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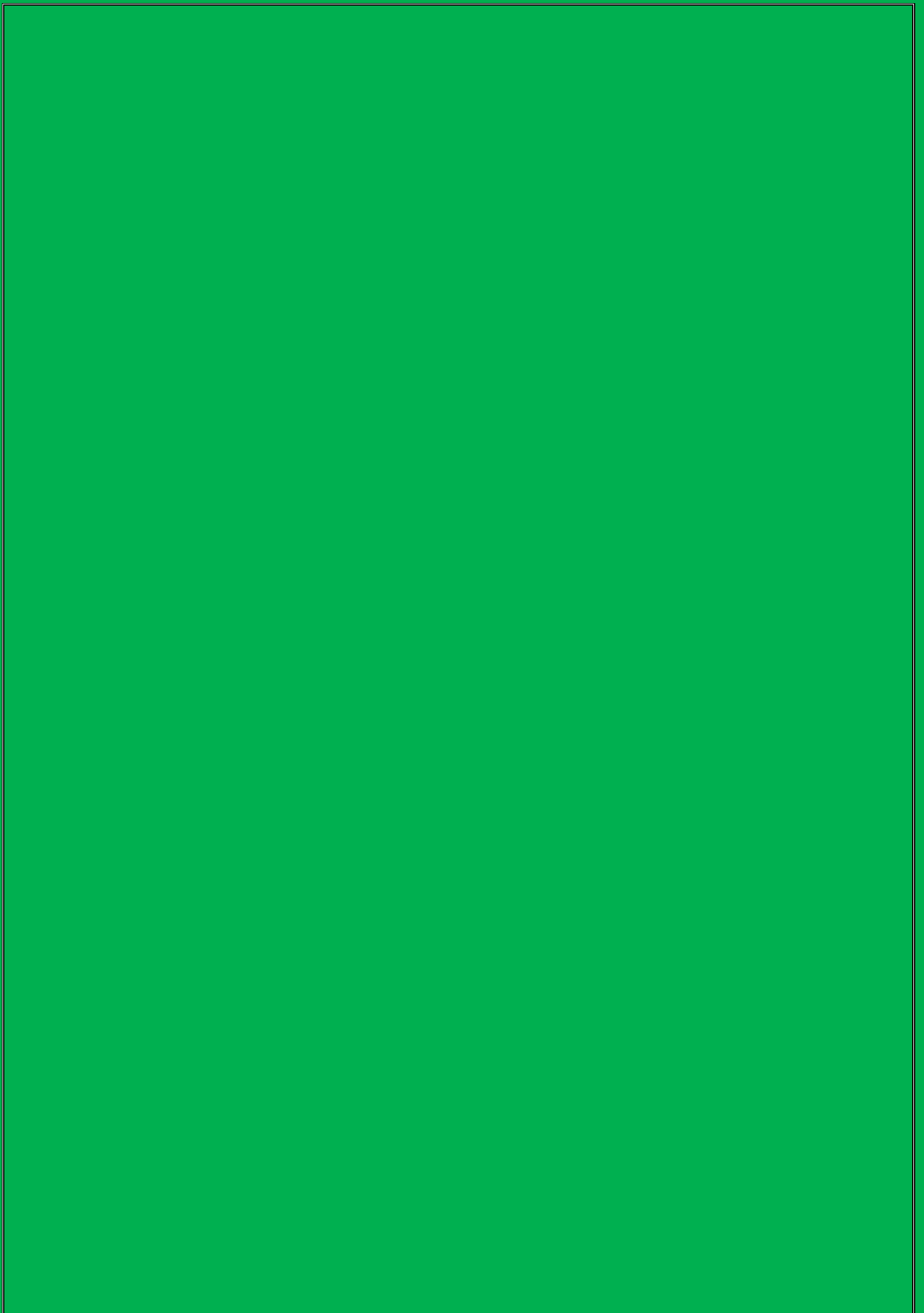
EVALUATION OF RKVY PROJECTS

OF

UNIVERSITY OF AGRICULTURAL SCIENCES,

BENGALURU

"DEVELOPMENT OF SUSTAINABLE PILOT MODEL SEED PLATFORM"

INSTITUTION OF AGRICULTURAL TECHNOLOGISTS,

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CONTENTS

"DEVELOPMENT OF SUSTAINABLE PILOT MODEL SEED PLATFORM"

EXECUTIVE SUMMARY

Over 60 per cent of the Indian population continue to depend on agriculture and allied activities for their livelihood. Hence, growth of this sector is an essential perquisite for overall economic growth. Globally, India is the third largest producer of cereals, with only China and the USA ahead of it. India is 2nd in rice, wheat and production of other cereals. It is the largest exporter of cereal products and offers huge opportunity for milling technology, up-gradation, automation, integration, fortification etc. India is 2nd largest global producer of fruits and vegetables with 254 MT production. Adoption of innovative technologies like protected cultivation, hydroponics and aeroponics have contributed to improvement in quality of horticultural produce.

There are several domains which are of an interest to a farmer. A farmer might need information about the listed categories:

- crop planning (when to grow the crop, which crop to grow, seed variety related to the soil type, the time of harvest);
- buying seeds, pesticides, farm-equipment, and fertilizers, contact with the respective dealers;
- marketing applications (the available price in the current market);
- information applications (about the latest schemes, weather forecast, soil type, new techniques and tricks to increase productivity);
- for contacting farm specialists;
- for checking the available storage facilities;
- for post-harvest technologies.
- Access to weather information
- Outbreak of pests and diseases
- Demand/ supply of produces
- Availability of farm equipment

To support this sector, Central and State governments have been launching new reforms, schemes and policies every year. New techniques and inventions are made to help the agriculture domain. However, the main problem is in the dissemination of the information down to farmers' level. Though, data is available in the forms of printed media, audio and visual forms, newspaper, Internet, etc., yet it is not available at the same place. The formats and structures of the available data are also dissimilar. For a typical farmer, it becomes very hard to understand and make usage this information.

The need for timely access to information for decision making in agriculture and allied sectors needs no emphasis. Keeping this is view, various options have been explored for transferring information to farmers in a timely and cost-effective manner. The potential of Information and Communication Technologies (ICTs) in enabling access to and exchange of information for farmers is evident. Among ICTs, there has been increasing use of mobile phones which is changing the agricultural communication process. The introduction of mobile phones has resulted in new services and applications. In the agriculture sector, these include access to market information, weather information, monitoring plant health, education, other services etc.

In the recent years, the usage of smartphones and Internet connectivity has largely increased in rural areas which shows their potential in spreading the agriculture-based information to the people. Smartphones have penetrated in almost all the environments where people carry out their everyday activities, and perform tasks that are normally run on personal computers. Also, mobile literacy is higher than computer literacy, even though mobile devices might have inconvenient user interfaces. Hence mobile applications are an amiable option for transmitting information to the people in villages and rural areas.

The growth of mobile communication technology is creating a number of opportunities for social empowerment, and grassroots innovation in developing countries. One of the areas with potential impact is in the contribution of mobile applications to Agricultural and Rural Development (ARD), by providing access to information, markets, and services to rural inhabitants (World Bank, 2012).

Studies reveal that mobile phones have a positive impact on sustainable poverty reduction and identify accessibility as the main challenge in harnessing the full potential (Bhavnani et al., 2008). Today farmers are receiving diverse facts or information about faming like seeds, crop selection, crop processes weather, fertilizer, pesticides etc. from various resources which are distributed on many different locations according to its origin, its processors, producers or vendors. It is true that the information is available by means of several applications, videos, images, but the problem lies in the fact that the information is not available at the same platform- a system which covers all the important information about all the domains of agriculture, and available at their location.

The advantages of mobile phones include: affordability, wide ownership, voice communication, and instant and convenient service delivery. Due to these, there is explosion across the world in the number of mobile apps, facilitated by the evolution of mobile networks and by the increasing functions and falling prices of mobile handsets (World Bank, 2012).

The introduction of mobile phones has led to the development of new services and applications in agriculture for the benefit of farmers and other stakeholders. Services that started with occasional messages have evolved to multimodal and multimedia delivery of advisory and to m-agriculture applications for smartphones. These services are addressing the information and communication gap between farmers and extension personnel and giving a bargaining position to farmers (Saravanan, 2014). Access to information on new varieties, inputs such as seed, fertilizers, machinery, price information, weather, pests and diseases, nutrient management at the right time can help farmers get access to crucial information to support activities from production to marketing.

There is an increasing number of mobile apps providing access to agriculture and allied sector information. A mobile application is a software on a mobile phone handset or tablet computer that enables a user to access specific information; make payments and other transactions; send messages; etc. The application (app) is downloaded (for free or for payment) from a wireless network from an online store and may require a live connection to function effectively.

Farmers need timely information in response to their specific needs. There are mobile applications that provide latest agricultural information about trends, equipment, technologies and methods being used, help identify pests and diseases, provide real-time data about weather, early warnings about storms, local markets offering best prices, seeds, fertilizers etc. In addition, farmers can also interact and get guidance from agriculture experts across the country via the apps. These apps help in providing market information, facilitating market links, providing access to extension services, farm related information etc.

Government of India has launched a number of web and mobile based applications (Annexure I) for dissemination of information on agriculture related activities, free of cost, for the benefit of farmers and other stakeholders (Bhasker and Lakshmi Murthy, 2017). There are apps also developed by agricultural institutions, private sector, NGOs. These apps are disseminating information from agricultural research and extension to farmers and other stakeholders and facilitating exchange of information among stakeholders.

Among the various input based technologies for improving crop production, Seed has emerged as an important input, which has a great bearing on yield of the crop. Most of the technological innovations aimed at improving crop yields are still seed oriented. Seed is the basic and most critical input for sustainable agriculture. The response of all other inputs depends on quality of seeds to a large extent. It is estimated that the direct contribution of quality seed alone to the total production is about 15 − 20% depending upon the crop and it can be further raised up to 45% with efficient management of other

inputs. Efforts are continuously made to increase crop yields by genetic manipulation of the seed aimed at sustained expression of its vigour. The efforts presuppose availability of such genetically superior seeds to farmers for commercial production. This can be achieved by scientific seed production techniques. The earlier times when farmer used to make use of his own seeds is no longer valid after the arrival of hybrid varieties, which can be used for one generation only. To make available quality seeds to the farmers, seed production and processing have emerged as important activities in all crops.

Keeping the above in view, the project **"DEVELOPMENT OF SUSTAINABLE PILOT MODEL SEED PLATFORM"** was taken up by University of Agricultural Sciences, Bengaluru with Rashtriya Krishi Vikas Yojana funding. The project was implemented from 2017-18 to 2020-21. The details of the project are as under:

1.	**Title of Project**	:	**"DEVELOPMENT OF SUSTAINABLE PILOT MODEL SEED PLATFORM"**
2.	**Nodal officer and Principal Investigator**	:	**DR. S. RAJENDRA PRASAD** Vice Chancellor, University of Agricultural Sciences, GKVK, Bengaluru
3.	**Implementing Institution (S) and other collaborating Institution (s)**	:	Dr. K. Vishwanath, Associate Professor, Dr. Parashivamurthy
4.	**Date of commencement of Project**	:	2017-18
5.	**Approved date of completion**	:	2020-21
6.	**Actual date of completion**	:	2020-21
7.	**Project cost**	:	Rs. 81 lakhs

The objectives of the project are as follows:
1. To provide a common platform for the seed producers, consumers and seed stakeholders for furtherance of the sustainable agro production system.
2. To develop and update the data base of all the private and public sector seed producers, organizations and their products (Varieties/ Hybrids) details/ performance etc.
3. To have data base of region-wise and season-wise growers/ cultivators/ different stakeholders of seed.
4. To establish linkages with seed producers, growers, seed dealers and all seed stakeholders including farmers.

5. To arrange interaction meetings at periodical intervals for effective functioning.
6. To arrange technical knowhow, do-how, timely guidance and technical expertise/ inputs for successful crop harvest.
7. To provide market information on regular basis.
8. To promote formation of Farmers' Producer Organizations/ companies for easy access of seeds to the end users.
9. Any such other objectives as deem fit for smooth functioning of the platform.

The project was implemented from 2017-2020 at National Seed Project, University of Agricultural Sciences, Bengaluru to strengthen the seed delivery system and improve the socio-economic status of the farmer.

The project was implemented in systemic manner by gathering information from farmers, seed and other inputs dealers, private and public seed producing companies/ agencies. Based on the information obtained, a web page and a mobile app named as "BEEJ AADHAR" were designed and developed in both Kannada and English languages. Information collected and updated from private and public seed companies (NSC, KSSOCA, Agricultural department, All agricultural universities etc.,) included company name, place, category, crop, variety, features, class of seeds, quantity of seeds, region, season, cost of seeds per quintal, seed rate, package of practices, source of seeds/ dealers, contact person, supplying area of seeds, seed production area etc. Information collected and updated on farmers producing seeds included farmer name, address, seed category, crop, variety, growing since, season, to whom they produce, post harvesting methods, procurement cost etc. Similarly information on seed dealers viz., dealer name, address, seed category, crop, variety, class of seed, cost of seed etc., were collected and updated to the app and also information of farmers who are cultivating and maintaining tradition varieties were also collected and updated viz., farmer name, address of farmer, location, state, area, crop group, variety, season, available for sale, quantity of seed available, cost, methods followed for germination, seed storage techniques, award name etc.,

Package of practices are very important for farmers to produce quality seed. Hence, in addition to seed stake holder's details, this app also contains the details about package of practices and advance technologies recommended by University of Agricultural Sciences, Bengaluru. The package of practices includes information like introduction of crop, method of cultivation and management, mechanization, insect and disease management, harvest and post-harvest management etc. Information related to traditional variety conservers and awardees were also updated in the app.

The updated app was launched during Krishi mela, 2018 of University of Agricultural Sciences, GKVK, Bengaluru by former Chief Minister of Karnataka Mr. H. D. Kumara Swamy.

SALIENT FEATURES OF BEEJ AADHAR APP

Beej Aadhar is a mobile app which provides common platform for the seed producers, consumers and seed stakeholders for furtherance of the sustainable agro production system. It provides information on all hybrids/ varieties developed, land races, etc., field tested and being distributed from all type of seed producers to the farmers or farmer's organizations, availability, cost of seeds also establishes organic linkages between seed producers and growers besides providing information of package of practices and advanced technologies.

The app has been developed in both English and Kannada. The user has to register for use of the app. The registration is done by providing the mobile phone number and a password. The category of the user, viz., farmer, seed producer, academic etc., is also recorded at the time of registration. After registering the user can log in to the app by using his mobile number and password. By selecting any one of the above options, information relevant to that topic can be accessed. By accessing "Public Seed Companies", all the information on different crop seeds produced and marketed by the public seed companies like Karnataka State Seeds Corporation can be obtained. By accessing "Private Seeds Companies", information on crop seeds produced by different private seed companies can be obtained. Similarly, information on farmers producing seeds and dealers marketing seeds can be obtained.

In addition, information on package of practices for different crops, farmer varieties registered under PPV and FRA, farmer awardees recognized by PPV and FRA, advanced technologies for different crops, and service links to several services like seed testing labs, soil testing labs etc can be accessed.

For the popularization and further improvement of the app, one day workshop (Seed day cum) was conducted on 26th April 2019 at University of Agricultural Sciences, GKVK, Benagaluru. On this occasion seeds were distributed to progressive farmers to encourage them for quality seed production and also organized exhibition for traditional variety maintainers to showcase their products for encouraging other farmers and NGO's. Leaflet on information about Beej Aadhar app was released at this workshop.

To create awareness about Beej Aadhar app among seed producing farmers and dealers, training programmes were organized at all the Krishi Vignyana Kendras of University of Agricultural Sciences, GKVK, Bengaluru and also at J.S.S. Institute of Engineering, Mysore in collaboration with Raitha Snehi Farmers Producers company. The suggestions given by the seed stakeholders were also considered for further improvement of the app.

It is observed that the app provides information on crop seeds developed by 12 public sector, 21 private sector companies besides 112 seed dealers and 104 farmers producing seeds. The crop seeds today are available from more than 500 government and private seed companies and more than 7,00,000 dealers network in the country. Of these 208 private seed companies including 21 seed companies producing vegetable seeds exclusively have more than 80% share in the country's seed production. Most of these companies are not included in the app. The lists of dealers and farmers are also very less compared to the total number of seed dealers in the state and farmers selling their own seeds. There is need to include all the seed companies in the state for the app to be meaningful and useful to the farmers. Lists of public and private seed companies can be collected from the State Seed Producers' Association.

The package of practices and the advanced technologies given in the app are useful to the farmers. However, information on standardized indigenous technologies, information on use of biofertilizers and biopesticides should have been included as these technologies are gaining farmers' interest nowadays. Information on Contingent Crop Planning on real time basis should be included which will be useful to the farmers for crop planning depending on climatic variations.

The app is user friendly and can be easily accessed. There are more than 145 apps dealing with various agricultural activities in the country. The mobile apps developed by Mobile Seva Division, Ministry of Agriculture and Farmer Welfare, Government of India like Kisan Suvidha, Agrimarket, crop insurance, Pusa Krishi and MKisan are comprehensive and contain complete information on all aspects covered by the apps. There is need to improve the Beej Aadhar app on similar on similar lines. Information given in Mobile apps such as seed calculator, NPK calculator, Fertilizer calculator can also be added in Beej Aadhar app.

While adequate publicity has been given to the Beej Aadhar app developed by University of Agricultural Sciences, Bengaluru, the number of hits observed appears to be miniscule compared to the farmer population in the State. There is need to popularize use of the app among the farmers and seed producers. The public and private seed producers and dealers should be used as change agents to popularize the app among the farmers. The line departments can also be roped in for the purpose as most of the seeds are marketed through them.

There is need to incorporate information on month-wise market rates of the crop produce to enable the farmers to decide on the choice of crops to be grown. This will also, to some extent, solve the problems of gluts in markets as farmers tend to grow crops which his neighbour normally grows.

While the app is useful to the seed producers as it provides a single platform for introducing new varieties/hybrids to enhance varietal replacement rate, the varieties and hybrids of all crops available from seed companies will be made known to farmers, seed companies are able to access for progressive farmer who are willing to take up quality seed production and there is encouragement for enrollment of more number of dealers which will facilitate to connect large number of farmers, unless information on all the seed producers are available, the information that is culled from the app will be skewed and does not provide comprehensive advantage to the seed producers.

While seed dealers can access information about seed availability from seed companies to meet the farmers demand and information on new varieties/Hybrids which are released by public/private sector, they can supplement the technical information to their customers/ farmers. However, this will be of limited use in the absence of complete information of all seed companies.

In recent years, farmers are more focused on markets for their crop produce. Although, the Beej Aadhar app was supposed to provide market information on regular basis, this task has not been taken up. The real time market information will go a long way in making this app more useful and attractive to farmers.

REFLECTIONS AND RECOMMENDATIONS

1. The Beej Aadhar app developed by the University of Agricultural Sciences, Bengaluru is comprehensive, user friendly and fairly complete. It compares well with similar apps developed for seeds in different states.
2. There is need to include information on all public and private seed producers, seed dealers and farmers producing seeds for the app to be useful to the users.
3. There is need to improve the Beej Aadhar app on lines similar to apps developed by Mobile Seva Division, Ministry of Agriculture and Farmer Welfare, Government of India like Kisan Suvidha, Agrimarket, crop insurance, Pusa Krishi and MKisan. Information given in Mobile apps such as seed calculator, NPK calculator, Fertilizer calculator can also be added in Beej Aadhar app.
4. Most of the private seed companies having more than 80% share in the country's seed production are not included in the app.
5. The package of practices and the advanced technologies given in the app are useful to the farmers. However, information on standardized indigenous technologies, information on use of biofertilizers and biopesticides should have been included as these technologies are gaining farmers' interest nowadays.
6. Information on Contingent Crop Planning on real time basis should be included which will be useful to the farmers for crop planning depending on climatic variations.

7. While adequate publicity has been given to the Beej Aadhar app developed by University of Agricultural Sciences, Bengaluru, the number of hits observed appears to be miniscule compared to the farmer population in the State. There is need to popularize use of the app among the farmers and seed producers. The public and private seed producers and dealers should be used as change agents to popularize the app among the farmers. The line departments can also be roped in for the purpose as most of the seeds are marketed through them.

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9. In recent years, farmers are more focused on markets for their crop produce. Although, the Beej Aadhar app was supposed to provide market information on regular basis, this task has not been taken up. The real time market information will go a long way in making this app more useful and attractive to farmers.

10. There is need for mechanism to upgrade the technical knowledge/ knowhow/ do-how etc on regular basis/ from time to time.

11. There is need to include contingent crop planning for seed production.

12. Protocols need to be developed for forest and horticultural seedlings.

ACTION POINTS

Researchable issues:

1. There is need for in depth research on establishment of seed zones in Karnataka for different crops and agricultural zones.

2. There is need for development of prediction model for the future seed demand to improve the SRR & VRR

3. Developing and expanding similar services through innovative models for planting materials including forest and horticultural crops.

4. Protocol development to reuse the identified varieties which will have the potential for higher yield and resistance to biotic/abiotic factors.

Policy issues:

1. Expansion of the platform through the government policies for compulsory updation of seed stock by all seed producers, dealers, farmers to avail seed services in their location/zones.

2. Convergence of all seed stakeholders for successful and effective implementation of Beej Aadhar app.

3. Integration of Raitha Samparka Kendras (RSK's) for popularization and implementation of Beej Aadhar app for up scaling the technology.

"DEVELOPMENT OF SUSTAINABLE PILOT MODEL SEED PLATFORM"

INTRODUCTION

Moving towards a sustainable global food system will become more difficult as global population increases. A common perception is that global food supply is currently sufficient to feed the world's population, with timely distribution required to avoid hunger (World Hunger Organisation, 2016), but that food production must increase dramatically in the next decades (Food and Agriculture Organisation of the United Nations, 2009) as global population increases from 8 billion in 2018 to ≈9.7 billion in 2050 (United Nations Department of Economic and Social Affairs, 2015). The disturbing picture of global farming is emerging as pressure rises for farmers to sharply increase land output to levels never before seen. Currently, about 1 billion people are undernourished around the world. Caloric intake will climb even faster, especially as improved living standards and dietary habits in developing countries spike the demand for food.

Over 60 per cent of the Indian population continue to depend on agriculture and allied activities for their livelihood. Hence, growth of this sector is an essential perquisite for overall economic growth. Globally, India is the third largest producer of cereals, with only China and the USA ahead of it. India is 2nd in rice, wheat and production of other cereals. It is the largest exporter of cereal products and offers huge opportunity for milling technology, up-gradation, automation, integration, fortification etc. India is 2nd largest global producer of fruits and vegetables with 254 MT production. Adoption of innovative technologies like protected cultivation, hydroponics and aeroponics have contributed to improvement in quality of horticultural produce.

Food and nutrition security are intimately interconnected, since only a food-based approach can help in overcoming malnutrition in an economically and socially sustainable manner. Food production provides the base for food security as it is a key determinant of food availability. The Indian food industry is poised for huge growth, increasing its contribution to world food trade every year. The country achieved a production level of 284 million tonnes. The food sector has emerged as a high-growth and high-profit sector due to its immense potential for value addition, particularly within the food processing industry. It is an undisputed fact that the area of the agriculture land on the planet will decrease and the demand for food and fibre for the ever-increasing population will keep on increasing.

Against the back drop of Government's intention of doubling farm income by 2022, the emphasis has been directed towards reducing the cost of inputs, ensuring remunerative prices, reducing wastage at the farm level and creating alternative sources of income. The sheer indisputability of this is the basis of the paradigm shift that is currently underway. The traditional approach to farming focused on ever-increasing yields and neglected crop quality and resource depletion. The goal of the new sustainability initiative is fourfold: increase output; cultivate exceptional crops using farming practices that support high-quality food production, and distribute those crops via transparent supply chains; provide acceptable livelihoods for farmers and workers; and embrace environmentally sound practices that conserve precious resources (such as soil and water), protect biodiversity, and reduce losses.

There are several domains which are of an interest to a farmer. A farmer might need information about the listed categories:

- crop planning (when to grow the crop, which crop to grow, seed variety related to the soil type, the time of harvest);
- buying seeds, pesticides, farm-equipment, and fertilizers, contact with the respective dealers;
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of Information and Communication Technologies (ICTs) in enabling access to and exchange of information for farmers is evident. Among ICTs, there has been increasing use of mobile phones which is changing the agricultural communication process. The introduction of mobile phones has resulted in new services and applications. In the agriculture sector, these include access to market information, weather information, monitoring plant health, education, other services etc.

In the recent years, the usage of smartphones and Internet connectivity has largely increased in rural areas which shows their potential in spreading the agriculture-based information to the people. Smartphones have penetrated in almost all the environments where people carry out their everyday activities, and perform tasks that are normally run on personal computers. Also, mobile literacy is higher than computer literacy, even though mobile devices might have inconvenient user interfaces. Hence mobile applications are an amiable option for transmitting information to the people in villages and rural areas.

As on 31 July 2017 the number of telephone subscribers was 1210.71 million (1186.79 million wireless and 23.92 million fixed land line telephones) as estimated by the Telecom Regulatory Authority of India (TRAI, 2017). The tele-density has reached 93.88 per cent as of July 2017. However, there is huge gap between urban and rural tele-density, 173.21 and 57.45 respectively. According to IDC, India has the fastest-growing smartphone market in the world, accounting for 27.5 million devices sold in the second quarter of 2016, up 17 percent from the previous quarter. Mobile subscriptions are expected to reach 1.4 billion by 2021, according to the Ericsson Mobility Report of June 2016. (CNBC, 2016).

The growth of mobile communication technology is creating a number of opportunities for social empowerment, and grassroots innovation in developing countries. One of the areas with potential impact is in the contribution of mobile applications to Agricultural and Rural Development (ARD), by providing access to information, markets, and services to rural inhabitants (World Bank, 2012).

Studies reveal that mobile phones have a positive impact on sustainable poverty reduction and identify accessibility as the main challenge in harnessing the full potential (Bhavnani et al., 2008). Today farmers are receiving diverse facts or information about faming like seeds, crop selection, crop processes weather, fertilizer, pesticides etc. from various resources which are distributed on many different locations according to its origin, its processors, producers or vendors. It is true that the information is available by means of several applications, videos, images, but the problem lies in the fact that the information is not available at the same platform- a system which covers all the important information about all the domains of agriculture, and available at their location.

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The introduction of mobile phones has led to the development of new services and applications in agriculture for the benefit of farmers and other stakeholders. Services that started with occasional messages have evolved to multimodal and multimedia delivery of advisory and to m-agriculture applications for smartphones. These services are addressing the information and communication gap between farmers and extension personnel and giving a bargaining position to farmers (Saravanan, 2014). Access to information on new varieties, inputs such as seed, fertilizers, machinery, price information, weather, pests and diseases, nutrient management at the right time can help farmers get access to crucial information to support activities from production to marketing.

There is an increasing number of mobile apps providing access to agriculture and allied sector information. A mobile application is a software on a mobile phone handset or tablet computer that enables a user to access specific information; make payments and other transactions; send messages; etc. The application (app) is downloaded (for free or for payment) from a wireless network from an online store and may require a live connection to function effectively.

The main advantages of mobile apps for farmers are, easy to access information on farmers mobile. The information is stored in the mobile handset itself for easy access, for example the details of package of practices, pest and disease information and scheme related information etc. Wherever the information is dynamic in nature, for example weather details, market prices, advisory services, the mobile app requires Internet connectivity to fetch the data from the back-end server databases. The mobile services, particularly the SMS service is only a one-way information provider to the farming community. The farmer needs two-way-communication and dynamic information for day-to-day farming (Sunidhi Sharma et al., 2018).

Farmers need timely information in response to their specific needs. There are mobile applications that provide latest agricultural information about trends, equipment, technologies and methods being used, help identify pests and diseases, provide real-time data about weather, early warnings about storms, local markets offering best prices, seeds, fertilizers etc. In addition, farmers can also interact and get guidance from agriculture experts across the country via the apps. These apps help in providing market information, facilitating market links, providing access to extension services, farm related information etc.

Government of India has launched a number of web and mobile based applications for dissemination of information on agriculture related activities, free of cost, for the benefit of farmers and other stakeholders (Bhasker and Lakshmi Murthy, 2017). A list of mobile apps is given in Annexure. These apps can be downloaded from the official website mkisan.gov.in or from the Google play store. There are apps also developed by agricultural institutions, private sector, NGOs. These apps are disseminating information from agricultural research and extension to farmers and other stakeholders and facilitating exchange of information among stakeholders.

Among the various input-based technologies for improving crop production, Seed has emerged as an important input, which has a great bearing on yield of the crop. Most of the technological innovations aimed at improving crop yields are still seed oriented. Seed is the basic and most critical input for sustainable agriculture. The response of all other inputs depends on quality of seeds to a large extent. It is estimated that the direct contribution of quality seed alone to the total production is about 15 – 20% depending upon the crop and it can be further raised up to 45% with efficient management of other inputs. Efforts are continuously made to increase crop yields by genetic manipulation of the seed aimed at sustained expression of its vigour. The efforts presuppose availability of such genetically superior seeds to farmers for commercial production. This can be achieved by scientific seed production techniques. The earlier times when farmer used to make use of his own seeds is no longer valid after the arrival of hybrid varieties, which can be used for one generation only. To make available quality seeds to the farmers, seed production and processing have emerged as important activities in all crops.

Availability of seeds at the right time is one of the crucial determinants of improving food production in the country. Hence, a farmer has to ensure availability of good quality seeds well in time to take up sowing at an ideal time. Presently, the farmers depend on the seeds supplied by government departments procured from various government and private seed suppliers. In the limited time available to him a farmer is not able to take appropriate decision as to type of seed to be used. Lack of information on the quality standards of various varieties of seeds available is often the factor limiting farmer's choice of seeds. The need for such information to facilitate the farmer to choose the best available seeds has been felt in recent years with seeds available from more than 500 government and private seed companies and more than 7,00,000 dealers network in the country.

International Rice Research Institute (IRRI), Philippines together with the Odisha Department of Agriculture and the Odisha State Seed Corporation (OSSC) has developed a mobile application and web-based Management Information System (MIS) portal for seed demand estimation called SeedCast. With the help of this app, farmers will have access to

information on which seeds are available with which dealers, so they can access these for purchase and cultivation according to their needs and environmental conditions. The app is also useful for the seed corporations to estimate demand for varieties of rice seeds, which makes nearly 80% of the Kharif cultivation. The mobile app will also augment the initiative in Odisha on increasing productivity of rice-based cropping by encouraging replacement of older, lesser-yielding varieties of rice with new, higher-yielding varieties (IRRI, 2018).

Keeping the above in view, the project **"DEVELOPMENT OF SUSTAINABLE PILOT MODEL SEED PLATFORM"** was taken up by University of Agricultural Sciences, Bengaluru with Rashtriya Krishi Vikas Yojana funding. The project was implemented from 2017-18 to 2020-21. The details of the project are as under:

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3. To have data base of region-wise and season-wise growers/ cultivators/ different stakeholders of seed.
4. To establish linkages with seed producers, growers, seed dealers and all seed stakeholders including farmers.

5. To arrange interaction meetings at periodical intervals for effective functioning.
6. To arrange technical knowhow, do-how, timely guidance and technical expertise/ inputs for successful crop harvest.
7. To provide market information on regular basis.
8. To promote formation of Farmers' Producer Organizations/ companies for easy access of seeds to the end users.
9. Any such other objectives as deem fit for smooth functioning of the platform.

HYPOTHESIS

The context of the evaluation arises from the following facts:

1. Against the back drop of Government's intention of doubling farm income by 2022, the emphasis has been directed towards reducing the cost of inputs, ensuring remunerative prices, reducing wastage at the farm level and creating alternative sources of income. The sheer indisputability of this is the basis of the paradigm shift that is currently underway. The traditional approach to farming focused on ever-increasing yields and neglected crop quality and resource depletion. The goal of the new sustainability initiative is fourfold: increase output; cultivate exceptional crops using farming practices that support high-quality food production, and distribute those crops via transparent supply chains; provide acceptable livelihoods for farmers and workers; and embrace environmentally sound practices that conserve precious resources (such as soil and water), protect biodiversity, and reduce losses.

2. To support this sector, Central and State governments have been launching new reforms, schemes and policies every year. New techniques and inventions are made to help the agriculture domain. However, the main problem is in the dissemination of the information down to farmers' level. Though, data is available in the forms of printed media, audio and visual forms, newspaper, Internet, etc., yet it is not available at the same place. The formats and structures of the available data are also dissimilar. For a typical farmer, it becomes very hard to understand and make usage this information.

3. The need for timely access to information for decision making in agriculture and allied sectors needs no emphasis. Keeping this is view, various options have been explored for transferring information to farmers in a timely and cost-effective manner. The potential of Information and Communication Technologies (ICTs) in enabling access to and exchange of information for farmers is evident. Among ICTs, there has been increasing use of mobile phones which is changing the agricultural communication process. The introduction of mobile phones has resulted in new services and applications. In the agriculture sector, these include access to market information, weather information, monitoring plant health, education, other services etc.

4. The growth of mobile communication technology is creating a number of opportunities for social empowerment, and grassroots innovation in developing countries. One of the areas with potential impact is in the contribution of mobile applications to Agricultural and Rural Development (ARD), by providing access to information, markets, and services to rural inhabitants (World Bank, 2012).

5. Studies reveal that mobile phones have a positive impact on sustainable poverty reduction and identify accessibility as the main challenge in harnessing the full potential (Bhavnani et al., 2008). Today farmers are receiving diverse facts or information about faming like seeds, crop selection, crop processes weather, fertilizer, pesticides etc. from various resources which are distributed on many different locations according to its origin, its processors, producers or vendors. It is true that the information is available by means of several applications, videos, images, but the problem lies in the fact that the information is not available at the same platform- a system which covers all the important information about all the domains of agriculture, and available at their location.

6. Among the various input based technologies for improving crop production, Seed has emerged as an important input, which has a great bearing on yield of the crop. Most of the technological innovations aimed at improving crop yields are still seed oriented. Seed is the basic and most critical input for sustainable agriculture. The response of all other inputs depends on quality of seeds to a large extent. It is estimated that the direct contribution of quality seed alone to the total production is about 15 – 20% depending upon the crop and it can be further raised up to 45% with efficient management of other inputs.

7. Availability of seeds at the right time is one of the crucial determinants of improving food production in the country. Hence, a farmer has to ensure availability of good quality seeds well in time to take up sowing at an ideal time. Presently, the farmers depend on the seeds supplied by government departments procured from various government and private seed suppliers. In the limited time available to him a farmer is not able to take appropriate decision as to type of seed to be used. Lack of information on the quality standards of various varieties of seeds available is often the factor limiting farmer's choice of seeds. The need for such information to facilitate the farmer to choose the best available seeds has been felt in recent years with seeds available from more than 500 government and private seed companies and more than 7,00,000 dealers network in the country.

OBJECTIVES AND ISSUES FOR EVALUATION

The scope of evaluation is to study the impact of scheme, **"DEVELOPMENT OF SUSTAINABLE PILOT MODEL SEED PLATFORM"** implemented by University of Agricultural Sciences, Bengaluru from 2017-18 to 2019-20.

1. Stake Holders

a) University of Agricultural Sciences, Bengaluru – Sponsorer

b) Rashtriya Krishi Vikas Yojane – as Monitoring Authority

c) Institution of Agriculture Technologists – as Consultant

d) Farmers / beneficiaries as target group of evaluation

2. Purpose of Evaluation

Evaluation Framework

The focus of Evaluation is:

i. To evaluate the extent of usefulness of the mobile app developed to the farmers, dealers and other stakeholders.

ii. To evaluate the extent of adoption of this mobile app by farmers for sourcing seeds, adopting package of practices recommended by the University.

iii. To evaluate the impact of mobile app in educating the farmers on new varieties developed, in facilitating seed producers in getting progressive farmers for quality seed production and in bringing all the seed stakeholders on one platform.

iv. To evaluate the steps taken to update the information in mobile app and bringing all the seed producers on the platform.

LOG FRAME/THEORY OF CHANGE/PROGRAM THEORY

The intention of the project is to evaluate the impact of the project on development of a single platform for all seed stakeholders so that the seed production policy is dovetailed to the requirements of farmers and other stakeholders.

The evaluation of the project is expected to provide an insight into the seed production process and will focus on finding answers to some of the following questions:

1. How this app is helpful to seed stakeholders and farming community?
2. How many people are registered and using this app?
3. How this app brings all the seed stakeholders to one platform?
4. Have farmers accessed new varieties through this app?
5. Have the farmers are benefited from this app?
6. Whether the seed stakeholders are updating the data frequently?
7. Whether the information updated in the app is authenticated?
8. Have the farmers adopted the advance technologies recommended in the app?
9. Have the farmers are using package of practices recommended in the app for seeds production?
10. What is the extant of awareness created among the seed stakeholders?
11. What are the arrangements made for further continuation/ running of the app after completion of the project?
12. Have the farmers adopted ICT's application in agriculture?
13. Have the farmers gained knowledge on application of app?

14. Have the farmers realized the importance of the app?
15. Have the private and public seed stakeholders are succeeded in getting progressive farmers for quality seed production?
16. Have the farmers are promoted to conserve the tradition varieties by this app?
17. Have farmer accessed traditional varieties through this app?
18. Have seed companies benefited by using this app to reach remote areas?
19. Have the farmers are using pest and disease control measures mentioned in the app?
20. Have seed companies/seed dealers/seed enterprisers benefited by this app to spread new varieties seeds to farmers?

EVALUATION DESIGN

Evaluation design has a rationale of requirement of field level data (primary) that is required to study evaluation objective with respect to beneficiary farmers on one part and the projects taken up for study per se on the other part. The evaluation requires analysis of administration obligations under the two heads and hence a secondary data analysis becomes important and accordingly formats were designed to procure secondary data. The third obligation under evaluation is opinion of stake holders with respect to improvement of the schemes, which require group discussions and exchange of views both in the form of a format, as well as group discussions with the stake holders. The entire evaluation process required a central administration of all activities.

A core team of experts at the Institution level considered three methods to bring a meaningful evaluation of the subject, keeping in mind the scope, evaluation questions and sub-questions duly keeping its focus on the purpose of evaluation. The three methods are:
   a. Accessing and analysis of secondary data from the implementing department.
   b. Interaction with Principal Investigator and his team.
   c. Actual visit to the project site to study and obtain necessary information to elicit answers to the evaluation questions.

DATA COLLECTION AND ANALYSIS

The project was implemented from 2017-2020 at National Seed Project, University of Agricultural Sciences, Bengaluru to strengthen the seed delivery system and improve the socio-economic status of the farmer.

The project was implemented in systemic manner by gathering information from farmers, seed and other inputs dealers, private and public seed producing companies/ agencies. Based on the information obtained, a web page and a mobile app named as "BEEJ AADHAR" were designed and developed in both Kannada and English languages. Information collected and updated from private and public seed companies (NSC, KSSOCA, Agricultural department, All agricultural universities etc.,) included company name, place, category, crop, variety, features, class of seeds, quantity of seeds, region, season, cost of seeds per quintal, seed rate, package of practices, source of seeds/ dealers, contact person, supplying area of seeds, seed production area etc. Information collected and updated on farmers producing seeds included farmer name, address, seed category, crop, variety, growing since, season, to whom they produce, post harvesting methods, procurement cost etc. Similarly information on seed dealers viz., dealer name, address, seed category, crop, variety, class of seed, cost of seed etc., were collected and updated to the app and also information of farmers who are cultivating and maintaining tradition varieties were also collected and updated viz., farmer name, address of farmer, location, state, area, crop group, variety, season, available for sale, quantity of seed available, cost, methods followed for germination, seed storage techniques, award name etc.,

Package of practices are very important for farmers to produce quality seed. Hence, in addition to seed stake holder's details, this app also contains the details about package of practices and advance technologies recommended by University of Agricultural Sciences, Bengaluru. The package of practices includes information like introduction of crop, method of cultivation and management, mechanization, insect and disease management, harvest and post-harvest management etc. Information related to traditional variety conservers and awardees were also updated in the app.
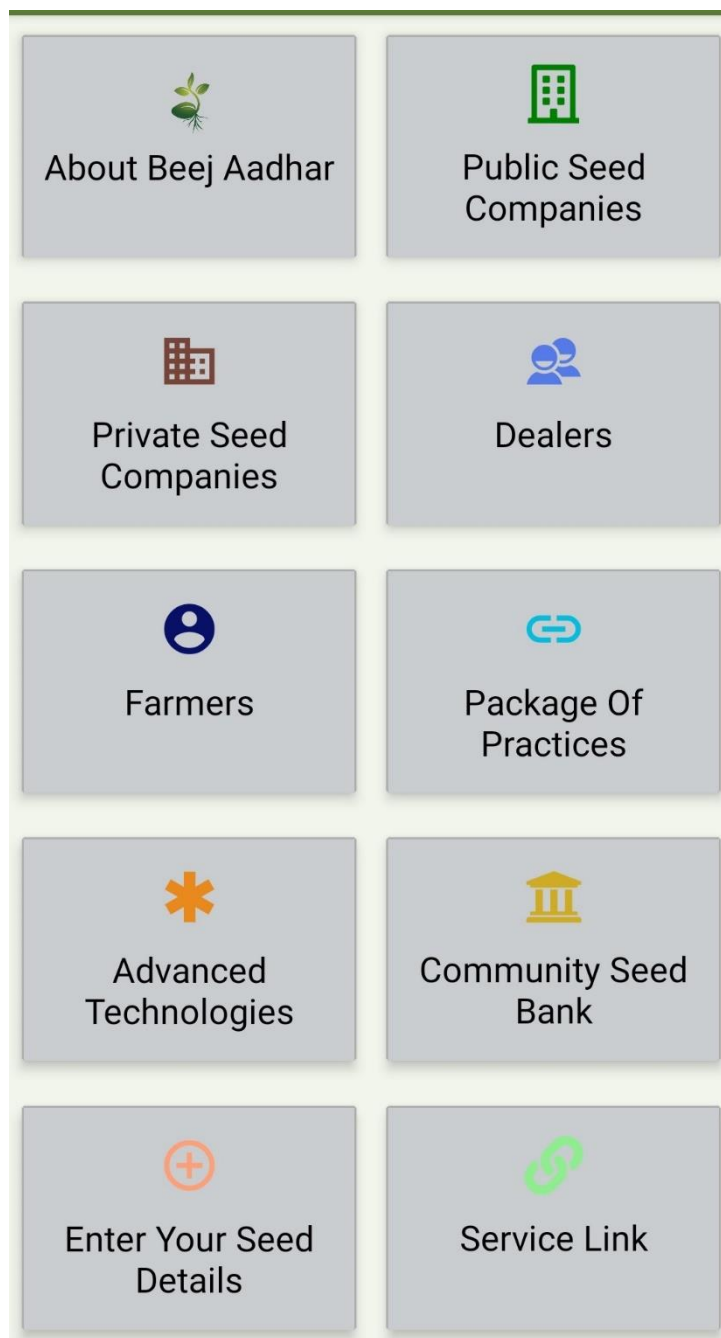
The updated app was launched during Krishi mela, 2018 of University of Agricultural Sciences, GKVK, Bengaluru by former Chief Minister of Karnataka Mr. H. D. Kumara Swamy.

SALIENT FEATURES OF BEEJ AADHAR APP

Beej Aadhar is a mobile app which provides common platform for the seed producers, consumers and seed stakeholders for furtherance of the sustainable agro production system. It provides information on all hybrids/ varieties developed, land races, etc., field tested and being distributed from all type of seed producers to the farmers or

farmer's organizations, availability, cost of seeds also establishes organic linkages between seed producers and growers besides providing information of package of practices and advanced technologies.

The app has been developed in both English and Kannada. The user has to register for use of the app. The registration is done by providing the mobile phone number and a password. The category of the user, viz., farmer, seed producer, academic etc., is also recorded at the time of registration. After registering the user can log in to the app by using his mobile number and password. Once the user logs in to the app the following screen appears:

About Beej Aadhar	Public Seed Companies
Private Seed Companies	Dealers
Farmers	Package Of Practices
Advanced Technologies	Community Seed Bank
Enter Your Seed Details	Service Link

By selecting any one of the above options, information relevant to that topic can be accessed. By accessing "Public Seed Companies", all the information on different crop seeds produced and marketed by the public seed companies like Karnataka State Seeds Corporation can be obtained. By accessing "Private Seeds Companies", information on crop seeds produced by different private seed companies can be obtained. Similarly, information on farmers producing seeds and dealers marketing seeds can be obtained.

Data of Public seed stakeholders in the app

Total: 12 (NSC, KSSOCA, NSP of all Universities, DOA, KOF etc.,)

Data of Private seed companies in the app

Total: 21 (CP seeds, Namdhari seeds, Lakshmi seeds, Arunodaya seeds, etc.,)

Seed producing farmers data in the app

Total: 104

Seed dealers data in the app

Total: 112

In addition, information on package of practices for different crops, farmer varieties registered under PPV and FRA, farmer awardees recognized by PPV and FRA, advanced technologies for different crops, and service links to several services like seed testing labs, soil testing labs etc can be accessed.

Package of Practices in the Beej Aadhar app

Total crops: 64

Cereals : 12
Pulses : 07
Oil seeds : 07
Vegetables : 35
Commercial crops : 03

Advance technologies of major crops included in the Beej Aadhar app

Community Seed Bank details in the Beej Aadhar app

Total: 246

Total crops: 28

Cereals : 06
Pulses : 07
Oil seeds : 05
Vegetables : 08
Commercial crops : 02

Service links

Farmer Awardees recognized by PPV and FRA

🏆 **Award:** Plant Genome Savior Recognition Certificates (2007-08) (Only Certificate)
📍 **Name of the Awardee and Address:** Rung Bhotiya Farmers Community, Vyas Valley, Tehsil Dharchula, District Pithoragarh, Uttarakhand.

🏆 **Award:** Plant Genome Savior Recognition Certificates (2007-08) (Only Certificate)
📍 **Name of the Awardee and Address:** Shri B. Pradeesh & other Paddy farmers of AkampadamChimpachala PadasekaraSamithy, Distt., Palakkad, Kerala.

Farmer varieties registered under PPV and FRA

2007 - Mr. Dev Nath Verma - Rice
2007 - Mr. Arun Kumar - Rice
2008 - Dadaji Ramaji Khobragade - Rice
2008 - Mr. Indrasan Singh - Rice
2008 - Balasaheb Appasaheb Patil - Chickpea
2008 - Kuldeep Singh Sandhu - Rice
2008 - Kuldeep Singh Sandhu - Rice
2009 - Prakash Singh Raghuvanshi - Wheat
2009 - Prakash Singh Raghuvanshi - Pigeon pea
2009 - Kuldeep Singh Sandhu - Wheat
2009 - Prakash Singh Raghuvanshi - Wheat

There is also provision for farmers to register as seed growers and enter details of seeds produced by them. Queries regarding the seeds can be raised with "? Ask Your Question" option. Similarly, information on the nearest seed dealer can also be obtained.

Beej Aadhar: – A solution for seed

Information pertaining to the seeds produced by the following companies and dealers are included in the app:

Public Seed Companies

a. National Seed Corporation, Bengaluru
b. National Seed Project of all the Agricultural universities
c. Karnataka Oil Federation
d. Department of Agriculture
e. Karnataka State Seeds Corporation

Private Seed Companies

a. CP seeds Pvt Ltd.
b. Namdhari seeds Pvt Ltd.
c. Arunodaya agro seeds Pvt Ltd.
d. Eldorado agritech Pvt Ltd.
e. Siri seeds Pvt Ltd.
f. UPL Pvt. Ltd.
g. Penna seeds Pvt Ltd.

Seed Dealers

a. Manjunath, Mobile no: 9164151590, East Point Seeds, 297 BTB Area 13 th cross, B main, Thilak nagar, Jayanagar, Bengaluru
b. Shobha R & Devaraju T V,Mobile no.: 8904491110, 7411105516, Shree Veershwara Agro Center, Marasandra, Doddaballapura main road, Banglore north, Dodda thumkur post
c. Murthy Y , Mobile no.: 9986000905, M/S Sumo Agro Agencies, Sree Balaji lodge building, near new bus stand, Vijayapura
d. Muniswami gowda , Mobile no.: 8970901787, Naveen Agro Service, BB road, Beside HDFC bank, Devanahalli-562110
e. K G Purushotthama, 9066555752, Shri Raghavendra traders, Magadi, Kempegowda circle, Ramanagara dist.
f. K H Paramashivaiah, 9986984580, Sri Gangadhareshwara fertilizer, Kiran agencies, Rammandira road, Kadur, Magadi taluk and Ramanagara dist.
g. Mahadeva T M , 9620568775, Krushik Agro Centre, No. 12, SJC college complex, J C ROAD, Channapatna.
h. Shivkumar, Mobile no.: 9986841342, Sahara Agri Genetics, # 1401, Kuvempu main road, Hebbal, Dasarahalli.

Farmers

a. Nagesh, Thorebeerahalli, Challakere, Mobile no.:8861235295
b. Srikantawmy, Maddur,Mandya dist., Mobile no.:9844883203, 702299332
c. Hemanth, B Hosahalli,Mandya dist., Mobile no.:9945643770
d. Anand,K.R.Pete., Mobile no.:9902521774

e.   Madhu, Kikeri, Mobile no.:9972452502

f.   Hariprasad, mobile no.:8971116269, 9739826599

g.   Manju, Mobile no.:9880643345

h.   Jayakumar, Mobile no.:9945067357

i.   Chandrashekar, Bagepalli, Mobile no.:9963370580

j.   Hanumanna, Kaparahalli, Challaker, Mobile no.:9972078485

k.   Nagaraju, Ghati, Doddaballapura, Mobile no.:9731959119

l.   Shivananda, Hemdore, Sira, Mobile no.:866071206, 9945791104

m.   Siddeshwarareddy, Meerasaba halli, Challakere, Mobile no.: 8152938906, 9113814460

n.   Ashwatha reddy, Rajana kunte, Yalahanka, Mobile no.:9342879330

o.   Junje gowda, Sakkara, Hiriyur, Mobile no.: 9901285507

p.   Shivanna, Allalsandra, Benagluru, Mobile no.:9845440599

q.   Muralidhar, Gundammagere, Mobile no.:8660648615

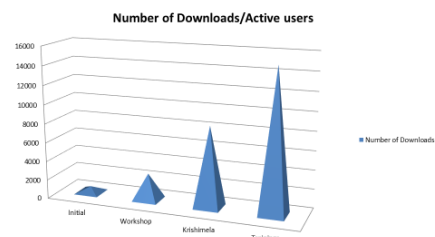Package of practices and advanced technologies have been included for the following crops

Field Crops		Horticultural crops		Commercial crops
Paddy	Redgram	Tomato	Pumpkin	Cotton
Maize	Green gram	Brinjal	Bitter gourd	Sugarcane
Jowar	Black gram	Potato	Snake gourd	Tobacco
Wheat	Bengal gram	Chillies	Ash gourd	
Bajra	Cow pea	Capsicum	Cucumber	
Baby corn	Field bean	Onion	Bottle gourd	
Pop corn	Horsegram	Cabbage	Chow chow	
Ragi	Groundnut	Cauliflower	Muskmelon	
Navane	Sunflower	Knol khol	Bhendi	
Haraka	Soybean	Beans	Pea	
Castor	Sesamum	Field beans	Cluster beans	
Safflower	Niger	Radish	Carrot	
		Beet root		

After launch of the app, downloads have been observed all over the country. The details of number of downloads by seed stakeholders are given below:

Areas of App Download
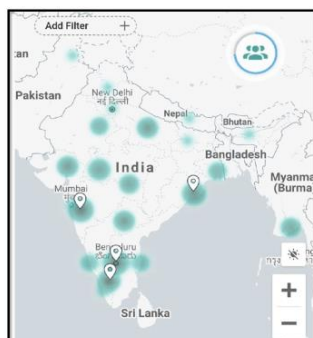
Usage of Beej Aadhar app by seed stakeholders

For the popularization and further improvement of the app, one day workshop (Seed day cum) was conducted on 26th April 2019 at University of Agricultural Sciences, GKVK, Benagaluru. On this occasion seeds were distributed to progressive farmers to encourage them for quality seed production and also organized exhibition for traditional variety maintainers to showcase their products for encouraging other farmers and NGO's. Leaflet on information about Beej Aadhar app was released at this workshop.

To create awareness about Beej Aadhar app among seed producing farmers and dealers, training programmes were organized at all the Krishi Vignyana Kendras of University of Agricultural Sciences, GKVK, Bengaluru and also at J.S.S. Institute of Engineering, Mysore in collaboration with Raitha Snehi Farmers Producers company. The suggestions given by the seed stakeholders were also considered for further improvement of the app.

KVK, Konnehalli on 26.11.2019

KVK. Mandya. on 27.11.2019

KVK. Hassan. on 28.11.2019

KVK, Chinthamani, on 29.11.2019

Beej aadhar app application, advantages and operating methods were recorded and broadcasted by Chandana channel to reach farmers and seed stakeholder.

The Beej Aadhar App has been given adequate publicity through different media.

FINDINGS AND DISCUSSION

Beej Aadhar is a mobile app which is supposed to provide a common platform for the seed producers, consumers and seed stakeholders for furtherance of the sustainable agro production system. It provides information on all hybrids/ varieties developed, land races, etc., field tested and being distributed from **all type of seed producers** to the farmers or farmer's organizations, availability, cost of seeds also establishes organic linkages between seed producers and growers besides providing information of package of practices and advanced technologies.

It is observed that the app provides information on crop seeds developed by 12 public sector, 21 private sector companies besides 112 seed dealers and 104 farmers producing seeds. The crop seeds today are available from more than 500 government and private seed companies and more than 7,00,000 dealers network in the country. Of these 208 private seed companies including 21 seed companies producing vegetable seeds exclusively have more than 80% share in the country's seed production. Most of these companies are not included in the app. The lists of dealers and farmers are also very less compared to the total number of seed dealers in the state and farmers selling their own seeds. There is need to include all the seed companies in the state for the app to be meaningful and useful to the farmers. Lists of public and private seed companies can be collected from the State Seed Producers' Association.

The package of practices and the advanced technologies given in the app are useful to the farmers. However, information on standardized indigenous technologies, information on use of biofertilizers and biopesticides should have been included as these technologies are gaining farmers' interest nowadays. Information on Contingent Crop Planning on real time basis should be included which will be useful to the farmers for crop planning depending on climatic variations.

The app is user friendly and can be easily accessed. There are more than 145 apps dealing with various agricultural activities in the country. The mobile apps developed by Mobile Seva Division, Ministry of Agriculture and Farmer Welfare, Government of India like Kisan Suvidha, Agrimarket, crop insurance, Pusa Krishi and MKisan are comprehensive and contain complete information on all aspects covered by the apps. There is need to improve the Beej Aadhar app on similar on similar lines. Information given in Mobile apps such as seed calculator, NPK calculator, Fertilizer calculator can also be added in Beej Aadhar app.

While adequate publicity has been given to the Beej Aadhar app developed by University of Agricultural Sciences, Bengaluru, the number of hits observed appears to be miniscule compared to the farmer population in the State. There is need to popularize use of the app among the farmers and seed producers. The public and private seed producers

and dealers should be used as change agents to popularize the app among the farmers. The line departments can also be roped in for the purpose as most of the seeds are marketed through them.

There is need to incorporate information on month-wise market rates of the crop produce to enable the farmers to decide on the choice of crops to be grown. This will also, to some extent, solve the problems of gluts in markets as farmers tend to grow crops which his neighbour normally grows.

While the app is useful to the seed producers as it provides a single platform for introducing new varieties/hybrids to enhance varietal replacement rate, the varieties and hybrids of all crops available from seed companies will be made known to farmers, seed companies are able to access for progressive farmer who are willing to take up quality seed production and there is encouragement for enrollment of more number of dealers which will facilitate to connect large number of farmers, unless information on all the seed producers are available, the information that is culled from the app will be skewed and does not provide comprehensive advantage to the seed producers.

While seed dealers can access information about seed availability from seed companies to meet the farmers demand and information on new varieties/Hybrids which are released by public/private sector, they can supplement the technical information to their customers/ farmers. However, this will be of limited use in the absence of complete information of all seed companies.

In recent years, farmers are more focused on markets for their crop produce. Although, the Beej Aadhar app was supposed to provide market information on regular basis, this task has not been taken up. The real time market information will go a long way in making this app more useful and attractive to farmers.

BUDGET ALLOCATION AND UTILIZATION

(Rs. in lakhs)

Budget sanctioned	Budget released	Financial target	Financial achievement	Utilization	% utilization
81.00	81.00	81.00	55.00	55.00	67.90

A budget of Rs. 81 lakhs was sanctioned for the project. An amount of Rs. 55 lakhs was utilized. The details of funds utilized are given below:

Sl no	Particulars	2019-20 Amount allotted (Rupees)	2019-20 Amount spent (Rupees)	Balance amount (Rupees)
1	S.R.F / IT professional / Technical assistant	20,58,075	10,18254	10,39,821
2	Skilled assistant/Computer assistant	6,38,171	416248	2,21,923
3	Travel allowance	1,85,707	576	1,85,131
4	Contingency	1,61,580	5719	1,55,861
5	NRC(computer, Laptop, Printer, Scanner and others computer equipments)	1,26,499	1,26,400	99
6	Furniture's	39,200	00	39,200
7	Repair of furniture and equipments	50,000	00	50,000
8	Training programmes/ HRD	3,00,000	00	3,00,000
9	Outsourcing for data collection	2,15,400	92,200	1,23,200
10	Printing and publications	1,99,140	57756	1,41,384
11	Advertisement charges	1,00,000	00	1,00,000
12	Vehicle hire charges	1,00,000	22,602	77,398
13	Seminars/ Workshop	5,00,000	3,59,408	1,40,592
14	Training material (posters/charts etc…)	1,19,240	68641	50,599
15	Civil works	30,980	00	30,980
16	Amc for equipments and software	80,500	80,240	260
	Total	49,04,492	22,48,044	26,56,448

REFLECTIONS AND RECOMMENDATIONS

1. The Beej Aadhar app developed by the University of Agricultural Sciences, Bengaluru is comprehensive, user friendly and fairly complete. It compares well with similar apps developed for seeds in different states.

2. There is need to include information on all public and private seed producers, seed dealers and farmers producing seeds for the app to be useful to the users.

3. There is need to improve the Beej Aadhar app on lines similar to apps developed by Mobile Seva Division, Ministry of Agriculture and Farmer Welfare, Government of India like Kisan Suvidha, Agrimarket, crop insurance, Pusa Krishi and MKisan. Information given in Mobile apps such as seed calculator, NPK calculator, Fertilizer calculator can also be added in Beej Aadhar app.

4. Most of the 208 private seed companies including 21 seed companies producing vegetable seeds having more than 80% share in the country's seed production are not included in the app.

5. The package of practices and the advanced technologies given in the app are useful to the farmers. However, information on standardized indigenous technologies, information on use of biofertilizers and biopesticides should have been included as these technologies are gaining farmers' interest nowadays.

6. Information on Contingent Crop Planning on real time basis should be included which will be useful to the farmers for crop planning depending on climatic variations.

7. While adequate publicity has been given to the Beej Aadhar app developed by University of Agricultural Sciences, Bengaluru, the number of hits observed appears to be miniscule compared to the farmer population in the State. There is need to popularize use of the app among the farmers and seed producers. The public and private seed producers and dealers should be used as change agents to popularize the app among the farmers. The line departments can also be roped in for the purpose as most of the seeds are marketed through them.

8. There is need to incorporate information on month-wise market rates of the crop produce to enable the farmers to decide on the choice of crops to be grown. This will also, to some extent, solve the problems of gluts in markets as farmers tend to grow crops which his neighbour normally grows.

9. In recent years, farmers are more focused on markets for their crop produce. Although, the Beej Aadhar app was supposed to provide market information on regular basis, this task has not been taken up. The real time market information will go a long way in making this app more useful and attractive to farmers.

10. There is need for mechanism to upgrade the technical knowledge/ knowhow/ do-how etc on regular basis/ from time to time.

11. There is need to include contingent crop planning for seed production.

12. Protocols need to be developed for forest and horticultural seedlings.

ACTION POINTS

Researchable issues:

1. There is need for in depth research on establishment of seed zones in Karnataka for different crops and agricultural zones.
2. There is need for development of prediction model for the future seed demand to improve the SRR & VRR
3. Developing and expanding similar services through innovative models for planting materials including forest and horticultural crops.
4. Protocol development to reuse the identified varieties which will have the potential for higher yield and resistance to biotic/abiotic factors.

Policy issues:

1. Expansion of the platform through the government policies for compulsory updation of seed stock by all seed producers, dealers, farmers to avail seed services in their location/zones.
2. Convergence of all seed stakeholders for successful and effective implementation of Beej Aadhar app.
3. Integration of Raitha Samparka Kendras (RSK's) for popularization and implementation of Beej Aadhar app for up scaling the technology.

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LIST OF APPS DEVELOPED FOR AGRICULTURAL ACTIVITIES

Sl No	Name of App	Language	Publisher	Purpose & Uses	Downloading Site
1	Karshika Vivara Sanketham	Malayalam/Eng	Department of Agriculture,Kerala	latest information about agriculture business, best practices and modern methods of agriculture.	Google Playstore,www.krishi.info
2	Karshika Keralam	English	Department of Agriculture	provide agricultural officers - a platform to interact with farmers and share best practices happening across the Globe	Google Playstore, www.krishi.info
3	Agriculture: FEM@Mobile	English	KVK MALAPPURAM, KAU	FEM@Mobile is a mobile application in agriculture containing information on 100 crops	Google Playstore,http://www.farmextensionmanager.com/
4	Krishi App	Malayalam/Eng	Philosan Technologies	make people self-dependent in agriculture and 100% Organic Farming,	Google Play
5	Sreshta Krishi	English	Prakruthi	help homestead farmers to meet the challenges of their day to day farming.	Google Play
6	Krishi App by Krishipadam.com	Malayalam	Anand Web Solutions	organic farming	Google Play
7	Karshakan	Malayalam	Sping Labs Technologies	Karshakan" provides daily market price of agriculture products and useful tips for farmers in various areas	Google Play

8	Krishivideo Advice App	English	NIPHM & MANAGE	Solutions to field problems	http://www.manage.gov.in/ orhttp://niphm.gov.in/
9	Kisan Suvidha	English	Mobile Seva Division, Ministry Of Agriculture and Farmer Welfare ,GOI	information on weather dealers, market prices, agro advisories, plant protection, IPM Practices	Google Play,Farmers Portal, https://apps.mgov.gov.in
10	AgriMarket	English	Mobile Seva Division, Ministry Of Agriculture and Farmer Welfare ,GOI	AgriMarket mobile app can be used to get the market price of crops in the markets within 50 km of the device's location.	Google Play,Farmers Portal ,https://apps.mgov.gov.in
11	Crop Insurance	English	Mobile Seva Division, Ministry Of Agriculture and Farmer Welfare ,GOI	calculate the Insurance Premium for notified crops based on area, coverage amount and loan amount in case of loanee farmer	Google Play,Farmers Portal, https://apps.mgov.gov.in
12	Pusa Krishi	English	Mobile Seva Division, Ministry Of Agriculture and Farmer Welfare ,GOI	Agribusiness Ventures through technology development and commercialization for everyone from a corporate to an individual farmer.	Google Play,Farmers Portal, https://apps.mgov.gov.in
13	MKisan Application	English	Ministry Of Agriculture and Farmer Welfare ,GOI	advisories and information being sent by experts	Farmers Portal
14	Farm-o-pedia	English	Mobile Seva	Get suitable crops as per soil and season Get crop wise information	Google Play,https://apps.mgov.gov.in

15	Horticultural Crops	English	Mobile Seva	The data refers to number of horticultural crops varieties released on national level.	Google Play,https://apps.mgov.gov.in
16	Soil Health Card App	English	Department of Agriculture Co-operation and Farmer Welfare	Data Entry and Reports and Soil Health Card	http://www.soilhealth.dac.gov.in/
17	AgriApp	English	Agriapp	information on Crop Production, Crop Protection	Google Play
18	SMART AGRIBIZ	English	Mobi254Tech	Agribussiness	Google Play
19	myRML for Farmers	English	RMLISPL	Market Prices Climet & other details	Google Play
20	Farmer's Friend/Krishi Mitra	English	AppRevelations	Agriculture Information	Google Play
21	Kisan App	English	NIC	Farmerregistration	
22	Kisaan Helpline	English	Ample eBusiness	Agricultural Technology & Michenery	Google Play
23	CropInfo India	English	Arun Gulbadher	Information on Crops cultivated in India	Google Play
24	CropInfo	English	Nirantara LRPL	Production Technology of commercially important Horticultural crops	Google Play
25	Organic Farming	English	XENON NATION	Organic Farming.	Google Play
26	Organic Farming Methods	English	Venture Technology Ltd	Organic Farming.	Google Play

27	Organic Garden	English	MichaelMg	Organic gardening	Google Play
28	Organic Gardening	English	Sun Media Soft	Organic Cultivation	Google Play
29	Organic Happiness	English	Indian Domain	Organic Garden	Google Play
30	GPS Route Finder	English	Prime Studio	Route Finder during field visit	Google Play
31	GPS Fields Area Measure	English	Studio Noframe	Measuring Field Area	Google Play
32	Fields Area Measure	English	LKE TECH	Measuring Field Area	Google Play
33	ArcGIS	English	Esri	ArcGIS is a great way to discover and use maps	Google Play
34	Land Area Calculator	English	JMH Technology Solutions	Area Conversion	Google Play
35	Kisan Market	English	Rikwaa Tech Lab	empowers Indian Farmers to connect directly with buyers and saves brokerages and transport spendings.	Google Play
36	Green House	English	Bit Xpert Technologies	Green house ideas	Google Play
37	Z-Greenhouse	English	EmilNeo	Green house ideas	Google Play
38	Virtual Farm Manager	English	Myriad Mobile	Managing your farm	Google Play
39	ifarma	English	Agrostis	Integrated Farm Management Application	Google Play

40	eFarmer	English	eFarmer B.V.	Farm Record Keeping	Google Play
41	AGRIBUDDY	English	AGRIBUDDY LIMITED	farmer's best friend i	Google Play
42	Horticulture	English	Nikhilreddy Gujjula	Horticultural Crops	Google Play
43	Horticultural Crops	English	Mobile Seva	Horticulture	Google Play
44	Horticulture	English	Nikhilreddy Gujjula	Horticulture	Google Play
45	Vegetable Crops	English	Mobile Seva	Vegetable	Google Play
46	Veg Pest ID	English	BreakThrough Apps	Vegetable Pest	Google Play
47	Fruit PestFinder - Western US	English	Utah State University Extension IPM Program	Pests	Google Play
48	Vegetable Farming	English	Qitmir	Vegetable cultivation	Google Play
49	Agriculture Dictionary	English	ERMILOGIC	terms related to Agriculture, Farming	Google Play
50	Learn Agricultural Engineering	English	WAGmob	Agricultural Engineering	Google Play
51	Garden Manager : Plant Alarm	English	LemonClip	Gardening Tool	Google Play
52	Vegetable Doctor	English	Bugwood	Vegetable Pest & Dieseases	Google Play

53	Insecticides	English	WaterMarc Developers	Insecticides in india	Google Play
54	Fertilizer Calcualtor	English	Dr. Vishwanath Koti	Calculate NPK	Google Play
55	Fertilizer Calculator	English	ICAR CCARI	Calculate from soil test data	Google Play
56	Pesticide Calculator	English	ICAR CCARI	Pesticide Calculation	Google Play
57	Fertilizer calculator n2f	English	ICAR CCARI	NPK Calculator	Google Play
58	Seed Calculator	English	ICAR CCARI	Seed Calculator	Google Play
59	Plant Population Calculator	English	ICAR CCARI	Plant Population Calculator	Google Play
60	Farming Calculator	English	SamF	Farm Calculation	Google Play
61	Agronomic Calculator	English	Agrimind	Agronomic calculations	Google Play
62	Fertilizer	English	a1mobi	Fertilizer	Google Play
63	Crop Fertilizers	English	Sismatik	Fertilizer	Google Play
64	Organic Fertilizer	English	Matthew H. Smith	Organic Fertilizer	Google Play
65	SoilInfo App	English	SRIC - World Soil Information	Soil	Google Play
66	Yara CheckIT	English	Check IT	Deficiencies	Google Play

67	Pesticides Database 2016	English	Tekno Soft	Pesticide Information	Google Play
68	Modes of Action	English	Ag PhD	Modes of action of PP chemicals	Google Play
69	Deficiencies	English	Ag PhD	Nutrient deficiencies	Google Play
70	Ag PhD Field Guide	English	Ag PhD	Field Pest	Google Play
71	ID Weeds	English	University of Missouri - Extension Division	Identification of weeds	Google Play
72	Weed ID	English	BASF	Identification of weeds	Google Play
73	Ag Weed ID	English	Penton	Identification of weeds	Google Play
74	Veg Pest ID	English	BreakThrough Apps	identify pests	Google Play
75	PestXpert	English	2 dam creative	ssist professional pest controllers i	Google Play
76	Global Pest Control Training	English	Volkan Temiz	Pest Control	Google Play
77	Aquaponics Guide Aquaculture	English	Appeo.es	Aquaponics	Google Play
78	Agricultural Business	English	Freshvine	Agribusiness information	Google Play
79	RKMP Rice Crop FAQ's	English	Mobile Seva	FAQ	Google Play

80	RKMP M-Learning	English	Mobile Seva	Mobile Learning	Google Play
81	RKMP Extension Tools	English	Mobile Seva	Extension Tools	Google Play
82	Rice Innovations	English	Mobile Seva	Rice Innovations	Google Play
83	RiceXpert	English	National Rice Research Institute	Rice Information	Google Play
84	Rice Doctor	English	LucidMobile	Diagnosis of problems	Google Play
85	Rice Globe	English	VastPotato	Rice Information	Google Play
86	Oilseeds at a Glance	English	Mobile Seva	Oilseeds	Google Play
87	e-kalpa	English	Stegoc Technologies	Coconut	Google Play
88	Agri Precision - Agriculture	English	LEONARDO OM	Prexcision Agriculture	Google Play
89	ICAR-NRCP	English	Pomogranate research centre	Pomoranate	Google Play
90	Cereals Millets	English	Mobile Seva	Cereals & Millets	Google Play
91	IFFCO Kisan Urban Greens	English	IFFCO Kisan	Agriculture	Google Play
92	IFFCO Kisan-Agriculture App	English	IFFCO Kisan	Agriculture	Google Play
93	Spice Garden	English	Vaibhav Mahajan	Spice Garden	Google Play

94	Medicinal plants	English	Radu Savutiu	Medicinal Plants	Google Play
95	Herbal Guide	English	Arkopharma	Medicinal Plants	Google Play
96	Herbalpedia	English	Lionasys	Medicinal Plants	Google Play
97	Mandi Prices	English	Farmobi Technologies	Market Prices	Google Play
98	eFarmer	English	eFarmer B.V	Agriculture	Google Play
99	Hydroponics Manager	English	NECTEC	Hydroponics	Google Play
100	HYDROPONIC HELPER	English	GTRIDER	Hydroponics	Google Play
101	Jain Irrigation MIS Catalogue	English	Jain Irrigation systems Ltd.	Irrigation	Google Play
102	Excellence Irrigation	English	Green Hills Group	Irrigation	Google Play
103	Garden Guide	English	ATZ Software	Garden	Google Play
104	DIY Garden Ideas	English	Doknow	good diy outdoor garden ideas	
105	Home Gardening	English	Sismatik	Garden	Google Play
106	Home Garden Design Idea	English	Atsushila	Garden	Google Play
107	Homegrown with Bonnie Plants	English	Growing Interactive	gardening app for beginning and experienced gardeners.	Google Play

108	Bonsai Trees	English	The Hobby App	Bonsai	Google Play
109	Bonsai Care	English	AndroStudio	Bonsai	Google Play
110	Bonsai Styling	English	AndroStudio	Bonsai	Google Play
111	Flower Arrangement Ideas	English	ZaleBox	Flower Arrangement	Google Play
112	1000 flower arrangements	English	Compucraft	Flower Arrangement	Google Play
113	Flowers	English	byearlina	Flower Arrangement	Google Play
114	Flower Images	English	MillenniumDroid	Flower Arrangement	Google Play
115	Food Pulse	English	Food Pulse Social Food Shopping	Food shopping	Google Play

List of 30 Mobile Apps which will definitely bring significant change in the lives of farmers and agriculture.

S.No	App Name	Download Link
1	**My Agri Guru**	https://play.google.com/store/apps/details?id=com.myagriguru&hl=en
2	**Iffco Kisan**	https://play.google.com/store/apps/details?id=com.IFFCOKisan
3	**Agriplex**	https://play.google.com/store/apps/details?id=com.agriplexindia.agriplexconsumer
4	**Market yard**	https://play.google.com/store/apps/details?id=com.globalfarm.marketyard
5	**Indian Satellite Weather**	https://play.google.com/store/apps/details?id=com.shahul3d.indiasatelliteweather
6	**Zero Budget Natural Farming**	https://play.google.com/store/apps/details?id=com.oyepages.zbnf
7	**Kisan Space**	https://play.google.com/store/apps/details?id=com.kisan
8	**Crop Insurance**	https://play.google.com/store/apps/details?id=in.farmguide.farmerapp.central&hl=en
9	**Mandi Central**	https://play.google.com/store/apps/details?id=com.tradeforsure

10	Machinery guide	https://play.google.com/store/apps/details?id=hu.zbertok.machineryguide&hl=en
11	Uzhavan (Tamil App)	https://play.google.com/store/apps/details?id=agri.tnagri&hl=en
12	Kisan Suvidha	https://play.google.com/store/apps/details?id=in.cdac.bharatd.agriapp
13	Agrowon	https://play.google.com/store/apps/details?id=com.sakal.agrowon
14	Shetkari	https://play.google.com/store/apps/details?id=com.eagleitsolutions.shetkarimitra
15	Kisan Yojana	https://play.google.com/store/apps/details?id=com.purplechai.admin.kissanyojnaapp
16	Krishi Network	https://play.google.com/store/apps/details?id=com.krishi.krishi
17	MSAMB	https://play.google.com/store/apps/details?id=com.msamb
18	e-Gram	https://play.google.com/store/apps/details?id=com.reformist.krushiking001
19	Fasal Salah	https://play.google.com/store/apps/details?id=com.weathersys.agro
20	Farm Bee	https://play.google.com/store/apps/details?id=com.rml.Activities

21	KVSMT	https://play.google.com/store/apps/details?id=com.kvsmt.mobile
22	Coconut expert (Tamil)	https://play.google.com/store/apps/details?id=com.cdac.tnau_coconut_tamil
23	Napanta	https://play.google.com/store/apps/details?id=com.napanta.farmer.app
24	CCMobile	https://play.google.com/store/apps/details?id=com.root.ccmobile&hl=en
25	Bijak	https://play.google.com/store/apps/details?id=com.bedwal.bijak.mvp&hl=en
26	Agromedix	https://play.google.com/store/apps/details?id=com.iqra.agromedix
27	Bajar Bhav	https://play.google.com/store/apps/details?id=com.bajarbhav
28	Agriculture Business	https://play.google.com/store/apps/details?id=com.AgriculturalBusiness3dsp
29	Agri Live	https://play.google.com/store/apps/details?id=agri.live
30	Agri App	https://play.google.com/store/apps/details?id=com.criyagen

TERMS OF REFERENCE FOR EVALUATION OF THE PROJECT ENTITLED "DEVELOPMENT OF SUSTAINABLE PILOT MODEL SEED PLATFORM" IMPLEMENTED DURING THE PERIOD 2017 TO 2020 BY UNIVERSITY OF AGRICULTURAL SCIENCES, BENGALURU.

1. **Title of the study:**

Development of sustainable pilot model Seed platform

2. **Department/Agency implementing the scheme:**

National Seed Project, University of Agricultural Sciences, GKVK, Bengaluru

3. **Background and the context:**

The project was sanctioned under the Rashtriya Krishi Vikas Yojana (RKVY) which is a state plan Scheme of Additional Central Assistance launched by the Government on India under the aegis of the National Development Council, which seek to achieve 4% annual growth in agriculture by incorporating information on local requirements, geographical /climatically conditions, available natural resources/ technology and cropping pattern in districts so as to significantly increase the productivity of the Agriculture. Under this scheme several projects are being implemented with the aim of innovative new technology in agriculture for enhancing agricultural productivity

The University of Agricultural Sciences Bengaluru is implementing good number of RKVY projects in different disciplines. Development of Sustainable pilot model seed platform is one such project, which was sanctioned during 2017.

Designing appropriate seed systems to meet the specific challenges it demands clear identification of needs and strategies. Therefore, strengthening of the seed system at community level should involve all possible aspects of modern seed activities. In order to strengthen the seed delivery system, interventions are required to strengthen informal seed supply systems, such as establishing model seed platform with different channels for effective seed system. This can also improve the seed availability and access to improved varieties of seed to small and resource poor farmers and thereby increasing their income level and livelihood, which in turn improves the socio-economic status of farmers.

4. **Present status of the Project:**

To strengthen the seed delivery system and improve the socio-economic status of the farmer the above project was implemented from 2017-2020 at National Seed Project, UAS, Bengaluru.

The project was implemented in systemic manner by gathering information from Farmers, Dealers, Private and Public seed sectors as per the formats/schedules prepared. Developed a webpage and Mobile App (Beej Aadhar) in both Kannada and English languages. Collected information on private and public seed company data (company name, place, category, crop, variety, features, class of seeds, quantity of seeds, region, season, cost of seeds per quintal, seed rate, package of practices, source of seeds/dealers, contact person, supplying area of seeds, seed production area etc.,), farmers (it includes farmer name, address, seed category, crop, variety, growing since, season, to whom they produce, post harvesting methods, procurement cost etc.,), Dealers (Dealer name, address, seed category, crop, variety, class of seed, cost of seed etc.,), community seed bank (farmer name, address of farmer, location, state, area, crop group, variety, season, available for sale, quantity of seed available, cost, methods following for germination, seed storage techniques, award name etc.,), package of practices of all the crops (introduction of crop, method of cultivation and management, mechanization, insect and disease management, harvest and post-harvest management etc.,) and advance technologies of all the crops. All the collected information has been updated to the app. In addition to seed stake holders details we had also updated Package of practices and Advance technologies recommended from University of Agricultural Sciences, Bengaluru. Information related to traditional variety conservers and awardees were also updated in the app. We have launched the app during krishi mela by Chief Minister and also conducted Seed day cum workshop for the popularisation of the app. Now we are planned to conduct training programme at KVK level.

5. **The Objectives:**
   1. To provide a common platform for the seed producers, consumers and seed stakeholders for furtherance of the sustainable agro production system.
   2. To develop and update the data base of all the private and public sector seed producers, organizations and their products (Varieties/ Hybrids) details/performance etc.,
   3. To have data base of region-wise and season-wise growers/cultivators/different stakeholders of seed.
   4. To establish linkages with seed producers, growers, seed dealers and all seed stakeholders including farmers.
   5. To arrange interaction meetings at periodical intervals for effective functioning.
   6. To arrange technical know-how, do-how, timely guidance and technical expertise/inputs for successful crop harvest.
   7. To provide market information on regular basis.
   8. To promote formation of farmer's producer's organizations/companies for easy access of seeds to the end users.
   9. Any such other objectives as deem fit for smooth functioning of the platform.

6.   Evaluation questions and minimum expectations:

1. How this app is helpful to seed stakeholders and farming community?
2. How many people are registered and using this app?
3. How this app bring all the seed stakeholders to one platform?
4. Have farmers accessed new varieties through this app?
5. Have the farmers are benefited from this app?
6. Whether the seed stakeholders are updating the data frequently?
7. Whether the information updated in the app is authenticated?
8. Have the farmers adopted the advance technologies recommended in the app?
9. Have the farmers are using package of practices recommended in the app for seeds production?
10. What is the extant of awareness created among the seed stakeholders?
11. What are the arrangements made for further continuation/ running of the app after completion of the project?
12. Have the farmers adopted ICT's application in agriculture?
13. Have the farmers gained knowledge on application of app?
14. Have the farmers realized the importance of the app?
15. Have the private and public seed stakeholders are succeeded in getting progressive farmers for quality seed production?
16. Have the farmers are promoted to conserve the tradition varieties by this app?
17. Have farmer accessed traditional varieties through this app?
18. Have seed companies benefited by using this app to reach remote areas?
19. Have the farmers are using pest and disease control measures mentioned in the app?
20. Have seed companies/seed dealers/seed enterprisers benefited by this app to spread new varieties seeds to farmers?

7.   Evaluation methodology and sampling:

1. Interaction with Co-ordinator and Principal Investigators to seek information
2. The evaluation should be undertaken at National Seed Project, GKVK campus, Bengaluru
3. The Beej Aadhar app and app information is to be inspected and evaluated for its utility
4. Response of the app beneficiaries *viz.,* farmers, dealers and seed stakeholders is to be documented

8.   Deliverables:

A detailed report of the impact of the project on seed stakeholders needs to be submitted.

9.   Duration and time schedule for the study:
The task should be completed in **3 months**

- Discussion with Principal Investigator
- Discussion with farmers and seed stake holders
- Preparation of draft report
- Presentation of draft report
- Final report to be submitted before the end of 3 months

10.   Quality expected from the Evaluation report:
The report should highlight the following

1. The importance of Beej Aadhar app as projected through the project implementation
2. The impact of application of the app by seed stakeholders
3. The impact of Beej Aadhar app in agriculture

11.   Recommendations:
Specific recommendations leading to policy changes in proper maintenance of the app by frequent updation of data by seed stakeholders shall be usefull

12.   Cost and Schedule of budgets:
The budget would be released as follows

1. The first instalment of consultation fee of 30% of the total fee shall be paid as advance to the consultant after the approval of the inception report, but only on execution of a bank guarantee of a schedule nationalized bank valid for a period of at least one month from the date of receipt of advance.
2. Second instalment of consultation fee of 50% of the total fee shall be payable to consultant after the approval of the draft report.
3. Third and final instalment of consultation fee amounting to 20% of the total fee shall be payable to the consultant after the receipt of hard and soft copies of the final report in the format and the number as prescribed in the agreement along with all original documents.
4. Tax will be deducted from each payment as per the rates in force; in addition the evaluator is expected to pay statutory Taxes at their end.

13.   Minimum qualification of the consultant:
Consultants should have and provide details of evaluation team members having technical qualification/capability as below.

1. Post graduate in agriculture and allied sectors having knowledge of Seed Science and technology and computer science
2. Research assistant with good data processing skills

3. And in such numbers that the evaluation is completed within three months of the schedule time prescribed by in the TOR. Consultants not having these number and kind of personnel will not be considered as competent for evaluation.

14. Providing oversight:

Government of Karnataka, RKVY cell will provide the funds and oversight for the study. All technical aspects of the study are subjects to their approval.

15. Contract persons:

Dr. S. Rajendra Prasad, Vice chancellor, University of Agricultural Sciences, Bengaluru-560065. is the Principal Investigator but **Dr. K. Vishwanath**, Associate Professor, University of Agricultural Sciences, Bengaluru-560065, Mobile no.: 9108925969, E.Mail ID: seedplatform17@gmail.com & vishwakoti@gmail.com will be the contact person for giving information and details for the study.

Farmers, dealers and seed stakeholders reference list for evaluation

1. List of farmers benefited from the app:
a. Nagesh, Thorebeerahalli, Challakere, Mobile no.:8861235295
b. Srikantawmy, Maddur,Mandya dist., Mobile no.:9844883203, 702299332
c. Hemanth, B Hosahalli,Mandya dist., Mobile no.:9945643770
d. Anand,K.R.Pete., Mobile no.:9902521774
e. Madhu, Kikeri, Mobile no.:9972452502
f. Hariprasad, mobile no.:8971116269, 9739826599
g. Manju, Mobile no.:9880643345
h. Jayakumar, Mobile no.:9945067357
i. Chandrashekar, Bagepalli, Mobile no.:9963370580
j. Hanumanna, Kaparahalli, Challaker, Mobile no.:9972078485
k. Nagaraju, Ghati, Doddaballapura, Mobile no.:9731959119
l. Shivananda, Hemdore, Sira, Mobile no.:866071206, 9945791104
m. Siddeshwarareddy, Meerasaba halli, Challakere, Mobile no.: 8152938906, 9113814460
n. Ashwatha reddy, Rajana kunte, Yalahanka, Mobile no.:9342879330
o. Junje gowda, Sakkara, Hiriyur, Mobile no.: 9901285507
p. Shivanna, Allalsandra, Benagluru, Mobile no.:9845440599
q. Muralidhar, Gundammagere, Mobile no.:8660648615

2. List of dealers benefited from the app:
a. Manjunath, Mobile no: 9164151590, East Point Seeds, 297 BTB Area 13 th cross, B main, Thilak nagar, Jayanagar, Bengaluru

b. Shobha R & Devaraju T V,Mobile no.: 8904491110, 7411105516, Shree Veershwara Agro Center, Marasandra, Doddaballapura main road, Banglore north, Dodda thumkur post

c. Murthy Y , Mobile no.: 9986000905, M/S Sumo Agro Agencies, Sree Balaji lodge building, near new bus stand, Vijayapura

d. Muniswami gowda , Mobile no.: 8970901787, Naveen Agro Service, BB road, Beside HDFC bank, Devanahalli-562110

e. K G Purushotthama, 9066555752, Shri Raghavendra traders, Magadi, Kempegowda circle, Ramanagara dist.

f. K H Paramashivaiah, 9986984580, Sri Gangadhareshwara fertilizer, Kiran agencies, Rammandira road, Kadur, Magadi taluk and Ramanagara dist.

g. Mahadeva T M , 9620568775, Krushik Agro Centre, No. 12, SJC college complex, J C ROAD, Channapatna.

h. Shivkumar, Mobile no.: 9986841342, Sahara Agri Genetics, # 1401, Kuvempu main road, Hebbal, Dasarahalli   etc.,

3. **List of private sector people benefited from the app:**
   a. CP seeds Pvt Ltd.
   b. Namdhari seeds Pvt Ltd.
   c. Arunodaya agro seeds Pvt Ltd.
   d. Eldorado agritech Pvt Ltd.
   e. Siri seeds Pvt Ltd.
   f. UPL Pvt. Ltd.
   g. Penna seeds Pvt Ltd. etc.,

4. **List of public sector people benefited from the app:**
   a. National Seed Corporation, Bengaluru
   b. National Seed Project of all the Agricultural universities
   c. Karnataka Oil Federation
   d. Department of Agriculture etc.,

EVALUATION TEAM MEMBERS

Sl. No.	Name	Designation
1	Dr. M. A. Shankar	Principal Investigator
2	Dr. B. C. Suryanarayana	Associate Investigator
3	Sri. Siddaraju	Associate Investigator

Dr. M. A. Shankar is a doctorate in Agriculture with specialization in Agronomy. He is former Director of Research, University of Agricultural Sciences, Bengaluru and presently the Executive Member of Institution of Agricultural Technologists, Bengaluru and Co-Chairman of Agribusiness Consultancy Subcommittee. He has implemented 51 research projects for the University funded by International organizations, Central and State governments, Private firms. He has guided 6 Ph. D. students and 15 M. Sc., (Agri) students. As Dean of College of Agriculture, Hassan, he has, with his administrative skills, streamlined accounting, financial, academic and administrative issues. He has been involved in review and evaluation of Technical Reports of 32 All India Co-ordinated Research Projects (AICRP) spread all over India. He has also evaluated 11 operational research projects for the technical feasibility and implementation. He has published 173 peer reviewed research papers. He has also penned 54 booklets and books for the University. He has vast experience in evaluation studies of projects.

Dr.Suryanarayana, B.C. is a doctorate in Agriculture with specialization in Agronomy and is a Certified Associate of Indian Institute of Banking (CAIIB), Fellow of Indian Institute of Valuers. He worked in State Bank of India from the year 1981 to 2014 as a Technical Officer and retired as Asst. General Manager (Rural Development). He is a practicing consultant in the field of Agriculture, Horticulture, poultry, dairy, fisheries and plant tissue culture and covered cultivation. He has about 35 years of experience in the field and has prepared several project reports for financial institution, written books in vanilla cultivation, anthurium, medicinal and aromatic crops, minor irrigation, poultry and dairy farming. He has appraised more than 6,000 proposals in agriculture and related fields for funding by the Bank and has also been involved in many studies relating to development of Agriculture and allied activities. He has served as a General Manager in a bio-fertilizer, bio-pesticides and organic manures manufacturing company and is also a Technical Director in a company involved in manufacture of agricultural implements and equipment.

Sri. Siddaraju is a Graduate in Agriculture with more than 35 experience in the field of Agriculture. He has served in the Karnataka State Department of Agriculture (KSDA) as Asst. Agricultural Officer in Farmers' Training and Education Centre, Soil Testing laboratory and as Subject Matter Specialist. He was Deputy Director of Agriculture (Commercial Crops) for 6 years, District Watershed Development Officer for 2 years. He has also been Joint Director of Agriculture (Inputs) for 5 years. He was involved in preparation of Annual Programme Planning booklets pertaining to Agricultural Inputs in Department of Agriculture. After retirement, he is serving as Chairman, Agriculture Consultancy Subcommittee, Institution of Agricultural Technologists, Bengaluru and has been actively involved in evaluation studies of projects.