 across the globe through its websites on the following websites



#### **RFID Technology:**

Each book in the library is tagged with an RFID (Radio frequency identification Device) tag. It is easy for Library staff to handle during lending, returning, sorting, tagging etc. of books using RFID tags in the library system.

#### **Institutional Repository D Space:**

DSpace is an open source repository application that allows the library to capture, store, index, preserve and distribute digital material including text, video, audio and data to the users of UASB in the field of Agriculture and allied sciences.



### Vidwan faculty profile database (IRINS):

Indian Research Information Network System, IRINS is a web-based Research Information Management (RIM) service developed by the Information and Library Network (INFLIBNET) Center. The portal makes it easier for academics, R&D organisations and faculty members, scientists to gather, curate and showcase scholarly communication activities and provide an opportunity to create a scholarly network.



### Krishikosh

The National Agricultural Education and Research System (NARES) of India is the Institutional Repository. The National Agricultural Innovation Project (NAIP) of the Indian Council of Agricultural Research (ICAR), New Delhi, was the inspiration for this project. Currently, Krishikosh contains approximately 65,200 documents, including papers, books, journals, institutional publications, conference proceedings, studies, theses and dissertations, and so on. The University Library has uploaded 13,164 thesis to Krishikosh.



**Krishi Chitralaya:** UASB Library is established with a sophisticated Video Library cum Virtual classroom to provide unique & dynamic real-time online multimedia service to user fraternity.

**EZproxy:** It is a web proxy server set up in 2019 to access the library's subscribed resources outside the library's computer network with restricted access websites that authenticate users by IP address. This permits library managers at home or elsewhere to access EZproxy servers and access resources subscribed to by UASB library.

**Mendeley and Zotero:** A free reference management tool installed in all computers helps collect references, organize your citations, and create bibliographies.

**OCLC WorldCat:** It is a non-profit membership organization that promotes cooperation among libraries worldwide. More than 54,000 libraries in 109 countries use OCLC services to locate, acquire, catalogue, lend and preserve print and electronic library materials.

**Document Delivery Service (DDS):** It refers to the physical or electronic delivery of a document from a library collection to the residence or place of business of a library user upon request. Library has received 529, 427, 254, 294 and 91 during 2016-17, 2017-18, 2018-19, 2019-20 and 2020-21, respectively.

**News Paper Clippings Service:** Library started a new service called "News Paper Clippings Service" in the year 2019, which collaborates all the agricultural information / articles published in the newspapers and sends them through email to the registered students and faculty.

**Content Management:** Library started content management service provided by scanning all the book contents, journals and reports from 2020 which collaborates all the agricultural information and send through mail.

**Lib-Agri Live:** Lib-Agri live (A daily latest update about the library) was started in 2020.



## IT INITIATIVES IN RESEARCH

### Seed Inventory Management Software:

This software is developed and used by NSP, Bangalore. Salient features are as follows:

- It is possible to extract crop, variety and season-wise sowing details.
- Sequence of operations viz., date of monitoring / inspection, harvesting and expected quantities of arrival can be easily predicted based on FIR reference.
- Arrival data of unprocessed quantities could be further updated and extracted with details of processed, quality tested and packed quantities crop-wise and variety-wise in tabular form.
- Details of delivery to the seed stores, quantity available, sale price and day-to-day transactions could be monitored online by the supervisor.

### Online fertilizer recommendation software – Krishiganaka:

The “Krishiganaka” mobile App/Website, which is the first of its kind in India, has been created for online fertiliser recommendation using the STCR approach for the Tumkur district. Using mobile applications, farmers can obtain the fertility status of their land by standing on their field (using Geo-Coordinates of their land via satellite) and also get the fertiliser nutrients to be used as per the STCR target yield concept in the final Soil Health Card by entering the crop to be grown and the yield target.

Website: Online Fertilizer Recommendation  
<http://www.krishiganaka.sit.ac.in>



Scan Me



Scan Me

Google Play Store: Krishiganaka

### NGT-Forecasting Pests and Diseases :

A ground-breaking framework for providing pest and disease forewarning based on information and communication technology (ICT) and the internet of things (IoT) for rice, pigeonpea, and grape. It aims to improve farm productivity through better crop

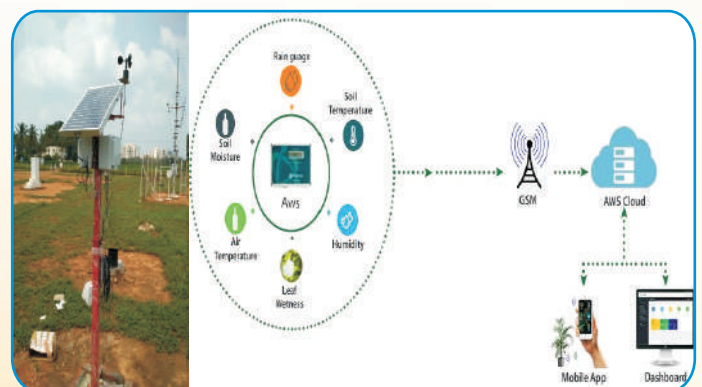
management ([www.ngtforewarningpd.com](http://www.ngtforewarningpd.com)). The aim of this web portal is to predict the occurrence of pests and diseases based on microclimatic parameters generated by automated weather station (AWS) data. The pest and disease warning information and appropriate crop management practises will be disseminated to farmers using electronic media through the Short Message Service (SMS) and mobile applications. The AWS device tracks all important parameters from the farm 365 days a year, 24 hours a day, and sends data to a cloud server, stored in the UAS, Bangalore local server.

Scientists and researchers at UAS, Bangalore, analyse the data in order to create statistical and mathematical predictive models for agricultural pest forecasting.

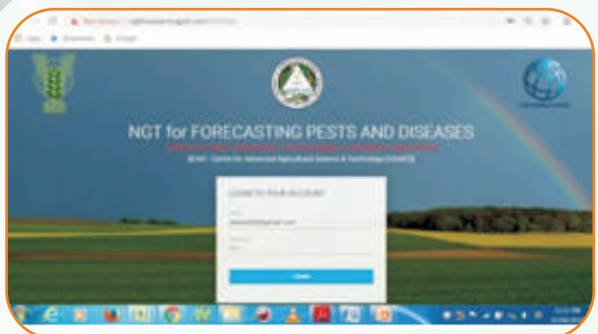
- The system will measure various parameters based on the data obtained and a given model developed by scientists.
- The built-in thresholds for rice, pigeonpea, and grapepests include smartphone warnings about pest occurrence based on weather parameters and management recommendations.
- A short message service (SMS) in both the local and English languages will be sent to the registered farmer.

### Advantages:

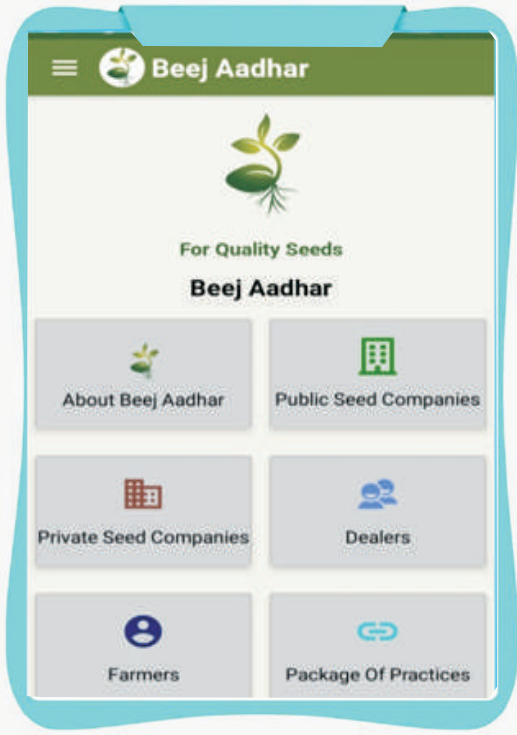
- Reduce production losses due to pest and human error.
- High-end analysis for optimizing environment parameters.
- Alert mechanism – During any deviation in environmental parameters.
- Forecasting models for rice, pigeonpea and grape pest and advisory to manage.



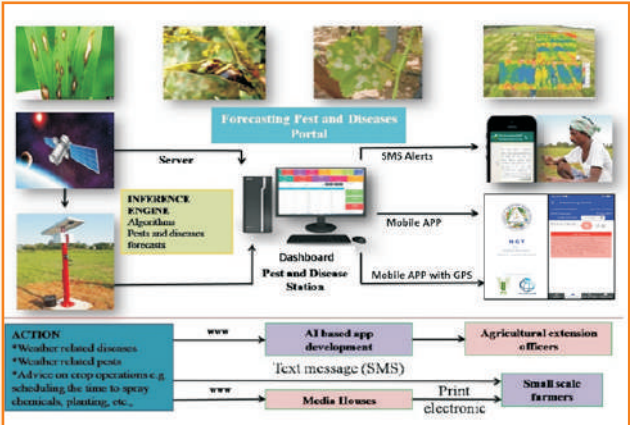
Integrated agricultural pest and disease forewarning web portal ([www.ngtforewarningpd.com](http://www.ngtforewarningpd.com)) and mobile applications.



The web portal of agricultural pest & disease forecasting and issuing an advisory to the farming community through SMS alerts (Dashboard).



Beej Aadhar App



The architecture of NGT- forewarning pests and diseases web portal

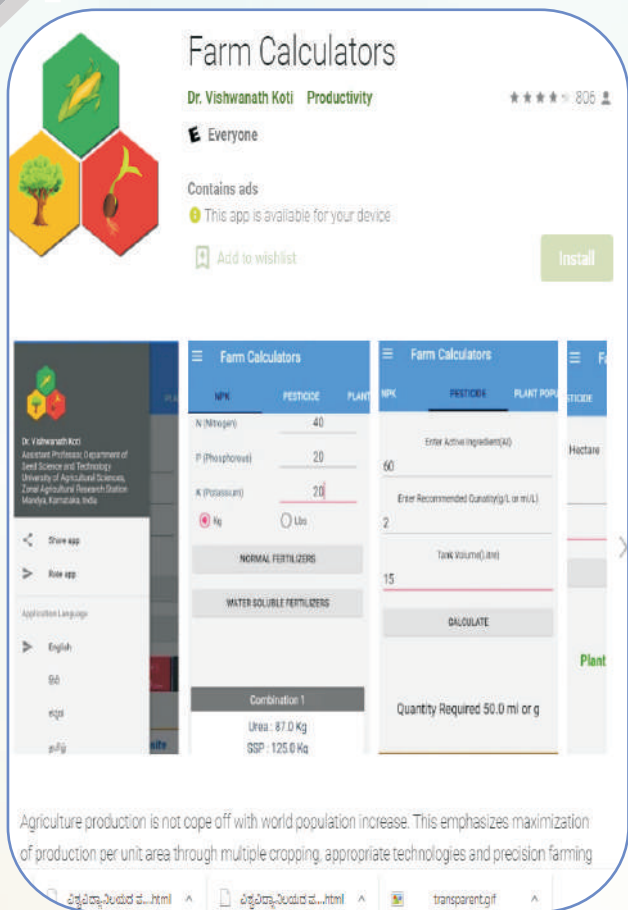
**Beej Aadhar App:**

The “Beej Aadhar” mobile app and website were designed to provide a shared forum for seed producers, customers, and seed stakeholders to work together to advance a sustainable agro-production framework. It provides information on all hybrids/varieties produced, Landraces, etc., field tested and distributed from all types of seed producers to farmers or farmer’s organisations, as well as availability, cost of seeds, and organic linkages between seed producers and growers. It also provides information on package of practise and advanced technologies.

**Farm Calculator App:**

Ready calculator for fertilizers calculation, seed rate and plant population calculation instantly.

- Fertilizers (NPK) Calculator: Calculate the exact quantity of NPK fertilizers required per unit area based on recommendation or soil testing, which saves costs and avoids excess use of fertilizers and soil health degradation.
- Pesticides/ Fungicides/ Herbicides Calculator: Apply the exact quantity of Pesticides/ Fungicides/ Herbicides of different company pesticides with different active ingredients to manage pests / diseases / weeds and minimize excess use of these agriculture inputs
- Plant Population Calculator: Calculates exact number of seeds for field crops or plants required for the unit area for horticulture crops.
- Seed Rate Calculator: Calculate the exact quantity of seeds required based on seed test weight and germination of the seeds.
- Seed Blending Calculator: Calculate blending of seeds of marginal lots with high germination lots to avoid wastage of marginal seed lots according to Karl Pearson square method. This could also be used as wine blending calculator.



**Farm Calculator App**

**Agricultural Pest Prediction and Advisory (APPA):**

To disseminate the technologies, an android-based mobile app has been developed. This mobile app is a complement to NGT's pest and disease forecasting web portal ([www.ngtforewarningpd.com](http://www.ngtforewarningpd.com)). The following are the features offered by the APPA:

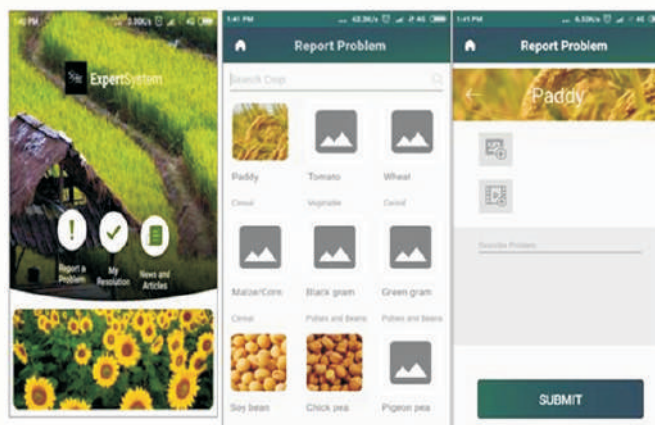
- Farmers can view the forecast and advisory whenever it needs.
- It is enabled to gather the open-source weather data of current location by GPS.
- It predicts the pest severity based on the local weather conditions.
- Advisory will be issued based on the pest severity.
- Increases the accuracy and user friendly
- The prediction is need and location based



**Android mobile application for pest and disease forecasting and advisory issuing to farmers**

**NGT Expert System**

The NGT expert system is an Android mobile app that allows experts to manage pests and diseases in the field that are registered by individual farmers or pest monitors on behalf of farmers. Farmers use an Android app to report an issue on the ground, which is then forwarded to a designated expert. Experts then advise the farmer via text or voice SMS.



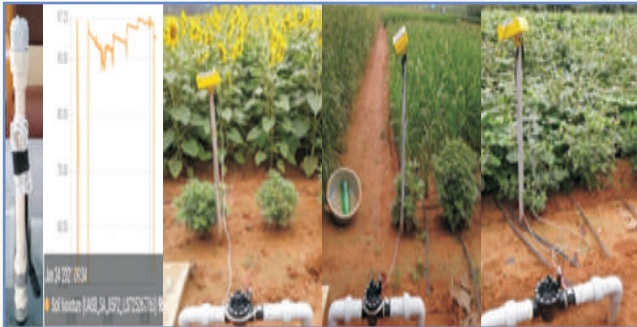
The following queries submitted by farmers or pest monitors will be available on web applications for experts to issue advisory.

- Farmer or Pest monitor records the problem on field using an android mobile app
- The details along with GPS location, are transferred to the server in real time
- Expert picks the problem based on the location or crop and issues advisory to the farmer
- The app is enabled with inbuilt IPM practice information for important crops



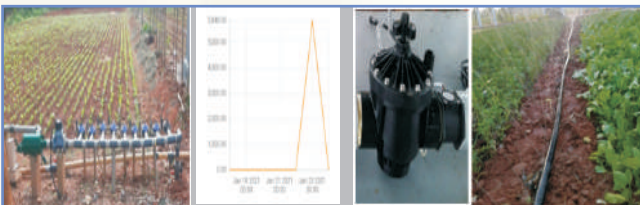
### Sensor Based Automated Irrigation Techniques in Important Agricultural Crops:

Conventional surface irrigation is water expensive and costlier. Precision production systems through time / volume-based automation require human intervention and interpretation, emphasizes sensor-based automation for efficiency and effectiveness. This system provides a complete precision irrigation solution considering crop, soil and weather information using AI and IoT. It consisted of Gateway, Soil moisture sensor, Field controller, Solenoid valve, IoT pump controller.



Soil Moisture sensor

Field controller



IoT pump controller

Solenoid valve

- Laser Spray / Rain Hose Method of Irrigation could enhance uniform germination of agricultural and vegetable crop seeds.
- Drip irrigation in aerobic rice saved water to the tune of 45-55 percent apart from reducing methane emission (18-20 Kgs/ha) almost 5 times less over surface flooded irrigation.
- Drip Irrigation with the application of N & K fertilizers through fertigation in different splits at fortnightly intervals up to flowering enhanced N and K use efficiency up to 65 and 80 percent, respectively

### Reduced Runoff Farming:

Under NAHEP, a water and energy secure polyhouse-based rainwater harvesting and sustainable production system is created by conceptualising drylands with rainfall exceeding 750 mm as an irrigated ecosystem. Full rainwater harvesting polyhouse, storage sump with a capacity of 50% harvestable water, solar green energy

system, and precision safe cultivation (sensor-based automation, fertigation, and weather control) are among the system's components. With only harvested rain water, the module can sustain a commercial crop under secure cultivation for 220-250 days per year.



Reduced Runoff Farming

### Solid State Cooling Module for Raw Milk Cooling:

It is a fabricated with food grade stainless steel material with 52 W/mK. The inner vessel (water jacket) has 3 litre capacity. The outer cooling cabinet has 6.5 litre capacity, 45 cm height and 15 cm diameter, and the insulation has been provided to the unit with thickness of 1 cm to reduce the heat loss to the surroundings. Components of solid-state refrigerator include, thermoelectric module / cooler, extended fins with exhaust fan (heat sink), switch mode power supply



**Solid state cooling module**

### Sub-Baric Food Grain Storage Bin:

Sub-baric storage method involves (manually or automatically) placing food grains in a storage structure, removing air from inside and sealing. The intent of vacuum storage is usually to remove oxygen from the container to extend the shelf-life of food grains. Vacuum storage reduces atmospheric oxygen, limiting the growth of aerobic bacteria or fungi, and preventing the evaporation of volatile components. The sub-baric storage bin can be used for storage of cereals, pulses and oil seeds for extension of shelf-life of food grains. The designed model has been submitted for patenting (Patent File No. 202141006200 Dated 14-02-2021).



### ESAP for Real-Time Pest Management:

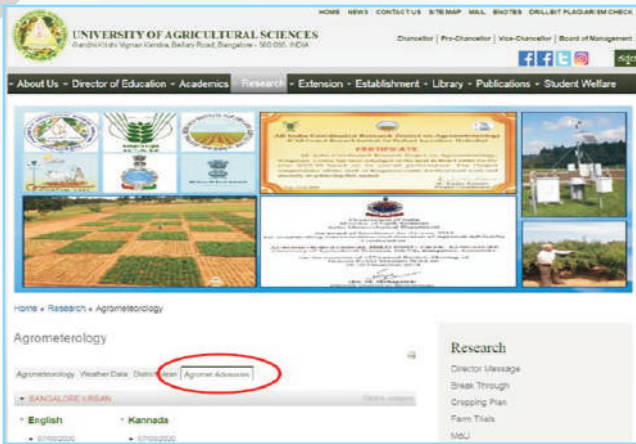
- ESAP is a digitized tool to empower extension officers of Dept. of Horticulture and Rural youth for real-time pest management through the ICT platform-ESAP
- Extension officer of Dept. of Horticulture (Ramanagara and Chikkaballapura districts) and rural youth @ 1 per taluk were trained and empowered with tablets containing pest diagnosis and management contents for providing on-spot consultation to farmers
- During 10 months, Extension officer and rural youth diagnosed and suggested management options for 16,813 pest problems
- Problems that were unable to diagnose using tablets were referred to subject experts located at KVK and other stations. Around 1,389 such problems were resolved by the experts using smartphones/computer within 24 hours
- Based on the pilot project's success at UAS, Bangalore, the Dept. of Horticulture, Govt. of Karnataka has expanded and adopted the same in the entire state of Karnataka.



**Extension officers resolving pest problem using app-based support system in farmers' field.**

### Weather Advisory Services:

Weather based bulletins are prepared by including the information on realized weather and weather forecast on rainfall, temperature, relative humidity, wind speed and direction for the next five days received from IMD, Bangalore. Agromet Advisories (AAS) are prepared by taking the guidance from experts viz., Agronomist, Horticulturist and Entomologist, Plant Pathologist, Animal, Fishery and Poultry Scientists. Apps like Meghdoot, Damini, Mausam and Sidilu are being used to update the farmers about past weather, forecasted weather, extreme weather along with agromet advisories. These AAS are dispersed every Tuesday and Friday through different channels listed below:



**Uploading AAS in UASB website (biweekly)**



**Mobile Apps used to upload agromet advisories**

**IT INITIATIVES IN EXTENSION**

**E-KrishiUASB Portal:**

The e-krishiUASB portal (<http://e.krishiUASB.karnataka.gov.in>) was launched in October 2015 as part of the RKVY project at ATIC, GKVK, and contains technical information on agricultural and horticultural crop cultivation, animal husbandry, sericulture, fisheries, and supplementary information to provide on-the-spot technical solutions to farmers and other stakeholders. This portal has links to the websites of Karnataka's agriculture and other related developmental departments, as well as farm universities. The package of practises can be viewed and downloaded from this portal, which can also be accessed from mobile phones. So far 30,79,839 visitors viewed the agriportal (up to January 25, 2021).



**Video-Conferencing Facility**

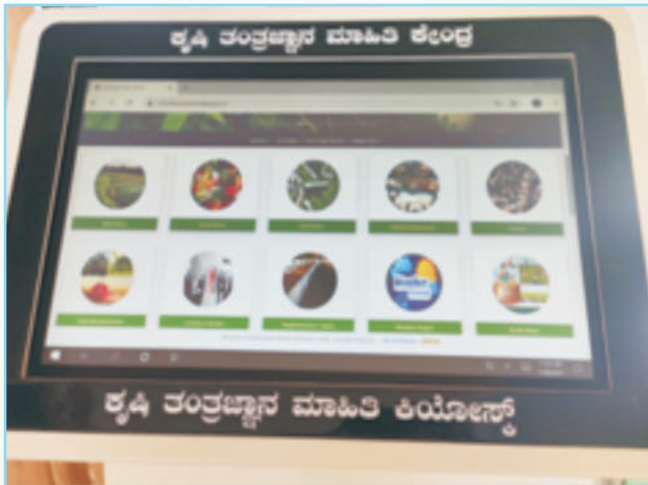
Video-Conferencing facility has been created in seven KVKs, one EEU of Mysuru and Main Expert Center at ATIC, UAS, GKVK to conduct need based video-conferencing to farmers / scientists / extension workers and other stakeholders, which would facilitate them to obtain technical advice apart from conducting meetings, interaction sessions and trainings.





## KIOSK

The University has established KIOSK facility for the farmers / farm women / farm youth/ extension personnel and other stakeholders to view the uploaded information in the UASB agriportal, which contains technical information of agricultural and horticultural crops, animal husbandry, sericulture, fisheries and supplementary information



### WhatsApp and Tollfree Number:

ATIC has Whatsapp number 9482477812 for which farmers and other stakeholders can send agriculture queries especially plant protection. Further, this center also has Toll Free No. 18004250571 through which farmers can get on spot technical advisories on agriculture and allied subjects.

## GREEN INITIATIVES

### National Innovations on Climate Resilient Agriculture (NICRA):

The KVK Chikkaballapura has implemented the NICRA project since 2011 with an outlay of Rs. 53.67 lakh. The significant activities carried out like natural resource management through construction of farm ponds, percolation tanks, trench cum bunds, nala bunds, desilting etc. Further, a custom hiring centre was established to overcome labours scarcity. These interventions created additional water storage capacity of more than three crores liters of water and improved groundwater table.

- As green initiatives all KVKs planted Tamarind, Jamoon, Hebbevu and forest plants in adopted villages.
- KVKs have used IT in the dissemination of KVK activities like mkissan portal for sending season-based messages and WhatsApp groups to

disseminate need based information. To create awareness of training programmes, special programmes, FLDs, OFTs, field visits, field days, and other activities, newspapers, social media, TV, and radio are used.

- KVK, Tumkur has planted around 1200 forest plants in KVK farm under mass plantation drive and all KVKs organized awareness programmes like environmental day, Swatchha Bharath pakwad, Vanamahothawa, etc.



### Renewable Energy:

The University's energy conservation programme includes renewable energy sources such as solar energy and biofuel. On the main campus, 100 kW of solar energy is produced every day, while other sub-campuses produce 50 kW. Solar water heating systems have been built in all of the University's hostels. Another renewable energy source is biodiesel, which is generated in the demonstration plant at a rate of 3000 litres per year. With Hindustan Aeronautics Limited's support, the biodiesel quality assurance laboratory will be further strengthened. Solar street lights are installed on all of the university's campuses.

The Biowaste of 200 cows, sheep, goats reared in the GKKV farm are being used for the bio-methanation process. About 4 to 5 tons of cow dung and agricultural waste available at the GKKV campus is being used for biogas generation of 200m<sup>3</sup> capacity. The Biogas plant generates about 300-320 electrical units per day and 25 KW Biogas generator runs for 10-12 hrs/day has been installed at ZARS, GKKV and VC Farm, Mandya. Twenty-five biogas-based power generation units have been established in the farmers condition as a PPP model (40:60 ratio of farmers and Government of India).



**Solar Power Plant at GKVK Campus**



**Biogas Generation Unit**



**Roof Top Solar Power Plant at Hostel**



**Biogas Power Generation Unit**



**Solar Street Lights at GKVK Campus**



**Kitchen Waste Biogas Plant at UG Girls Hostel, GKVK**

**Rainwater Harvesting:**

The rooftop rain water harvesting storage tank with a capacity of capacity 98,100 litres has been constructed under ICAR-NAHEP-CAAST Project on “Centre for Next Generation Technologies in Adaptive Agriculture for Reduced Runoff Farming”. The total roof catchment



area of 968 m<sup>2</sup> is utilized for rain water harvesting. The harvested water is used for watering plants and meets the domestic requirement at the College of Agricultural Engineering, GKVK.



### Green Certificate Programme (Planting by Students):

University of Agricultural Sciences, Bangalore, started an innovative programme 'Green Certificate Programme'. The students admitted for the undergraduate programmes from the academic year 2018-19 were given a tree sapling in the 1<sup>st</sup> semester to plant in a specified area and take care of the planted saplings for four years. At the end of their programme along with a degree certificate a green certificate will be issued to the students. This model will be repeated every year.



### Green Certificate Programme by UG Students

Under Green Initiatives, the Post Graduate students have established a PG Garden Lounge for the benefit of staff and students. It contains a garden water sprinkler, sparrow nests, and a small bird house in the bamboo and sparrow nest box.



### Green Certificate Programme by PG Students

### Biodiversity Heritage Site, GKVK Campus:

As per Section 37(i) of the Biological Diversity Act, 2002, the Government of Karnataka has issued Gazette Notification vide No. FEE 132 ENV 2009, Bangalore, dated 15<sup>th</sup> January 2010 for 417.50 acres covering 14 patches as 'Biodiversity Heritage Site' for the conservation of biodiversity, sustainable use of components of biodiversity, fair and equitable sharing of benefits arising out of the utilization of genetic resources.



**Tree Arboretum, GVKV Campus**

#### **Lead Botanical Garden:**

The botanical garden is a unique garden laid out in GVKV Campus to meet the teaching, research and conservation needs of plants of Karnataka in particular and Indian subcontinent in general. The 26-ha area is systematically divided into 10 blocks and the species are planted in the blocks demarcated by following Benthem and Hooker's system of classification of plants. The botanical garden has over 1000 species of plants, of which 120 and 35 species are medicinal and threatened & endemic species.

Further, the herbarium has 3700 sheets of specimens. It is a home for more than 100 species of birds and butterflies and many other insects owing to its rich diversity of nectar yielding plants.

#### **Waste Segregation:**

The University has joined hands with Central and State Governments and also with all stakeholders in the implementation of Swatcha Bharat Abhyan for segregation, collection and disposal of different types of wastes generated in the University headquarters and its teaching, research and extension units. In this regard, several awareness programmes have been conducted involving students, farmers, farm women and other stakeholders. The University has made this programme mandatory under the NSS course to inculcate the principles and importance of this programme for UG students. With the support of ITC limited, the waste paper from the university is picked up for recycling.



**Waste collection bins in the laboratory**

#### **Organic Waste Management Methods:**

The organic waste or trash generated through various agricultural activities / experiments, dry leaves, and other vegetation produced in the Campuses is used to produce compost and vermicompost, which is utilized for internal purpose and sold to the farmers when there is a surplus production of vermicompost



**Compost & Vermicompost Production from agriculture waste**



**Rooftop water harvesting systems**



**Rain Water Harvesting:**  
The roof top rain water harvesting storage tank of capacity 98,100 litres constructed under the ICAR-NAHEP-CAAST Project on "Centre for Next Generation Technologies in Adaptive Agriculture for Reduced Runoff Farming". The total roof catchment area of 968 m<sup>2</sup> is utilized for rainwater harvesting and the harvested water is used for watering plants and other facility requirements.



**Green House rain water harvesting Systems**



**Sensor Based Irrigation System**



**Farm pond Capacity 388 Lakh Litres**

**Farm Pond Capacity 7.5 Lakhs Litres**



**Borewell Recharge System**



### Energy Efficient Transport System:

The University has promoted the energy efficient internal transport system on the Campus to avoid air and noise pollution. In this regard, electrically operated buggies and scooters and bicycles for faculty, staff and students are deployed.



**Battery Operated Vehicle**



**E-Bikes**



**Campus Bicycles**