e-Book

A compendium of Good Practices and Extension Models

Bihar Agricultural University
Sabour (Bhagalpur) Bihar

A compendium of

Good Practices and Extension Models

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Foreword

It is with immense pride and profound appreciation that I introduce this compendium on “Good Practices and Extension Models." This compendium is a testament to the unwavering commitment of Bihar Agricultural University to transform and elevate the lives of our fellow citizens, particularly those engaged in agriculture. Bihar, a state with a rich agricultural heritage and a significant portion of its population dependent on farming, has long faced the challenges of fragmented landholdings, low agricultural productivity, and the need for a consistent income source for its rural communities. At Bihar Agricultural University, Sabour, we have taken it upon ourselves to address these challenges head-on and stimulate agricultural growth in the state.

This compendium showcases the innovative, pioneering, and successful extension models and approaches developed and implemented by our dedicated team of professionals. Each chapter within these pages delves into a unique facet of our extension efforts, ranging from the "Kisan Choupal", “ICT based Extension Model”, that bridges the gap between farmers and scientists to the "Community Animal Health Centres" ensuring affordable and accessible animal health services. These models and approaches have been carefully crafted to enhance agricultural knowledge, technology transfer, and sustainable practices while contributing to the prosperity of our farming communities.

The success of these extension models is a result of the tireless dedication of our faculty, researchers, and extension professionals who have worked relentlessly to bring agricultural information and technology to the doorsteps of our farmers.

I encourage all stakeholders, from policymakers to fellow agricultural institutions, farmers, and students, to explore the wealth of knowledge and experience within these pages. Together, we can continue to innovate and collaborate, working towards the betterment of Bihar's agriculture and the prosperity of its people.

Dr. D R Singh
Vice Chancellor

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सत्यमेव जयते

प्रशासनिक सुधार और लोक शिकायत विभाग

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शैक्षिक/अनुसंधान संस्थाओं द्वारा नागरिक केन्द्रिक सेवाओं में उत्कृष्ट शोध

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राष्ट्रीय ई-गवर्नेंस पुरस्कार, **2019-2020**

(रजत)

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Preface

We are honored to present this compendium entitled " Good Practices and Extension Models " a collection of innovative agricultural extension models and approaches that have been instrumental in reshaping the agricultural landscape of Bihar.

Bihar, a state with a predominantly agrarian economy, has faced unique challenges, including fragmented landholdings and low agricultural productivity. It is our collective belief that innovation and adaptation are key to overcoming these challenges and driving sustainable growth in the agricultural sector.

The chapters in this compendium reflect the tireless efforts of our dedicated team at Bihar Agricultural University, Sabour. These chapters delve into a diverse range of extension models, from the "Kisan Choupal" and ICT based Approaches towards fostering a strong connection between farmers and scientists, “Apni Kyari Apni Thali” to combat malnutrition among rural woman and children to the "System Approach Extension Model for Popularizing Grass Pea (Lathyrus sativus L) Cultivation under Climate Resilient Agriculture in Bihar." Each of these models has been carefully developed to address specific agricultural needs, enhance knowledge dissemination, and empower our farming communities.

Through the years, Bihar Agricultural University, Sabour, has grown into a dynamic institution that values research, extension, education, and training equally. Our commitment to the betterment of Bihar's agriculture and the livelihoods of its people remains unwavering.

We extend our deepest appreciation to the contributors of different models and the KVK personnel who have shared their expertise and experiences within these pages. It is their dedication and innovative spirit that have fueled the success of these extension models and approaches. We would also like extend sincie gratitude all our valuable partners including Department of Agricultue, Govt. of Bihar, ICDS, Govt. of Bihar, UNICEF, ATARI, Patna and COMFED

We hope that this compendium serves as a valuable resource not only for fellow institutions, researchers, and policymakers but also for the farmers who are at the heart of our agricultural endeavors. Together, we can continue to drive positive change in the field of agriculture, ensuring prosperity and sustainable growth for the state of Bihar.

Editors


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New Delhi
Secretary

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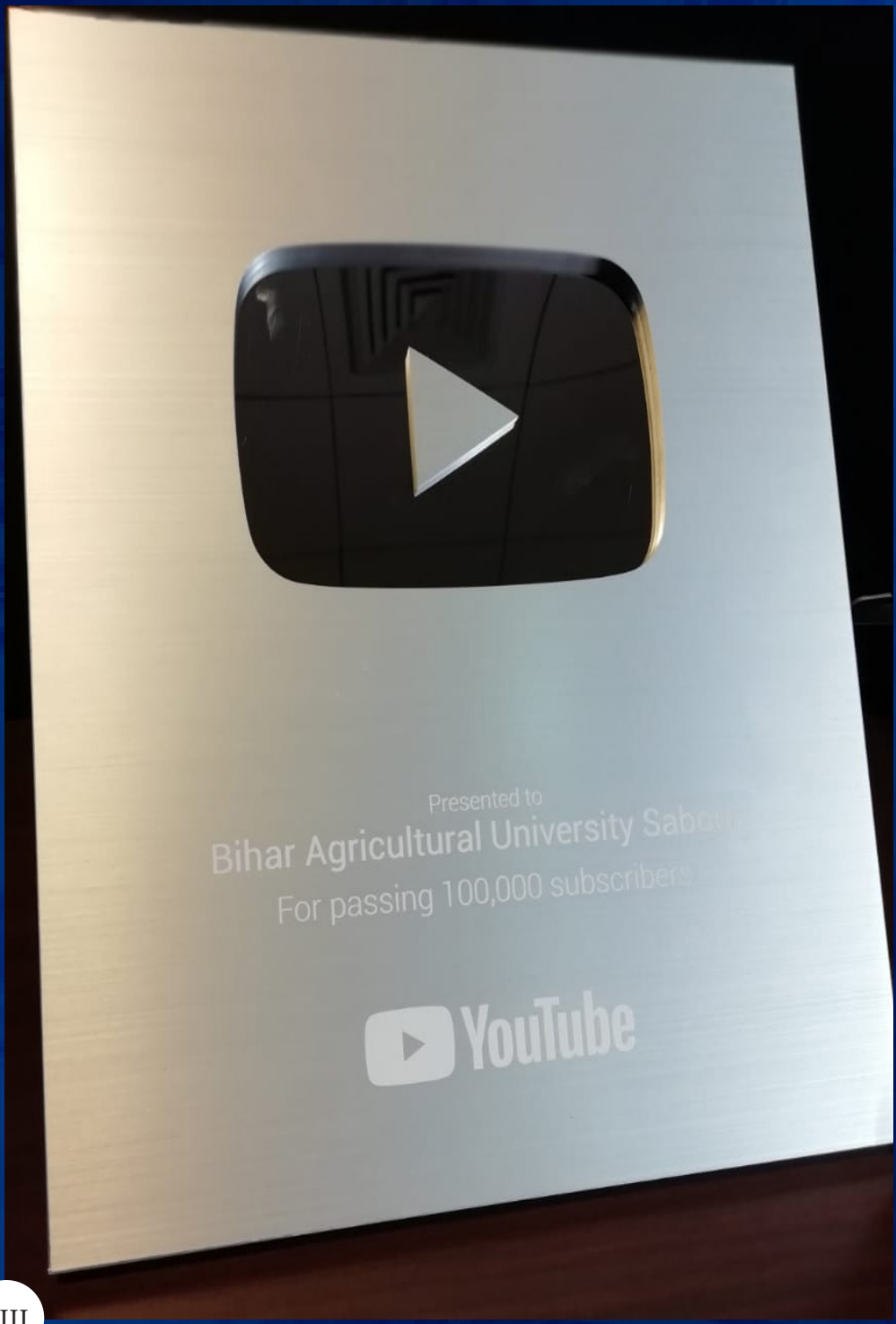
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CHAPTER -1

Agricultural Extension at Bihar Agricultural University: An Overview

Agricultural Extension at Bihar Agricultural University: An Overview

Bihar, with a total population of 104 million, is the third most populated state in India having 2.9 per cent of the total geographical and about 9 percent of its total population. The majority of the population in Bihar state is dependent on agriculture for its livelihood. About 51 percent of the household directly involved in farming of which 91 per cent are small and marginal farmers with 57 percent of the operated landholdings. The fragmented landholdings and low productivity of human labour continue to be the characteristic feature of rural Bihar. The continued involvement of the rural population in farming requires a steady flow of income from agriculture and allied activities.

A defining feature of rural Bihar is the fragmented nature of land ownership and the relatively low productivity of human labour in agricultural activities. This has long been a characteristic of the state. The continued involvement of the rural population in farming is heavily dependent on a consistent income from agriculture and related pursuits. Agriculture plays a crucial role in Bihar's economy, contributing around 18 percent to the state's Gross Domestic Product (GDP). Despite its abundant natural resources, Bihar, like several other eastern Indian states, did not fully benefit from the country's green revolution, a period of increased agricultural productivity. To address these challenges and stimulate agricultural growth, Bihar initiated a series of proactive measures, including the implementation of an Agricultural Road Map designed to boost the agricultural sector.

In the given context, Bihar Agricultural University, Sabour, stands out as a pivotal institution. Its establishment on August 5, 2010, was driven by a clear and focused mission, encapsulated in four primary objectives: Agricultural Education, Research, Extension, and Training. Since its inception, this university has played a significant role in driving the state's agricultural growth.

Over the past decade, Bihar's GDP has seen substantial growth, with the state's economy expanding at a remarkable rate of over 10 percent annually. Notably, the agriculture sector has been a key contributor to this economic progress.

Bihar Agricultural University, with its historic headquarters at Bihar

Agricultural College, is an institution with a comprehensive reach. It encompasses 10 Academic Units,12 Research Units and 22 Extension Units known as Krishi Vigyan Kendras strategically distributed across three distinct agro-ecological zones within the state of Bihar.

A pluralistic Agricultural Extension System

Bihar Agricultural University has a robust extension network through its 22 Krishi Vigyan Kendras (KVK) catering to more than 50 percent of the state's farming community. Since its inception the university has thrived to establish a sustainable pluralistic system of extension that can serve the technological needs of the farming community as well as establish a strong feedback system with the help of academicians and researchers. The Zonal Research and Extension Advisory Committee (ZREAC) at each Agroecological zone serves as a nodal link between Research and Extension. The ZREAC platform offers a unique opportunity to bring in farmers, researchers and extension functionaries to discuss emerging problems and offer a technical solution to farmers as well as to develop research programs. The KVKs are an important grassroots unit of the university that offers evidence-based solutions to the farm problems as well as helps in the transfer of technology. Apart from that, the university has embraced emerging ICT tools for the acceleration of technology transfer.

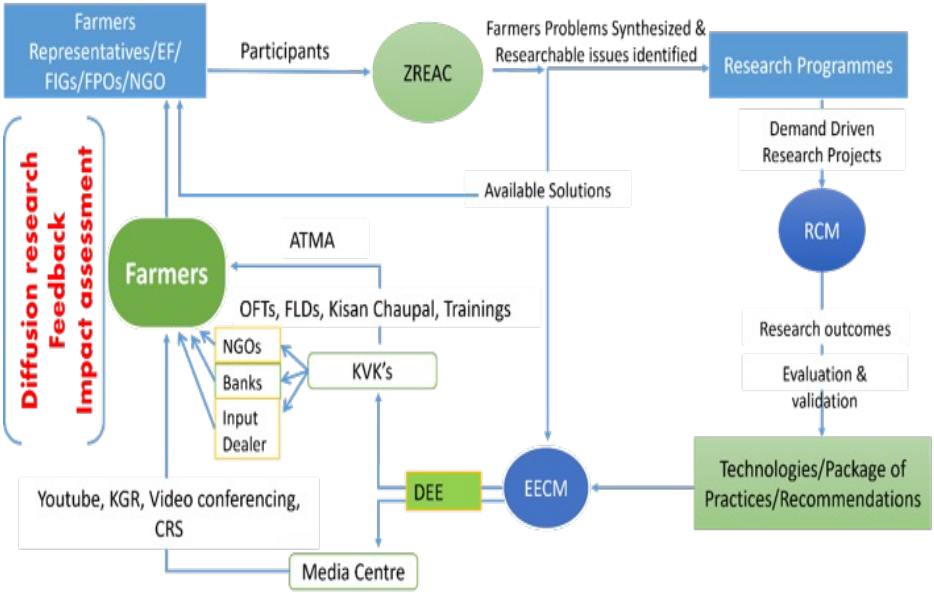

Fig. 1.1 Representation of Pluralistic extension system at BAU, Sabour

Bihar Agricultural University, Sabour has developed and embraced several novel approaches and models in the area of agricultural extension to reach the farming community. The successful innovative approaches, models, and good practices of the agricultural extension at BAU, Sabour include,

- Kisan Choupal: An Innovative Model Bridging the Farmer-Scientist Divide
- ICT based Extension Model for Enhanced Technology and Information Delivery
- Bringing Agricultural Information to Farmers' Doorsteps: The Kisan Gyan Rath Initiative
- ANKURAN model for nutritional security and attractive future generations towards agriculture
- Apni Kyari Apni Thali (AKAT): A model for enhancing nutritional security of rural woman and children
- Community Animal Health Centers (CAHC) for creation of affordable & accessible animal health services
- System Approach Extension Model for Popularizing Grass Pea (Lathyrus sativus L) Cultivation under Climate Resilient Agriculture in Bihar
- A model for efficient utilization of paddy straw to avoid crop residue burning and also for providing additional income to farmers

CHAPTER - 2

Kisan Choupal: An Innovative Model Bridging the Farmer-Scientist Divide

Kisan Choupal: An Innovative Model Bridging the Farmer-Scientist Divide

Introduction

The SAUs have limited human resources, especially trained experts, to cater the increasing needs of a large number of farmers. For the University with few hundred scientists, it is difficult to meet the expectations and needs of more than 8 million farming households. Similarly, with limited Cosmo politeness, it is also difficult for the farmers to locate and reach to the agricultural scientists, experts and extension agents. This has created a large gap between scientists and farmers which questions the justification of running such a huge extension system across the country. Considering this issue in hand, the Kisan choupal model was proposed wherein the group of expert scientists from Bihar Agricultural University and its constituent KVKs will visit the a pre-determined village, on pre-determined date with pre-determined purpose of addressing farm production problems of the village by answering the queries of farmers. The Bihar Agricultural University started "Kisan Choupal" on April 28, 2012, in collaboration with 21 Krishi Vigyan Kendras (KVKs) and 6 constituent colleges of the university with the following mandates:

- To strengthen linkage between scientists and farming community and provide science-based information at famers' doorsteps.
- To revive the tradition of Kisan Choupal existing in the ancient times to help farmers solve their problems on their own at their place.
- To collect feedback and/or researchable issues from farmers' fields and communicate to the researchers for further formulating research priorities.

The Kisan Choupal model is a groundbreaking initiative designed to facilitate closer interaction between farmers and scientists, thereby strengthening the interface between these two critical stakeholders.

Impact of the initiative

The Kisan Choupal initiative has yielded promising results, contributing significantly to improved technology adoption and fostering a stronger connection between the university and farmers. Farmers in Bihar have enthusiastically embraced the Kisan Choupal, as it equips them with firsthand knowledge of various crop management practices. Some farmers have been inspired to venture into agri-based entrepreneurship, further boosting agricultural productivity in the state. An impressive total of 9,873 Kisan Choupals have been organized, benefiting a substantial 6,31,668 farmers by the end of the 2019-20 fiscal year. The Department of Agriculture, Government of Bihar, has recognized the value of the Kisan Choupal model, incorporating it as one of its flagship programs to engage with and support farmers. To underscore the government's commitment, a budget of Rs. 184.9 lakh has been allocated for the implementation of Kisan Choupals throughout the state.

Since its inception on April 28, 2012, Kisan Choupals have made a substantial impact. Over the years, it has engaged a considerable number of participants, with both male and female farmers, as well as extension workers, actively involved. The cumulative reach and coverage over the years have been significant, with a total of 310,786 participants benefiting from these events. The initiative has not only fostered interest but also prompted action among farmers (Table 1). Due to COVID pandemic the Kisan Chaupal programme was affected. To combat the same the university has stated an innovative approach to engage with farmers by initiated, e-Kisan Chaupal through various virtual platforms including Youtube and other social media. A systematic schedule of Programmes were organized including, agriculture, horticulture, fisheries, poultry, livestock production etc. A total 119013 farmers were reached with help of e-chaupal during the pandemic period (Table 2)

Table 1. Details of Kisan Chaupal programmes carried out at BAU, Sabour

Year	Total No. of Kisan Choupal/ e-kisan Chaupal held	Male Participants	female Partici-pants	Exten-sion Worker	Total
2012-13	1176	56316	15093	3277	74686
2013-14	1200	66419	7821	1805	76045
2014-15	1200	65492	11862	1436	78790
2015-16	1372	61241	18834	1190	81265
2016-17	1392	56408	10724	4721	71853
2017-18	1204	66119	14958	2061	83138
2018-19	1199	50634	20066	10575	81275
2019-20	1130	54832	21752	8032	84616
Total	**9873**	**422629**	**121110**	**33097**	**631668**

Table 2. Details of e-Kisaan Chaupal organized during 2020-2021

Sl. No.	Date	Topic	No. of Beneficiaries
1.	12-11-2020	e- मत्स्य चौपाल	3258
2.	18-11-2020	e- उद्यान चौपाल	2472
3.	24-11-2020	e- किसान चौपाल	95
4.	27-11-2020	e- पशुपालन चौपाल	2630
5.	05-12-2020	e- मत्स्य चौपाल	2431
6.	11-12-2020	e- उद्यान चौपाल	2195
7.	19-12-2020	e- किसान चौपाल	4400
8.	28-12-2020	e- पशुपालन चौपाल	3980
9.	06-01-2021	e- मशरूम चौपाल	7376
10.	11-01-2021	e- चौपाल औषधीय पौधों की खेती	5526
11.	21-01-2021	e- किसान चौपाल	2538
12.	28-01-2021	e - मधुमक्खी पालन चौपाल	5145
13.	05-02-2021	e- मत्स्य चौपाल	16382

14.	11-02-2021	e- पशुपालन चौपाल	7156
15.	17-02-2021	e- उद्यान चौपाल	4182
16.	26-02-2021	e- किसान चौपाल	1475
17.	08-03-2021	e- महिला सशक्तिकरण चौपाल	4007
18.	15-03-2021	e- उद्यान चौपाल	3873
19.	20-03-2021	e- किसान चौपाल	2741
20.	05-04-2021	e- पशुपालन चौपाल	4221
21.	07-04-2021	e- मत्स्य चौपाल	4128
22.	15-04-2021	e- पशुपालन चौपाल	2732
23.	22-04-2021	e- उद्यान चौपाल	2483
24.	29-04-2021	e- किसान चौपाल	1691
25.	07-05-2021	e- कृषि अभियंत्रण चौपाल	2967
26.	21 -05-2021	e - पौधा संरक्षण चौपाल	1558
27.	28-05-2021	e- उद्यान चौपाल	2643
28.	04-06-2021	e- साधन संरक्षण तकनीक चौपाल	1887
29.	14-06-2021	e- पशुपालन चौपाल	3311
30.	18-06-2021	e- भूमि जल संरक्षण एवं प्रबंधन चौपाल	3308
31.	25-06-2021	e- मत्स्य चौपाल	6222
Total No. of farmers benefited			**119013**

Operational Model of Kisan Chaupal

The Kisan Choupal operational model is designed to achieve various objectives, including:

- ❖ Strengthening the link between scientists and the farming community by delivering science-based information to farmers at their doorsteps.
- ❖ Reviving the tradition of Kisan Choupals from ancient times, enabling farmers to solve their agricultural problems locally.
- ❖ Collecting feedback and researchable issues from farmers' fields and conveying them to researchers to shape research priorities.
- ❖ Providing area-specific, demand-driven information to farmers.
- ❖ Facilitating collaboration with different agencies working at the grassroots level.
- ❖ Motivating people through the use of scientific and technical videos on cropping practices and related activities.

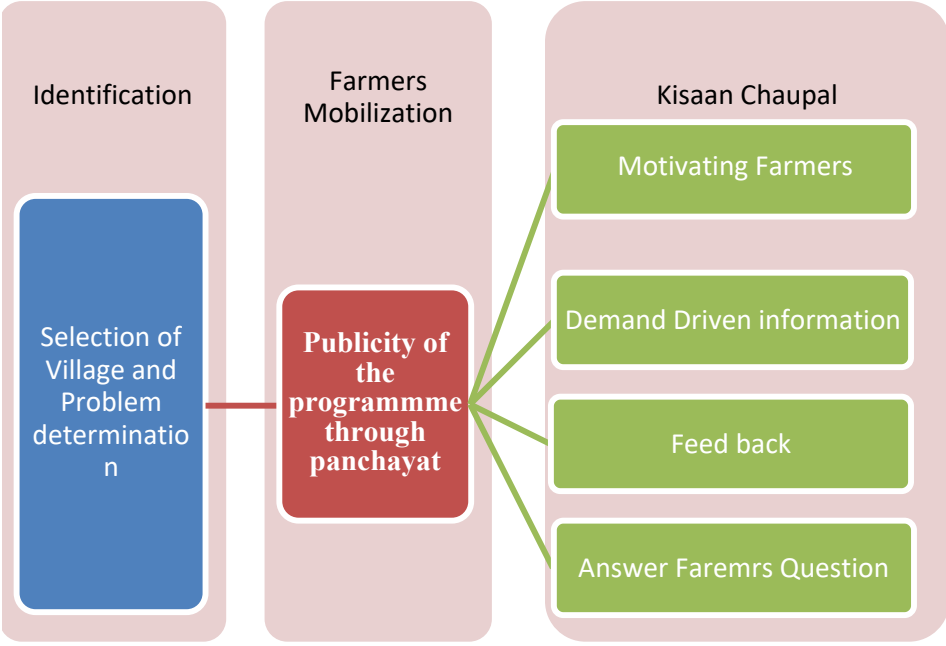

Figure 2.1. Operation Model of Kisaan Chaupal

Recognition of the Model

The success and potential of the Kisan Choupal program have not gone unnoticed. The Government of Bihar has embraced the model to enhance interaction between extension workers of the State Agricultural Department and farmers. Furthermore, the innovative extension methodology has received commendation from prestigious institutions such as the Indian Council of Agricultural Research (ICAR) in New Delhi and the National Institution for Transforming India (NITI Aayog), a policy think-tank of the Government of India.

Conclusion

The Kisan Choupal model has proven to be a powerful tool in bridging the gap between farmers and scientists. By directly connecting experts with farmers, this initiative has successfully facilitated technology transfer and knowledge dissemination in the agricultural sector. Its impact has been recognized and embraced by the government, and its effectiveness has garnered appreciation at the national level. Kisan Choupal is not just a program; it's a transformative model that has the potential to shape the future of agriculture in Bihar and beyond.

Considering the potential of the model the Govt. of Bihar has adopted the model to enhance the farmer-scientist interaction in the state. Since 2021, the Kisaan Chaupal is being conducted as regular programme across all the districts of Bihar by Department of Agriculture in collaboration with university and KVK's.


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CHAPTER - 3

ICT based Extension Model for Enhanced Technology and Information Delivery

ICT based Extension Model for Enhanced Technology and Information Delivery

Introduction

Bihar is a state in India with a high population density of 1102 people per sq. km. Agriculture is a major sector in the state, employing around 75% of the workforce and contributing 35% to the GDP. One of the main challenges facing the agricultural sector in Bihar is the slow adoption of technology, particularly in rural areas. This is further hindered by poor connectivity and communication infrastructure, with less than half of villages connected by roads and limited access to trained extension personnel. Improving technology dissemination and providing real-time crop production advice to farmers could help increase the growth rate of the agricultural sector and improve livelihoods for farmers in the state.

One major bottleneck in the transfer of agro-technology is the inability to reach every farmer in a short period of time. The use of information and communication technology (ICT) tools in agricultural extension is a promising solution and has the potential to be applied in various areas of agriculture. The scientific advances in the field of information and

communication technology (ICT) sector have brought revolutionary changes in several sectors. Bihar Agricultural University, Sabour has rolled out several ICT enabled innovative agriculture extension approaches to reach out to the farming community on real time basis in line with the national initiative of Digital India. The university team could able come up with innovative blend of ICT tools to solve the specific problem of technology dissemination. The present project has been initiated with following objectives,

- ❖ To develop a sustainable module of ICT based information and technology delivery to the farmers of Bihar
- ❖ To develop farmers friendly audio-video content for faster dissemination of technology
- ❖ To enable accelerated growth agriculture through enhanced technology delivery through ICTs

Design of the ICT based Extension Model

Considering the need for faster dissemination of the available technologies to each and every farmer especially to connect the youth to the latest information on the farm technologies, Bihar Agricultural University, Sabour with the help Rashtriya Krishi Vikas Yojana (RKVY) has rolled out several innovative agriculture extension approaches to reach out to the farming community on real time basis. The latest Information and Communication Technology (ICT) was successfully employed in the form of *mobile advisory services, video conferencing, drones in agriculture, community radio service, videos through SD cards and agricultural technology dissemination through social media.*

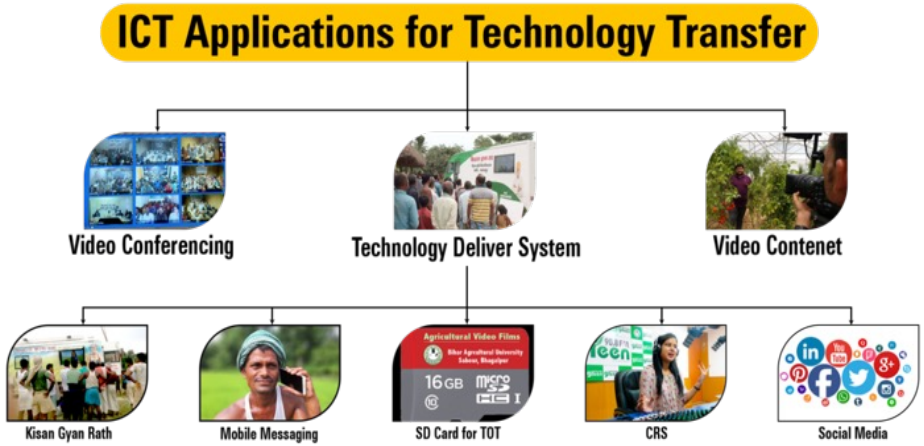


Fig. 3.1 Schematic Representation of ICT based Extension Model of BAU, Sabour

Components of ICT based Extension Model

1. Digital Choupal: Real time Farmer-Scientist Interface

In the rural agricultural landscape, reaching out to farmers in remote areas has always presented a significant challenge. The isolation of these communities often results in limited access to the latest agricultural knowledge and practices, hindering agricultural development. However, Bihar Agricultural University, Sabour, has ingeniously tackled this problem by introducing videoconferencing facilities at every Krishi Vigyan Kendra (KVK) under the university's jurisdiction. This technological innovation has substantially reduced the barriers of distance, providing farmers in remote regions with direct and real-time access to agricultural experts and scientists. It has transformed the landscape of agricultural outreach by making the exchange of knowledge more dynamic, efficient, and cost-effective. This approach has enabled farmers to receive expert guidance without the need for extensive travel, saving both time and resources.

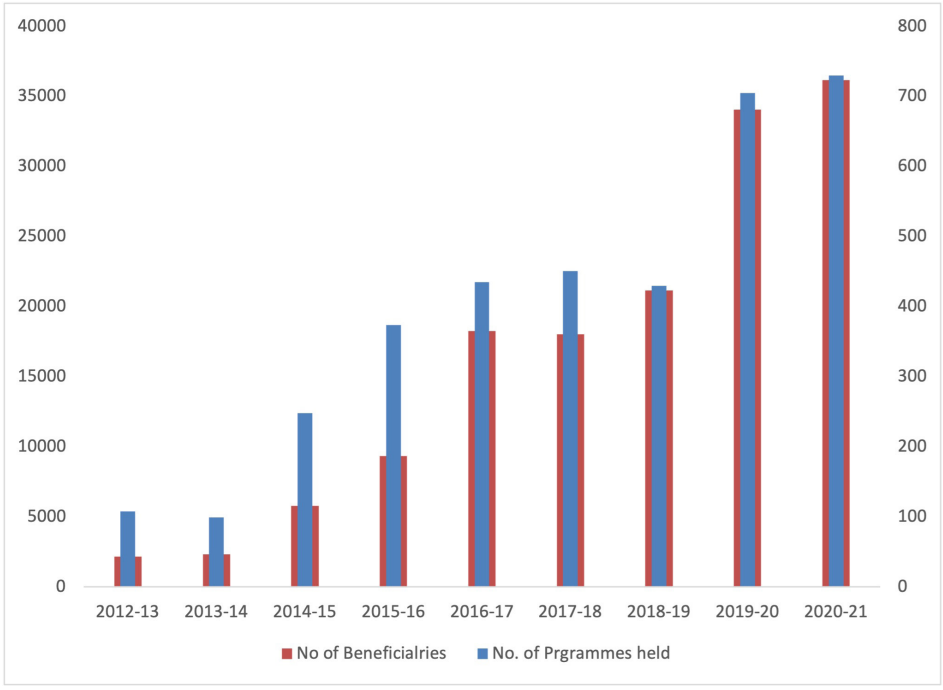
Moreover, the videoconferencing initiative has led to an increasingly tailored approach to training sessions. These sessions are designed to meet the specific agricultural needs of different regions and seasons, ensuring that farmers receive guidance that is most relevant to their circumstances. This personalized approach enhances the effectiveness of the training and ensures that farmers are equipped with practical knowledge in various agricultural domains. The range of topics covered in these videoconferencing sessions is extensive, encompassing critical areas such as weed management, poultry

vaccination, orchard management, goat farming, nutrient management, and mushroom cultivation.

One of the significant achievements of this initiative is its comprehensive coverage. It has successfully connected with all 20 Krishi Vigyan Kendras and 6 colleges within the university's jurisdiction, ensuring that a vast network of farmers can benefit from this transformative approach. The program hosts four videoconferencing-based training sessions each day, with each session accommodating approximately 100 farmers. These sessions also incorporate practical demonstrations, outdoor broadcasting, and crop health diagnostics, providing farmers with a rich and immersive learning experience. Furthermore, the videoconferencing program has fostered better convergence and coordination between farmers and the agricultural department. This interaction ensures that the agricultural knowledge imparted through videoconferencing aligns with the needs and priorities of the farming community.

In a technological era where remote communication is essential, the videoconferencing initiative has taken another innovative step by enabling live demonstrations through mobile signal aggregators. This feature enhances the accessibility of agricultural knowledge and allows farmers to witness agricultural practices in real-time, even in areas with limited connectivity.

In summary, the introduction of videoconferencing facilities at Krishi Vigyan Kendras has revolutionized agricultural outreach in remote areas, facilitating a seamless channel for knowledge exchange, real-time feedback, and customized training. This groundbreaking approach empowers farmers with essential agricultural knowledge and contributes significantly to the growth and sustainability of agriculture in the region. It exemplifies the potential of technology to bridge geographical gaps and transform agricultural extension services, ultimately benefiting farming communities and promoting agricultural development.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More

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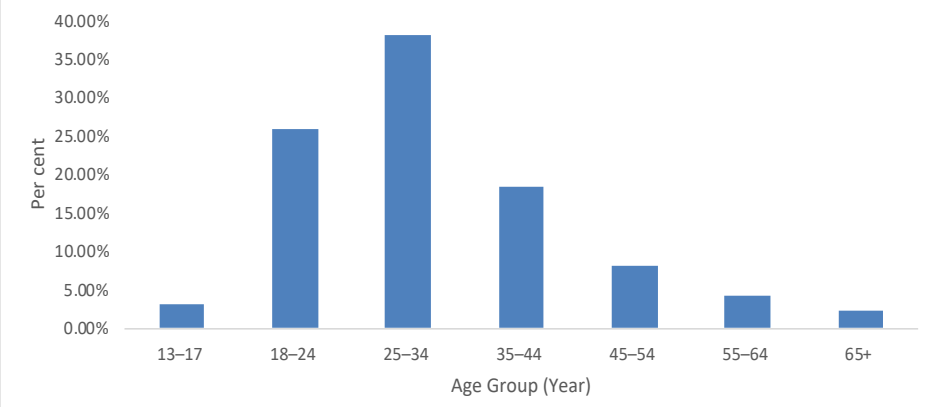
2. Digital Storytelling for Agricultural Learning: Unlocking Knowledge Through Narratives

Digital storytelling has emerged as a powerful tool for enhancing learning, and its application in the realm of agriculture has been transformative. At Bihar Agricultural University, Sabour, this innovative approach has been harnessed to disseminate crucial agricultural knowledge to farming communities. Digital storytelling involves the use of computer-based elements, including images, text, recorded audio narration, video clips, and music, to convey information effectively. In this context, the university's scientists have leveraged various video-sharing platforms such as YouTube to provide expert insights and practical guidance to the farming community. Their YouTube channel, regularly updated to cater to the preferences of a global audience, hosts a remarkable collection more than 400 technical and farmer educational videos, alongside 60 success stories of farmers. With a subscriber base exceeding 4.35 lakh and a combined viewership of about 4.7 crores, this initiative exemplifies how digital storytelling can bridge geographical gaps, empowering farmers with essential knowledge and fostering agricultural growth and sustainability through accessible and engaging content. The analysis of the viewership indicates that, more than 80% of the viewers are in the age group of 18 to 44 years. The university has also recived several accolades for the quality technical content developed by the media center including National awards from NIRD, Hyderabad for documentary (Ummeed) on tribal Development, national best technical video for "Dragon fruit cultivation video" from MANAGE, Hyderabad and a documentary entitled "Water for tomorrow" has been screened at prestigious 15th Prakriti International Documentary Film Festival, Ahmedabad.



3. Bridging the Digital Divide in Agriculture: Empowering Bihar's Farmers with Low-Cost SD Cards

In rural areas of many developing regions, access to the internet can be a significant challenge. The lack of reliable connectivity and high data costs often restrict the ability of farmers to access the wealth of technical information available in the digital age. However, a remarkable solution has emerged to address this digital divide - the use of SD cards loaded with digital content.

A pilot project was launched in collaboration with MANAGE, Hyderabad for the distribution of low-cost micro-SD cards among the farmers with following objectives,

- ❖ To disseminate Agricultural related video to the farmers
- ❖ To assess the level of awareness, Knowledge and level of Adoption of farm practices due to digital videos
- ❖ To evaluate the impact of digital videos on farm productivity

These small, portable SD cards have become a lifeline for farmers in areas where internet access remains a luxury. The cards are pre-loaded with a treasure trove of technical information, ranging from best farming practices and crop management to pest control. They serve as a comprehensive repository of knowledge, readily accessible to farmers on their smartphones and basic mobile devices.

This innovation has transformed the way farmers in these remote regions access crucial information. No longer do they have to grapple with slow, unreliable internet connections or bear the brunt of high data costs. Instead, they can now pop an SD card into their mobile devices and instantly gain access to a wealth of real-time technical information. These SD cards not only bridge the digital divide but also empower farmers to enhance their crop yields, adopt sustainable practices, and ultimately improve their livelihoods. As part of this project, a total of 100 progressive farmers equipped with smartphones were identified across the 25 districts, primarily through the Krishi Vigyan Kendras (KVKs). These farmers were provided with low-cost SD cards, each containing 20 popular videos related to agriculture and allied disciplines, sourced from various reliable channels. These videos

were thoughtfully curated to address the key aspects of farming practices, technology adoption, and productivity enhancement.

The SD cards has been very popular among the farming community. Considering its impact, the state govt. has provided the financial support for its out scaling across the state. Further, the micro -SD card has been upgraded with addition of USB reader which can be used to view the digital content in large screen by the farmers.

Considering the success, the initiative has been taken up for out scaling with financial assistance from the Department of Agriculture, Govt. of Bihar and over 5000 SD cards have been distributed among farmers, extension functionaries and other stake holders.

4. Mobile SMS Farm Advisories: Empowering Remote Farmers with Timely Information

The advent of mobile phones has ushered in a new era of farm advisories delivered through SMS, revolutionizing the way smallholder farmers in remote corners of the country access critical information. Thanks to the telecom industry and the proactive initiative of Bihar Agricultural University (BAU), farmers are now equipped with the power of mobile technology. These farmers receive timely and relevant SMS-based advisories, providing them with essential insights into weather conditions, market prices, pest and disease alerts, input costs, and opportunities to engage with buyers. This innovative approach has reached more than 6.5 lakh farmers annually, sending approximately 3000 advisories each year. Through the use of mobile phones, farmers are better equipped to make informed decisions about their farming practices, ensuring that they can mitigate risks, optimize crop yields, and enhance their economic prospects.

Considering the success of the project, BAU has forged a Memorandum of Understanding (MoU) with the Reliance Foundation to expand the dissemination of farm information in a similar pattern. This partnership promises to extend the reach of farm advisories through SMS, further empowering farmers with valuable insights and contributing to the growth and sustainability of agriculture in the region. The convergence of telecommunications and agriculture through SMS advisories represents a remarkable leap in ensuring that even remote farmers can access critical information in the palm of their hands, enhancing their agricultural practices and overall well-being.

5. BAU Agro Doctor: Bridging the Gap Between Farmers and Expert Advice

The Agricultural Call Center, also known as "Kisan Helpline," (0641-2451035 & 18003456455) is a valuable initiative by Bihar Agricultural University (BAU) to provide instant assistance to farmers with crop production issues. In addition to the regular toll-free telephone service, BAU has introduced a WhatsApp service called "BAU Agro Doctor." This innovative platform allows farmers to share real-time images of crop-related problems, such as weed infestations, pests, and diseases. Expert agricultural specialists from the university promptly diagnose these issues and provide advisories in real-time via WhatsApp. This service enhances the efficiency of addressing agricultural challenges and helps farmers make informed decisions, ultimately leading to improved crop yields and livelihoods. Over last five year more than 10000 queries have been resolved through BAU Agro Doctor across different desciplines.

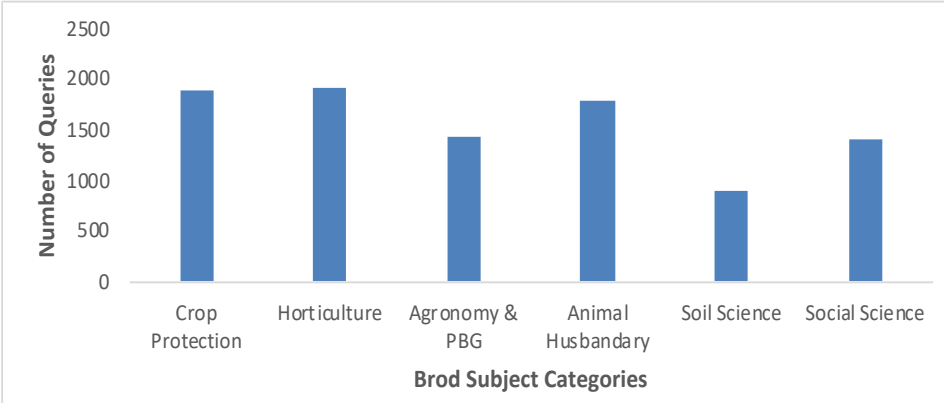


Figure 4. Pattern of Advisories Sent Through Kisan Helpline

बिहार कृषि विश्वविद्यालय द्वारा किसानों के लिए 24x7 व्हाट्सएप सेवा

BAU AGRO DOCTOR

कृषि, पशुपालन व मत्सय पालन से संबंधित लक्षणों का फोटो या विडियो व्हाट्सएप करें और अनुभवी वैज्ञानिकों से तुरंत समाधान पाएं

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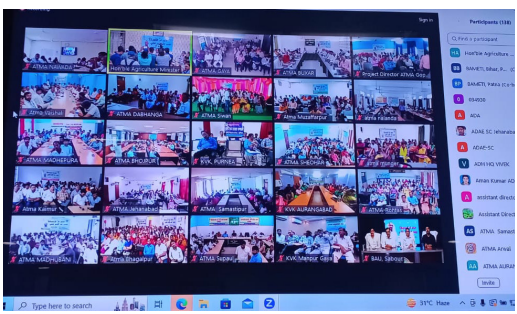
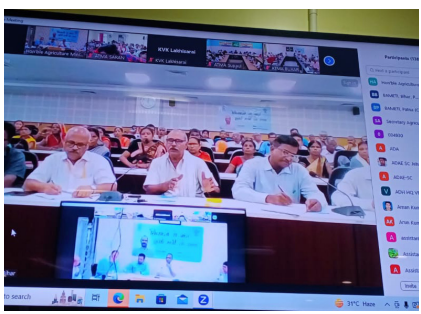
खेती की समस्या बताएं। व्हाट्सएप से समाधान पाएं ।।

6. Kisaano Se Baat Krsihi Mantri Ke Saath

Considering the success of video conferencing-based training interface programme, i.e., Digital Chaupal, the university has rolled out this novel approach to bring in farmers, scientists and the policy makers form the state agricultural department on a single platform. The farmers are connected to the programmes from the videoconferencing facility available at different KVKS across the state and the Minister of Agriculture along with officials from Agricultural Department are connected with the farmers and scientist from different expert group are connected from the BAU (HQ). The programme has unique advantage of having a real time scientific discussion with policy makers on various issues raised by the farmers. The programme has helped streamline various programmes of the state department of Agriculture. This programme has benefited the farmers to get firsthand information on various govt. schemes, policies and technological developments from single platform. Whereas, the govt. has advantage to reach thousands of farmers through this platform.





7. Sawal Jawab: Prayogshala Se Khet Tak (Question & Answer: from Lab To Land)

To address the specific technical queries of the farmers, an innovative programme "Sawal Jawab: Prayogshala se Khet Tak" (Question & Answer: from Lab To Land) has been started by the university on Nov 2023. The programme is aimed to reach the grassroots through digital platforms including social media networks. The live programme is hosted at BAU (HQ) with panel of experts in various agricultural and allied streams. The experts answer the queries raised by the farmers during this live programme. The programme will be conducted on monthly basis with specific themes based on the feedback from the farmers and other stakeholders.

8. Community Radio Station

This community radio initiative is an integral component of a broader ICT-based Extension Model of BAU, Sabour, strategically designed to enhance outreach and knowledge dissemination. In the context of this comprehensive extension approach, the community radio stations played a pivotal role by harnessing the power of information and communication technology to bridge the gap between agricultural experts, extension services, and rural communities. The community radio stations serve as an effective medium for the exchange of critical agricultural information, weather updates, market trends, and best practices. They also facilitate direct interaction between farmers and agricultural experts, promoting the timely dissemination of expert guidance and advice. Moreover, the focus on localized content and language ensures that the information is accessible and relatable to the rural population.

The first CRS, located at Krishi Vigyan Kendra in Barh, Patna, commenced operations on May 17, 2011, broadcasting on the 91.2 F.M. radio band. This community radio focuses on delivering content tailored to the local audience's specific interests and needs, particularly in the context of agriculture, health, hygiene, food and livelihood security, and social issues. The station, primarily run in the local dialect for better comprehension, airs two hours of programming per day, including segments like Krishak Manch, Mahila Jagat, Lok Rang, and Bal Manch.

In contrast, the CRS at BAU Sabour Campus, known as "90.8 FM Green," was established in August 2019 with a vision to enhance agricultural knowledge among farmers and provide guidance to children and youth in the community. This CRS has received the National Community Radio Award in 2023, focusing on farming knowledge, education quality, and community enrichment. The CRS Green reaches around three lakh listeners, with two lakhs tuning in through radio frequency and one lakh through mobile applications (FM Green) and digital platforms. Their prime-time programs cover topics like agricultural advice, youth careers, and health, all presented in Hindi and Angika over 12 hours.

Lastly, the Community Radio Station at KVK Manpur Gaya operates on a frequency of 89.6 MHz. Launched with the aim of providing quick information to farmers and fostering a positive community environment, this CRS broadcasts agriculture-related content, weather updates, market prices, and folk songs for four hours daily in Hindi and Magahi. Plans are in motion to establish additional community radio stations at KVK, Katihar.

Incorporating these community radio stations within the broader ICT-based Extension Model underscores their importance in fostering agricultural knowledge, empowering rural communities, and contributing to the overall socio-economic development of the region. This integration showcases a holistic approach that leverages technology to support sustainable agriculture, education, and community enrichment.

The "Radio Revision" program, initiated on March 20th 2023, aims to bolster students' academic performance and improve access to agricultural education. This innovative initiative, conceived by Dr. DR Singh, the Hon'ble Vice-Chancellor. The program is broadcasted live on the University's 90.8 FM Green radio channel, providing a valuable resource for undergraduate students to enhance their exam preparation and overall academic achievement.

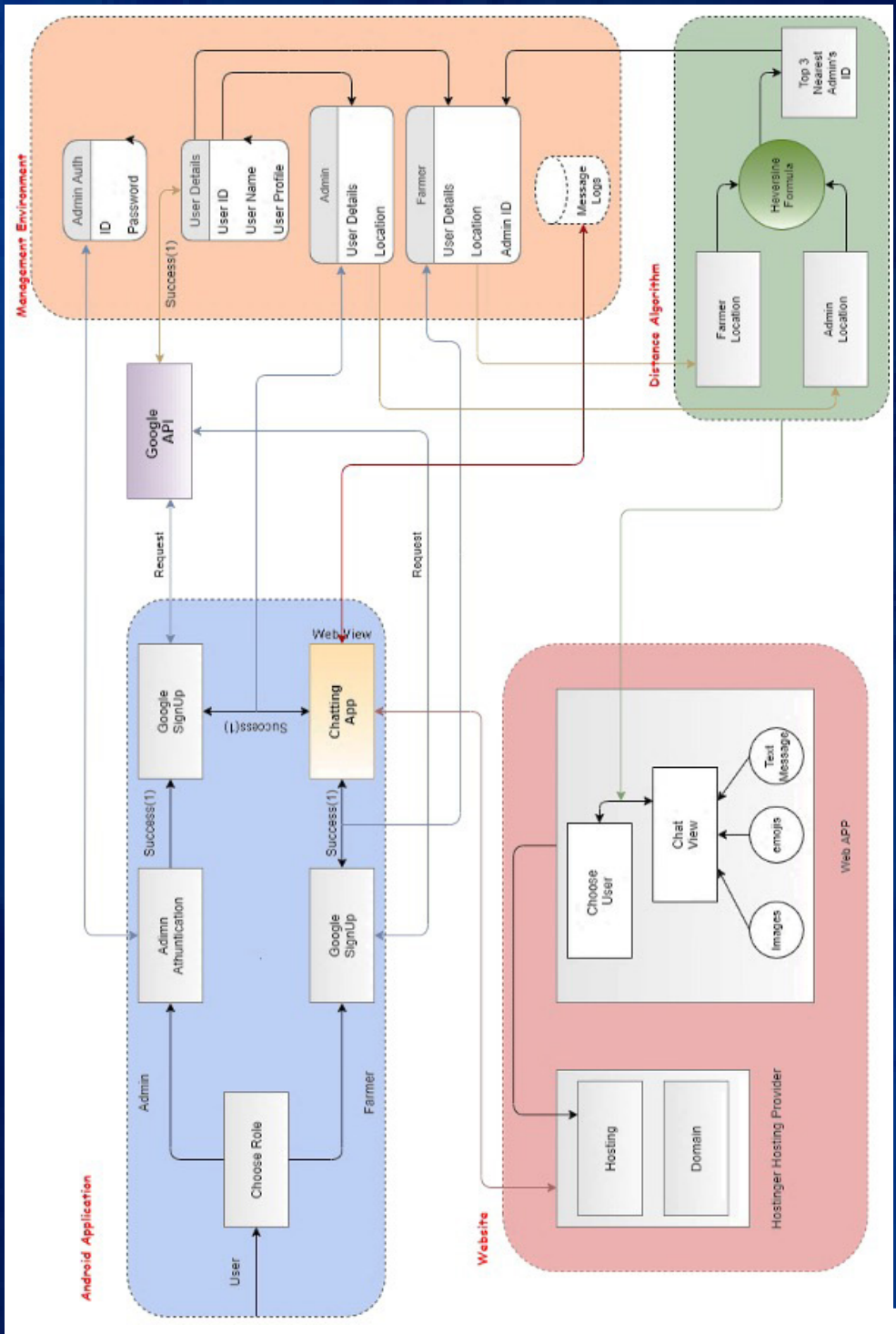

सामुदायिक रेडियो स्टेशन
कृषि विज्ञान केन्द्र, मानपुर, गया
89.6 FM


"फसल की सिंचाई करें या नहीं"
मौसम की जानकारी के प्रतिक्षा में महिला कृषक

9. New Digital Agriculture Initiatives at BAU, Sabour

The emerging areas like, Artificial Intelligence has huge potential to solve real life problems especially in Agriculture AI enabled tools can be a boon to address hitherto unsolved problems in agriculture sector. Bihar Agriculture University has initiated work on employing Artificial Intelligence, and Drones in various sectors of Agriculture.

AI powered Real Time Pest and Crop Disease Diagnostic and Farmer Advisory Model: Insect Pest, Diseases and weeds are major limiting factors for agriculture production across the world. These biotic constraints are more severe in eastern India, owing to lack access to expert for right diagnosis and advisory in rural areas. To address the issue, a model for detection of pest and diseases in major crops of Bihar was initiated. Initially machine learning model for pest and diseases of maize and rice was trained with diverse and exhaustive image data sets for over two dozen pest and diseases. Further, a application has been developed which enable the farmer to interact with nearby plant protection experts for real time advisory. Apart from that, work is underway to develop protocol for real time monitoring of pest and diseases using satellite and Drone based imagery which will ultimately enhance the farm productivity as well as reduce the pesticide load in the environment.


Management Environment
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Password
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User Name
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Message Logs
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Impact and Recognition of the model

The innovative agricultural extension model, with its multifaceted approach to reaching farmers and empowering them with knowledge, has made significant strides in the agricultural landscape of Bihar. Its impact spans various dimensions,

Empowering Rural Communities: This model has been instrumental in providing training and support to both the youth and farmers residing in remote and underserved areas. It brings essential information directly to their doorsteps, bridging the information gap and fostering agricultural development in these regions.

Strengthened Communication: The model has not only disseminated valuable information but also reinforced the relationships between agricultural experts and the farming community. It has facilitated a two-way exchange of knowledge, enabling farmers to seek guidance and provide real-time feedback.

Economical and Time-Efficient: By utilizing modern communication technologies, the model has reduced the need for extensive travel and associated expenses. Farmers can access information and guidance without the constraints of geographical distance.

Enhanced Research and Outreach: Real-time feedback from farmers has significantly improved the formulation of applied research. This interaction allows experts to tailor their advice and recommendations to the specific needs of the farming community.

Expanded University Presence: The model has extended the university's reach into rural areas, making it a valuable and trusted resource for agricultural information and knowledge dissemination.

Increased Technology Adoption: Farmers' uptake of modern agricultural technologies has seen a notable increase, contributing to enhanced productivity and economic growth in the agricultural sector.

Recognition

The model's exceptional contributions haven't gone unnoticed. It has received prestigious accolades and recognition, including the National Award for e-Governance under the category of Extraordinary Research in Citizen-Centric Services by Research Institutions, Skoch Digital India Award, Technology Sabha Award etc. The university’s pioneering role in utilizing ICT has been recognised with institution of an Advanced Agricultural Faculty Training Centre (CAFT) by the ICAR, New Delhi.

Moreover, the university's YouTube channel, an integral component of the

model, was honoured with the "YouTube Creator Award" for its outstanding production of farmer-friendly technical videos. This acknowledgment underscores the model's impact and innovation.

Resource Generation

The sustainability of this initiative is further fortified through resource generation efforts. The Government of Bihar allocated Rs. 40 lakhs for the production and distribution of videos using low-cost SD cards in the year 2019-2020. Additionally, the government contributed substantial funds of Rs. 200 lakhs for videoconferencing during the fiscal year 2018-19. Furthermore, the model's success in engaging with various platforms, particularly YouTube, has resulted in the generation of significant resources amounting to Rs. 20 lakhs. These financial contributions and resource generation efforts are essential for expanding and sustaining the model's reach, ensuring its continued success in advancing agricultural practices, supporting farmers, and fostering rural development.

Upscaling of the ICT model

With success of the various initiatives under ICT based extension Model, the Govt. of Bihar has included the model in its 4th Krishi Road Map for provided financial assistance for the upscaling of the model with the following initiatives,

- Transformation of e-Kisan Bhawan into single window Agricultural Service Terminals and Hubs (SWASTH)
- Strengthening the ICT infrastructure of Universities and KVK's

Contributors of the Model : R K Sohane, R N Singh, Abhay Mankar, Rajesh Kumar, Srinivasaraghavan A., Aditya, Ghanshyam, Ishwar Chandra, Anjum Hashim, Manish Kumar Singh, Shaligram Yadav, Brajesh Kumar Tiwari, Sandeep Kumar Tiwari and Annu Kumari

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Bihar Agricultural University shows the way

Bihar Agricultural University, Sabour, Bhagalpur has rolled out several ICT enabled innovative agriculture extension approaches to reach out to the farming community on real time basis. The university has come up with an innovative blend of ICT tools to solve the specific problem of technology dissemination. The major approaches adopted by the university include Real Time Farmers-Scientist Interface with Video-Conferencing, Kisan Gyan Rath-Taking Technology To Farmers Door Step, Community Radio Station, Digital Storytelling and its dissemination through Social media, Videos through SD cards: An approach to tackle internet issues and Dissemination of timely information through SMS.

The university has taken an initiative to cope-up malnutrition through agricultural intervention *Apni Kyari Apni Thali (AKAT)* in collaboration with ICDS (Department of Social Welfare, Bihar) and UNICEF. The programme has been implemented in four districts viz. Patna, Nalanda, Purnea and Khagaria through the existing Krishi Vigyan Kendras.

A systematic approach was followed in order to bring about perceptible improvement in the nutritional security through multipronged approach with special focus on one specific approach at each district. These included creation of awareness through nutrition education through CRS, Barh under KVK, Patna; Incorporation of mushroom to daily diet at in Nalanda, and enhancing diet diversity through establishment of nutri-gardens at Aanganwadi Centres (AWCs) at Purnea and Khagaria. Five villages were selected at each districts. A strong linkage was established between respective KVK and AWC with the help of ICDS, Government of Bihar.

Nutritional garden were established at AWC to include green leafy vegetables and fruits in the diets of pregnant and lactating women, and also provided to children. Community Radio Services were employed to boost up the nutritional and health awareness programme. Awareness through Community Radio Services is one of the fascinating ways adopted by the KVK has opted to reach rural mass.

The initiatives taken by the university encouraged the cultivation and inclusion of mushroom in diets to combat the malnutrition in children. Mushroom cultivation was promoted at each selected AWCs. Mushrooms were served as a supplement in meal at selected AWCs. An extensive campaign was conducted to remove the stigmas and taboos related to food habits including mushroom consumption. Rural women were empowered with technical knowledge of nutri-garden establishment, mushroom cultivation and culinary diversification.

FROM THE EXECUTIVE EDITOR'S DESK

RAJNI SHALEEN CHOPRA

FROM THE EXECUTIVE EDITOR'S DESK

7

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Director, CEC
Festival Patron

October 28 – 30, 2023, Gujarat University, Ahmedabad

SCREENING

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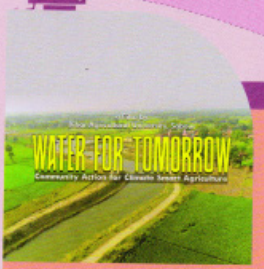

Dr. Ravindra Kumar Sohane

SYNOPSIS- For village Sakrorha in Modanganj block of Jehanabad district, inadequate water availability had been a major constraint. Earlier solely dependent on rainfall for irrigation, farmers often had to suffer loss of crop due to erratic rainfall. Implementation of NICRA project was taken up in Sakrorha village in 2011 by KVK, Jehanabad. Efforts were undertaken for addressing problem of inadequate water availability by reducing farmer's dependence on rain fed irrigation through proper management of natural resources. Total eight dead water bodies were revived as ponds Approximately 60- hectare area of village has been transformed into pond. The village presently has capacity of harvesting and storage of 13520 cubic meter water. Revival of water bodies has also proved useful in underground water recharging.

Director's/Producer's Profile

Dr. Ravindra Kumar Sohane is serving as Director Extension Education of Bihar Agricultural University, Sabour and he has been entrusted with additional charge of the Directorate of Planning as well. As Director Extension Education he has made remarkable contributions in the area of Agricultural Extension through employing innovative ICT tools. Dr. Sohane has been awarded with several awards and honors like, National e-Governance Award from ICT initiative in Agriculture, Best Extensionist Award by Animal Nutritional Society of India (ANSI), ICAR- Swami Sahajanand Sarswati Award for Seed-village concept, Best Young Agricultural Scientist from UPCAR, Lucknow, Dr. S. P. Arora Award for Best Research Paper by Animal Nutritional Society of India (ANSI), Best Extension Professional Award etc. TSP (Tribal Sub Plan) work documentary "Umeed: A Hope" secured Second Prize in 5th National Film Festival in Rural Development 2021 at NIRD, Hyderabad.


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Information Technology
Government of India

CHAPTER - 4

Bringing Agricultural Information to Farmers' Doorsteps: The Kisan Gyan Rath Initiative

Bringing Agricultural Information to Farmers' Doorsteps: The Kisan Gyan Rath Initiative

Introduction:

The Kisan Gyan Rath (KGR) is a pioneering initiative introduced by Bihar Agricultural University, Sabour, with the goal of providing essential agricultural knowledge and resources directly to farmers in Bihar, India. This mobile knowledge hub, in the form of a van, serves as a dynamic platform for delivering agricultural education and support to rural communities. The KGR project has been launched to address the critical need for accessible, practical agricultural information in a region where agriculture is a vital component of the economy and livelihoods.

Need for the Kisan Gyan Rath:

Bihar is characterized by a high population density and an extensive agricultural workforce. Despite its potential for agricultural growth, the state has faced challenges in adopting modern agricultural practices due to limited access to information and resources, especially in remote areas. The need for KGR arises from the imperative to bridge this knowledge gap and provide farmers with the latest agricultural techniques, practices, and knowledge. In a state where agriculture is a predominant occupation, empowering farmers with essential agricultural information is vital for enhancing productivity, improving livelihoods, and contributing to overall agricultural development.

Design of the KGR:

The Kisan Gyan Rath is meticulously designed as a mobile system equipped with a video display unit to demonstrate various agricultural practices. This innovative van travels from village to village, following a predetermined schedule that spans across all 25 districts of Bihar. Its design incorporates the capacity for soil analysis, interpretation, and the issuance of soil health cards to farmers. This feature is crucial as it assists farmers in

understanding the health and fertility of their soil, thereby aiding them in making informed decisions about crop selection, fertilizer application, and nutrient management. The KGR is designed to be an accessible, practical, and dynamic resource for agricultural education and support.

Impact of KGR:

The Kisan Gyan Rath (KGR) project has had a profound impact on Bihar's agriculture, serving as a catalyst for technology adoption and knowledge dissemination. Through its soil analysis and interpretation services, KGR directly benefited over 201,000 farmers, imparting essential agricultural knowledge and motivating them to embrace advanced practices. This initiative has created a cascading effect, promoted the wider adoption of modern farming methods and contributed to the sustainability of agriculture in the region. By making soil testing accessible at farmers' doorsteps, it has eliminated barriers to entry, increased farmers' curiosity, and enhanced their understanding of agricultural best practices. The KGR's engaging and practical approach ensures effective learning and the retention of valuable knowledge, making it a transformative asset in Bihar's agricultural development.

Looking into the success and popularity of KGR initiative of BAU, Sabour the Govt. of Bihar is taken up the task of up scaling the concept of KGR as "Gyan Vahan" in the 4th Krishi Road Map.

Contributors of the Model: R K Sohane, Ishwar Chandra and Ravi Kumar

किसान शाल रथ
शुभारम्भ
माननीय मुख्यमंत्री
श्री नीतीश कुमार जी
के द्वारा

CHAPTER - 5

ANKURAN: A Model for Nutritional Security and Attractive Future Generations Towards Agriculture

ANKURAN: A Model for Nutritional Security and Attractive Future Generations Towards Agriculture

Introduction

The Ankuran Model is an innovative and multifaceted initiative designed to address widespread issues of iron and micronutrient deficiency, primarily affecting children and mothers in Bihar, India. Launched in 2016, this model has a primary focus on integrating kitchen gardens with the mid-day meal program in schools. By strategically utilizing available wastelands surrounding educational institutions and applying scientific crop management practices, the model aims to cultivate nutrient-rich vegetables to improve dietary diversity among school-going children. Furthermore, it seeks to instill an interest in agriculture among students and leverage the expertise of agricultural scientists from Krishi Vigyan Kendra (KVK) in partnership with grassroots workers from the Integrated Child Development Services (ICDS). The Ankuran Model is underpinned by an inventive approach, aiming to break the cycle of malnutrition and offer sustainable solutions to combat the pervasive issues of anemia and nutritional deficiencies.

The Ankuran Model was born out of the urgent need to tackle the substantial prevalence of iron and micronutrient deficiencies among children and mothers in Bihar. The model's inception came in response to alarming statistics, including findings from the Annual Health Survey of 2012, which revealed that as much as 75-90% of adolescent girls in the region were suffering from anemia. Subsequent data from the National Family Health Survey (NFHS-4, 2015-16) underscored the widespread nature of the problem, showing high levels of anemia and stunting among small children, adolescents, women, and men. Existing anemia prevention programs had primarily focused on medical supplementation of micronutrients and iron. However, the Ankuran Model recognized the limitations of these programs and saw an opportunity to exploit community resources, local foods, and dietary practices as sustainable solutions to address iron and micronutrient requirements effectively. This innovative convergence of agricultural experts from KVK with grassroots workers from ICDS led to the conceptualization of the Ankuran Model. The objective of the demonstration which has been expanded to the entire state includes,

- ❖ Improve nutrition, health and hygiene awareness among children of class I-VIII in middle schools through monthly awareness programmes.
- ❖ Habituate use of local micronutrient rich foods among the children of class I-VIII in middle schools through school nutri-gardens
- ❖ Improve compliance of weekly iron and folic acid supplementation by linking it to the mid-day meal programme.
- ❖ Regularize screening of nutrition and health status of children of class I-VIII in middle schools.

Target Group& Stakeholders

Beneficiaries	Stakeholders			
	School level	Cluster level	Block level	District and Above
Children in class I-VIII standard- both boys and girls. Normally, children in class I-VIII are 6-14 years of age. Parents of the school going children.	School management committee Kitchen garden workers, mid-day meal cooks, Nodal teacher& school principals/ Tolla Sevak &Talim Markaz	Cluster resource co-ordinators Auxiliary Nurse Midwife	SMS of concerned KVK Block resource person of Mid-day meal scheme Block medical officer RBSK team at block level ATMA, Department of Agriculture	District Education Officer BAU, Sabour DRRPCAU, Samastipur ATARI, Patna UNICEF, Patna MDM Directorate, Patna Department of Education, Patna Department of Agriculture , Patna

Implementation Strategy

1. Technical assessment by a KVK for selection of suitable place in school campus for establishing nutrition garden.
2. Establishment of a nutrition garden in school campus for vegetables & fruits cultivation round the year with support from KVK and local agriculture department representatives
   - ❖ Cultivation of vegetables & fruits based on season
   - ❖ Supplying vegetables & fruits from nutrition garden to mid-day meals on a daily basis.
3. Periodic review of the nutrition garden KVK and local agriculture department representatives for technical support to schools for maintaining nutrition garden and keep it running.
4. Development of appropriate study materials for both students & teachers on micro-nutrients
5. Capacity building/training of school teachers & MDM school staff for strengthening nutrition initiatives
6. BCC/community mobilization activities for creating nutrition awareness through:
   - ❖ Morning assembly sessions in schools
   - ❖ Discussion on nutrition topics during class-room sessions
   - ❖ Discussion on nutrition issues in Bal Sansad and Meena Manch meetings
   - ❖ Facilitation of students' visit to nutrition garden on regular basis to motivate inquisitiveness on crops cultivated, content of micro-nutrients and their health benefits
   - ❖ Conduction of BCC/community mobilization activities on periodic basis by organizing
     i. Nutri-Mela on half-yearly basis
     ii. Nutri-quiz
7. Facilitate dedicated discussion on nutrition issues in School Management Committee meeting and showcasing the nutrition garden to parents on regular basis
8. Dedicated meetings & discussion with students on sanitation & hygiene
9. Facility of hand-wash stations in the schools
10. Facilitate administration of IFA tablets in schools under WIFS
11. Facilitate health check-up of students on quarterly basis under RBSK
12. Extend support to parents interested in establishing nutrition gardens in their home

Innovative aspect of the Model

The innovative strategy of Ankuran include,

- Captures the potential of nutrition garden by bringing in the theoretical aspects into practical reality by systematically establishing nutrition garden to improve dietary diversity both at school & household level.
  - It serves as a good vegetable top-up source nutrition provision through MDM in schools.
  - It facilitates transfer of knowledge and concept of school nutrition garden by sensitizing and motivating parents to establish nutrition garden in their homes to maintain the continuity of the supply of nutrient rich vegetables and fruits
- Capitalizes the concept of "learning by seeing" and demonstrates that model nutrition gardens in school are an effective medium for facilitating nutritional learning among students.
- Embeds the value of organically grown vegetables and fruits, teach their importance in physical & mental growth right from the small age, which eventually leads to adoption of health dietary and nutritional practices in the long run.
- Creates more qualitative impact by providing a platform of nutrition garden for conducting mobilization activities at the site to disseminate key messages on nutrition, sanitation and hygiene among students & parents through:
  - Morning assembly dedicated and scheduled class-room discussion (fixed Saturday), inclusion of nutrition messages in school management committee (SMC) meeting agenda, organization of school level quiz and Nutri-Mela etc
- Helps students inculcate healthy habbits by undertaking physical activities in and around nutrition garden.
- Increases the aesthetic value of school campus and makes it more hygienic with utilization of waste.

Coverage: The demonstration in 2016 started with 100 schools in 7 blocks of Purnea district and the successful implementation of the pilot of Ankuran project in 100 schools of Purnea district has catapulted in its adoption by state government for its expansion in 70,130 schools (primary and middle) across all the 38 districts of Bihar with complete financial support. A decision to scale up this intervention across all schools in the state has already been taken in the standing committee meeting of MDM under the chairmanship

of Additional Chief Secretary, Department of Education on February 2, 2018. Subsequently, administrative instructions have been released across all administrative levels to facilitate scale up of Ankuran project in line with the standard operational guidelines with dedicated financial provisions and robust reporting, monitoring and review mechanisms. In 2019, Government of India recognized the intervention and has approved funds for 20000 schools in Bihar.

Impact of the Model

With improvement in the supply situation of IFA and Albendazole in the State and taping the all-available food systems (home, school and farm food systems) to influence dietary norms, the intervention has led to an improving diets and nutritional indicators among adolescent girls and boys aged 10 to 14 years, within a school environment, by targeting the multiple, varied behaviours affecting health and nutrition.

From reporting high incidence of anemia due to unavailability to IFA tablets, adolescent girls who received the iron supplementation under the Weekly IFA supplementation programme report 40% coverage in November'19 (the programme has started in Feb'19). A midline survey of JEEVIKA for a adolescent and women empowerment programme in in two blocks of the district reveals that the consumption of protein rich foods (such as meat, poultry and fish) among adolescent girls in Purnea has increased by over 11 percentage points, and that of green leafy vegetables has increased by over 13 percentage points since 2016. On the other hand, consumption of aerated drinks has reduced by over 16 percentage points.

Considering the potential and success of the model, the Education department of Govt. of Bihar has adopted the model to be implemented in all government schools of Bihar with a focus on 20000 schools with Mid-day meal.

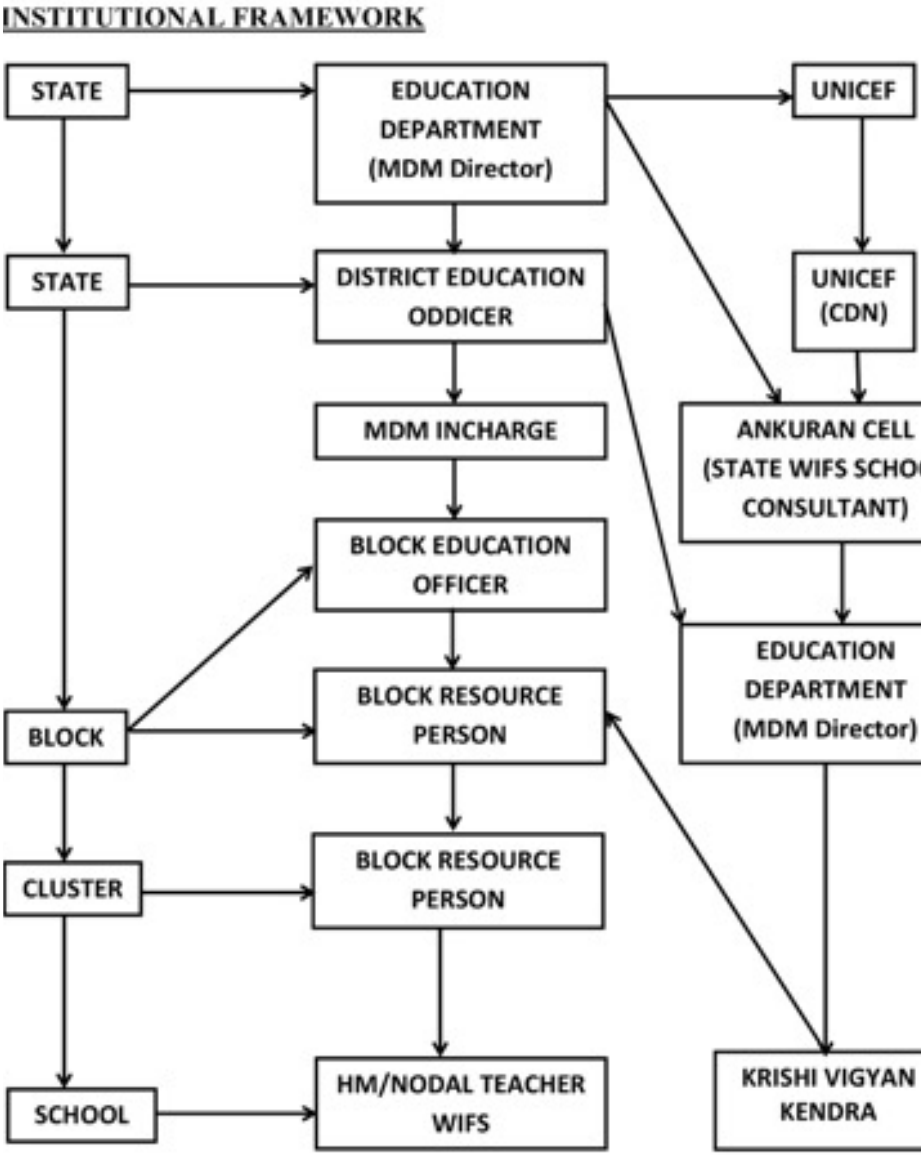


Figure 5.1 Institutional Framework of Ankuran Model

Contributors of the Model: R K Sohane, Seema Kumari, Ravi Narayan Parhi and Prakash

a film by Bihar Agricultural University, Sabour

WATER FOR TOMORROW

Community Action for Climate Smart Agriculture

Producer: DR. D.R. SINGH Director: DR. R.K. SOHANE

Associate Director: MR. MANISH KUMAR SINGH, Editor: MR. BRAJESH KUMAR TIWARI, Cinematographer: MR. SANDEEP KUMAR TIWARI

Drone Camera: MR. SHALIGRAM YADAV, Voice Over: DR. TIRTHARTHA CHATTOPADHYAYA, Sound: ANNU KUMARI

CHAPTER - 6

Apni Kyari Apni Thali (AKAT): A model for enhancing nutritional security of rural woman and children

Apni Kyari Apni Thali (AKAT): A model for enhancing nutritional security of rural woman and children

Introduction:

In Bihar, a significant majority of children face underprivileged childhoods, marked by adversity from birth. Alarming statistics reveal an infant mortality rate of 34 and 25% of newborns suffering from underweight conditions, reflective of widespread nutritional and immunization deficiencies in India. Despite several counter measures taken by the state and central government to alleviate malnutrition, there is significant proportion of the rural woman and children suffer malnutrition. Among the various reasons, insufficient nutrition awareness, lack of diet diversity and protein deficiency are considered as most significant challenges. To counter these challenges, the Integrated Child Development Services (ICDS) program provides essential healthcare, food, immunization, and referral services to children under 6 and their mothers, working in tandem with rural Anganwadi centers staffed by frontline workers.

In order to combat the malnutrition among the rural woman and children, Bihar Agricultural University in collaboration with ICDS and other stakeholders has launched a pilot project entitled, "Apni Kyari Apni Thali (AKAT),". This endeavor connects Krishi Vigyan Kendras (KVKs) and Anganwadi centers to address protein and micronutrient deficiencies among underprivileged infants and mothers. The initiative was launched with three objectives viz., i) Impact assessment of a nutrition education package via

Community Radio Station, ii) Food diversification through nutri-gardens, and iii) Ensuring high-quality nutrition with mushroom-enriched diets, all aimed at alleviating childhood malnutrition in Bihar comprehensively.

Majority of children in Bihar have underprivileged childhoods starting from birth. The infant mortality rate of children is 34 and 25% of newborn children are underweight among other nutritional and immunization deficiencies of children in India. Integrated Child Development Services (ICDS) is a government programme, which provides food, primary healthcare, immunization, health check-up and referral services to children under 6 years of age and their mothers. ICDS has also been linked to Anganwadi centres established mainly in rural areas and staffed with frontline workers. Bihar Agricultural University, Sabour, Bhagalpur has taken an initiative to cope-up malnutrition through agricultural intervention "Apni Kyari Apni Thali (AKAT)" in collaboration with ICDS (Deptt. of Social Welfare, Govt. of Bihar) and UNICEF. Figure 1 indicates the different linkage towards adaptation of this innovative model. This initiative aims to bring together KVKs and Anganwadi centres and overcome nutritional deficiency of protein and micronutrients to the unprivileged infants and their mothers. The scheme of implementation of the project is represented in Figure 2. To achieve the ultimate goal of alleviating malnutrition, three objectives have been formulated: (I) Impact of nutrition education package on malnutrition among rural women and children through Community Radio Station (CRS); (II) Diversification of food intake among rural women and children through establishment of nutri-garden under AWCs; (III) Ensuring quality nutrition among malnourished children and mothers through mushroom enriched food in their diets.

Implementation of the model:

The programme has been implemented under four districts viz., Patna, Nalanda, Purnea and Khagaria through the existing Krishi Vigyan Kendras. A systematic approach was followed to bring the perceptible improvement in the nutritional security through multipronged approach with special focus on one specific approach at each district. Creation of awareness through nutrition education through CRS, Barh under KVK, Patna, incorporation of Mushroom to daily diet at in Nalanda and enhancing diet diversity through establishment of nutri-gardens at AWCs at Purnea and Khagaria was the core strategy. Five villages were selected at each districts and a strong linkage was established between respective KVK and AWC with the help of ICDS, Govt. of Bihar. Nutritional garden were established at AWC to include green leafy

vegetables/fruits in the diets of pregnant/lactating women and children. Community Radio Services was employed to boost up the nutritional and health awareness programme. Awareness through Community Radio Services is one of the fascinating way the KVK has opted to reach rural mass. Our initiatives also encouraged the cultivation and inclusion of mushroom in diets to combat the malnutrition in children. Mushroom cultivation was promoted at each selected AWCs and same was served as a supplement in meal at selected AWCs. An extensive campaign was conducted to remove the stigmas and taboos related to food habits including mushroom consumption. The rural woman was empowered with technical knowledge of nutri-garden establishment, mushroom cultivation and diversification culinary. Nutrition education on selection of right food as per local availability, removal of taboos in food, causes of malnutrition and issues regarding micronutrient deficiencies were thoroughly discussed to bring about desirable changes in food consumption pattern.

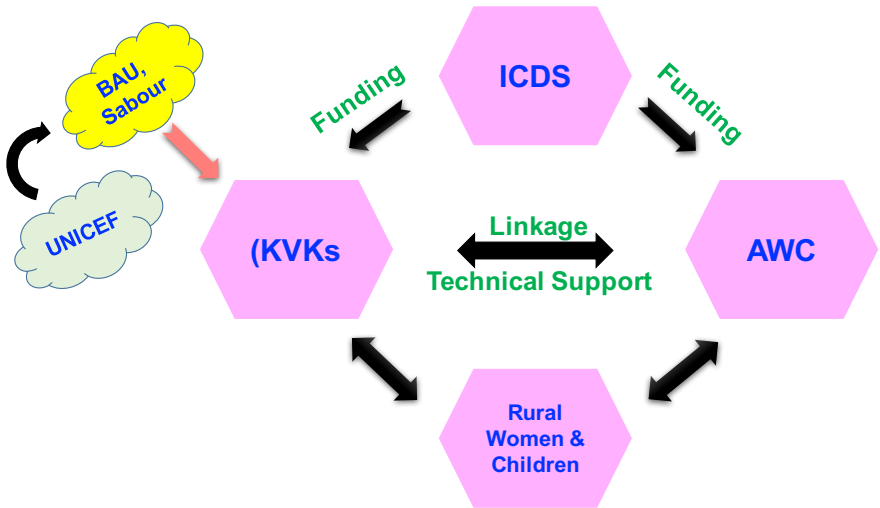


Figure 1: Linkage for adaptation of the model.

Approach and methodology adopted to bring innovation:

This programme was started in 2018 at four KVKs centres (viz., Patna, Nalanda, Purnea and Khagaria) of BAU, Sabour. All these centres have their unique approaches to meet with the demands of micronutrients to the unprivileged one. The following section will enlighten the glimpse of major initiatives and achievements by these four KVKs so far.

1. KVK, Barh, has started nutritional awareness programme to combat malnutrition among children, pregnant, lactating women, adolescent girls and other rural people through Community Radio Services (CRS). Five blocks under KVK, Patna (viz., Barh, Athmalgola, Belchhi, Pandarak and Bakhtiyarpur) have been selected, where population was more than 3000. A quick survey to get the feedback from the people from this blocks was conducted and results were highly fascinating. People also shared the nutritional knowledge that they perceive through this platform. Balanced diet, food and nutrition, nutritional deficiency diseases, enhancing nutrition through low cost diets, nutritional efficiency diet, benefits of moringa, mushroom, techniques for upgrading nutrition in regular food, cooking and processing method to retain nutrition availability like fortication, germination, fermentation and high protein diet etc. were the major attention covered for broadcasting every day for 3 hours. This programme also comprised of question-answer interactive session, poshan songs, drama nukkad-natak, stories, poems and lectures and interviews, etc. with nutrition experts, AW workers, CDPOs, scientists, local leaders and progressive women and farmers. A special session on supplementary feeding and preparation was concealed in details. Table 1 represents Prevalence of symptoms related to malnutrition/hidden hunger among children in adopted villages before and after implementation of Apni thali Apni Kyari initiative at KVK, Nalanda under Poshan Abhiyan.

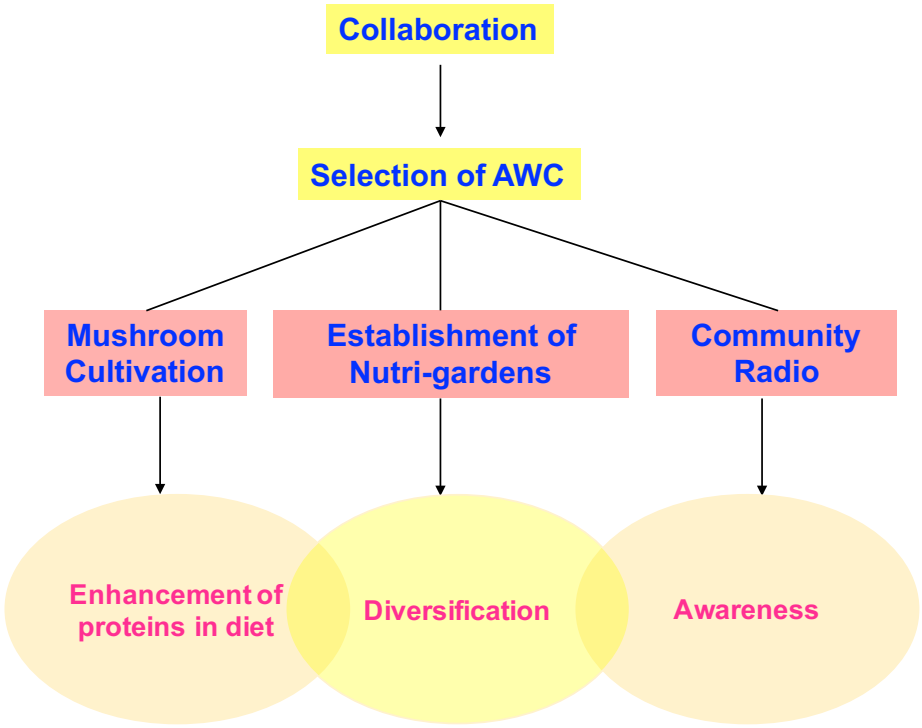
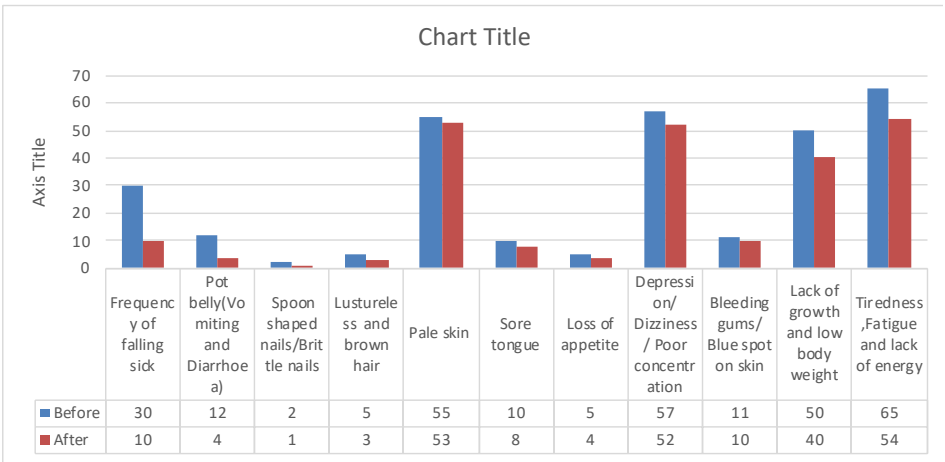


Figure 2: Working flow chart of the model.

2. KVK Khagaria ensured cheap, regular and handy supply of fresh vegetables via AWCs through establishment of nutritional garden. The major objective of nutritional garden was to provide green leafy vegetables and fruits into the diets of pregnant women and children of 6-24 month old. Supply of selected nutritious crops, garden tools, method of cultivation, uses and preservation techniques were facilitated by KVK to ensure their availability throughout the year. This programme was aimed to reduce atleast Rs 5000/- for fruits and vegetables from the total food budget of AW center. The nutri-garden at AWCs utilizes locally available compost for promotion of zero budget veg. cultivation. Local women of these area have been associated as committee members to the nutri-garden for production, management and efficient utilization. So far, 40 nutri-garden has been made and working day-night to fulfil the requirement of fresh fruits and green vegetables.



	Frequency of falling sick	Pot belly(Vomiting and Diarrhoea)	Spoon shaped nails/Brittle nails	Lusturelessness and brown hair	Pale skin	Sore tongue	Loss of appetite	Depression/ Dizziness / Poor concentration	Bleeding gums/ Blue spot on skin	Lack of growth and low body weight	Tiredness ,Fatigue and lack of energy
Before	30	12	2	5	55	10	5	57	11	50	65
After	10	4	1	3	53	8	4	52	10	40	54

Figure 3. Prevalence of symptoms related to malnutrition/hidden hunger among children in adopted villages before and after implementation of Apni thali Apni Kyari initiative at KVK, Nalanda under Poshan Abhiyan. (# After six months of implementation of the Apni thali Apni Kyari initiative)

3. KVK Jalalgarh, Purnea also ensured to enhance or meet nutritional requirement through nutrigarden and local people are opting it with a great enthusiasm. Main objective of the project is to provide nutritional education and also to upgrade micronutrients consumption for pregnant and lactating women of selected villages through Anganwadi centers. Total of 50 nutrigarden has been established with technical support like availability of seeds and seedling cultivation of seasonal vegetables and fruits for whole year. The produce of nutrigarden were distributed among beneficiaries as well as in AW meal for children. We are also conducting the training programmes to the progressive women, lactating mothers and others to facilitate this concept to them.

4. KVK, Nalanda employed mushroom cultivation, a nutrient-dense versatile food which shares some of the benefits of fruits and vegetable and complement almost every day meal. Total 25 mushroom production units were established in the selected villages. So far, 50 malnourished children ranging from 06-36 months and 20 pregnant women were selected from each center with the help of Anganwadi Sevika. We also conducting the detailed study or survey on approximately 250 children and 50 pregnant women to see the effect of mushroom supplementation. Each unit has produced approximately 50 kg mushroom so far, which was collected at ICDS center and distributed among 50 children and 20 pregnant mother. Mushrooms are being served as a supplement in meal at every AW center. We included mushroom in the recipe of pulao and halwa, which was well acceptable by children.

Impacts/Benefits resulting from the initiative:

The initial baseline survey conducted across the selected AWCs in 04 districts of Bihar indicated presence of various symptoms of malnutrition among children, NPNL, pregnant and lactating woman. Community radio station led nutritional awareness campaign resulted in significant improvement in knowledge attitude and practice in various life styles related to diet. The use of green leafy vegetables, Mushroom, Moringa in daily diet has been increased to the tune of 10-15 per cent. Awareness on hygienic food, safe drinking water, care during diarrhoea, anaemia management etc. has enhanced up the tune of 10-20 per cent through awareness campaign led by CRS (Table 2). Establishment of nutri-gardens has significantly enhanced the daily consumption of nutritious vegetables and fruits among the pregnant woman, lactating mothers and children. The midterm assessment of the nutri-garden suggests a positive change on several general indicators among the woman and children up the tune of 20-25 per cent. The innovative cropping system followed in current nutri garden across 50 AWCs has resulted in an average vegetable & fruit production worth of Rs. 34696 /- per AWC. An average of 1237 Kg of vegetable was produced per AWC per year fulfilling the recommended vegetables consumption needs 16-17 people as per FAO standards. Inclusion of mushroom in the regular diet of malnourished children and pregnant woman resulted in enhanced supplementation in amount of protein and micronutrients such as phosphorous, magnesium, calcium, iron and zinc etc. The supplementation of mushroom has resulted in fulfilment of approximately 12% protein, 22% niacin, 8% vitamin B, 43 % Mg and 36 % Zn towards RDA.

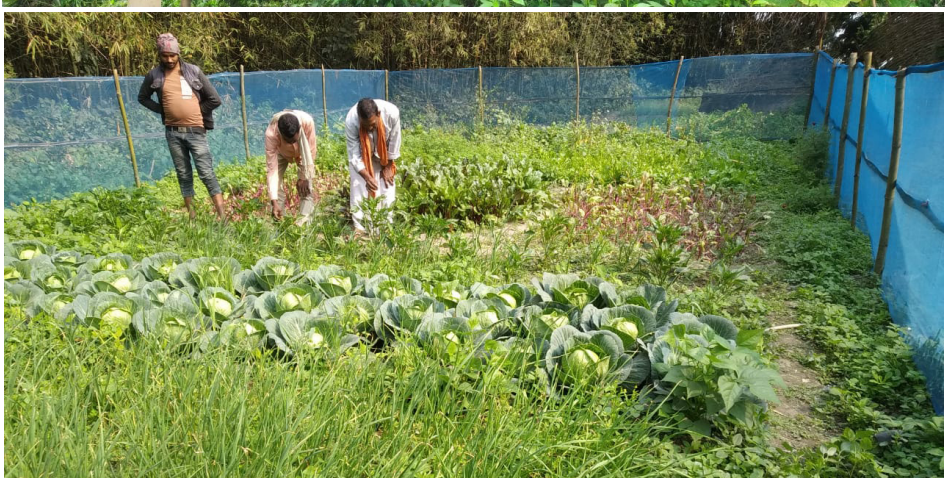
Table 2. Impact of Community Radio Station (CRS) led campaign on Knowledge (K), Attitude and Practice (P) of life style activities related to diet among rural woman and children

Activities promoted by awareness through CRS	Percentage population of practicing Prior to Project (%)	After Implementation	
		K	P
Use of Green Leafy Vegetables in daily diet	50	70	60
Use of mushroom in daily diet	25	75	47
Use Moringa products in daily diet	35	75	50
Hygienic & Scientific Processing and Cooking Methods	25	70	40
Frequency of supplementary Feeding among children	20	65	50
Knowledge on Symptoms of Malnutrition and their care	30	70	40
Knowledge and practice of Nutri-garden	50	80	60
Knowledge on different food groups	25	75	-
Immunization and safe Drinking Water	60	80	65
Level Diet Diversification	35	70	40
Scientific Care in Diarrhea	65	90	70
Care of pregnant and Lactating Women	40	85	60
Anemia management	60	90	55
Care of Children during Illness	50	80	60

Recognition of the model

Due to its remarkable success, the AKAT scheme has garnered government approval for implementation across 18,000 Anganwadi Centers (AWCs) possessing independent land resources within Bihar. The AKAT model's exceptional efforts in combating malnutrition have earned it the prestigious SKOCH award in the health category, highlighting its significant impact.

Contributors of the Model: R K Sohane, R N Singh, Abhay Mankar, Kumari Sharda, Seema Kumari, Anita Kumari, Jyoti Sinha, Brajendu Kumar, Srinivasaraghavan, Tushar Ranjan, Anjani Kumar, Alok Kumar, and Shweta Sahay, Manoj Kumar, Ravi Narayan Parhi and Muneshwar Jha



SKOCH AWARD

HEALTH

SILVER

BIHAR AGRICULTURAL UNIVERSITY, SABOUR

FOR

APNI KYARI APNI THALI (AKAT): AN INNOVATIVE MODEL FOR NUTRITIONAL SECURITY OF RURAL WOMAN & CHILDREN

CONFERRED THIS HONEST INDEPENDENT HONOUR IN INDIA ON 28TH OCTOBER 2020 AT NEW DELHI

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CHAIRMAN, SKOCH GROUP

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CHAPTER - 7

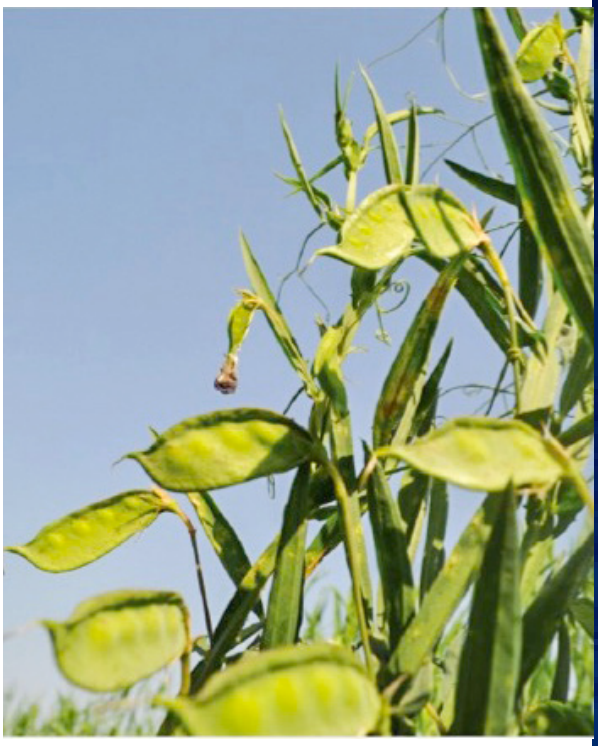
System Approach Extension Model for Popularizing Grass Pea Cultivation

System Approach Extension Model for Popularizing Grass Pea Cultivation

Introduction

The reinvigoration of Grass pea (Lathyrus sativus L.) cultivation holds great significance in the Indian agricultural landscape, especially in regions like Bihar, West Bengal, Odisha, Chhattisgarh, and Madhya Pradesh, where it once thrived. However, the widespread abandonment of grass pea cultivation can be attributed to the presence of a neurotoxin known as ODAP (B-oxalyl-L-a,ß-diaminopropionic acid), which, when ingested in substantial quantities, led to lathyrism. In this context, Bihar stands out with its existing cultivation of local grass pea varieties across approximately 50,452 hectares, resulting in a total production of 51,379 metric tons and a productivity of 1,018 kg/ha. The revival of grass pea has gained momentum with a policy change that lifted the ban on low ODAP content varieties such as Ratan (Bio L212) and Prateek (LS 157-14). The Department of Biotechnology, Ministry of Science and Technology, Government of India recognized the immense potential and challenges in promoting grass pea cultivation and, in September 2018, sanctioned the Biotech KISAN Project to Bihar Agricultural University, Sabour. This marked a crucial turning point in the efforts to popularize grass pea cultivation in Bihar. The need for this System Approach Extension Model arises from a compelling necessity to reintroduce grass pea cultivation in Bihar, particularly in rice fallow areas and Tal areas, in a safe and sustainable manner. Overcoming initial challenges that included seed procurement and dispelling concerns about grass pea consumption, the model focuses on the adoption of new grass pea varieties using scientifically proven methods.

Strategies for Implementation



Before implementing the System Approach Extension Model for promoting Grass Pea (Lathyrus sativus L) cultivation within the context of Climate Resilient Agriculture in Bihar, a comprehensive Strengths, Weaknesses, Opportunities, and Challenges (SWOC) Analysis was conducted. In terms of strengths, Bihar benefits from available rice fallow areas, historical success with widespread grass pea cultivation, the introduction of new low β-ODAP grass pea varieties with successful pilot demonstrations, the crop's nitrogen-fixing properties, minimal insect and disease infestation, and its established resilience to local climate conditions. Weaknesses include concerns among people regarding neurolathyrism, regardless of the variety of grass pea consumed, and the non-availability of low β-ODAP grass pea seed varieties in the state. Opportunities arise from the potential to expand local grass pea cultivation and improve productivity with low ODAP/BOAA content, thereby contributing to increased pulses production and nutritional security. Additionally, value addition through the creation of various grass pea-based products, the utilization of grass pea leaves as a source of livelihood for landless farm women, and the prospect for researchers to develop new grass pea varieties further enhance the agricultural landscape. Challenges involve addressing public fears related to grass pea consumption, establishing a robust seed supply chain for certified grass pea seeds, developing new grass pea varieties, and exploring the potential for value-added products derived from grass pea dal.

Model Frame work

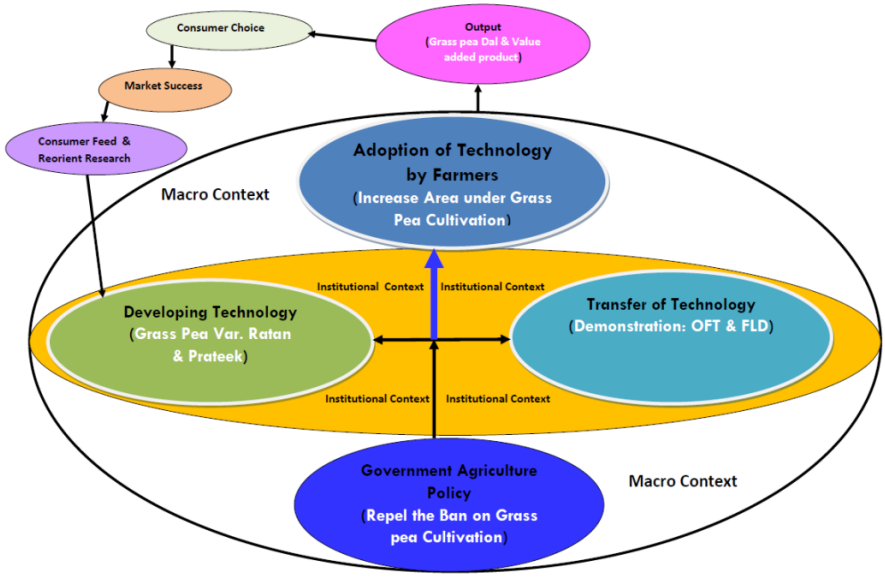


Figure: System Approach Extension Model for Popularising Grass Pea(*Lathyrus sativus* L.) Cultivation under Climate Resilient Agriculture

Implementation Dynamics of the Model

i. Agricultural Policy Shift: The Government of India's decision to repeal the ban on Grass pea cultivation marked a pivotal shift in agricultural policy. Furthermore, the Department of Biotechnology, Ministry of Science & Technology, Government of India, sanctioned a project aimed at popularizing grass pea cultivation in Bihar. This change in the macro context created a significant opportunity for the revival of this crop.

ii. Introduction of New Technology: The development of low β-ODAP grass pea varieties, namely Ratan and Prateek, emerged from research efforts conducted within the institutional context of agricultural research.

iii. Technology Transfer: Krishi Vigyan Kendras played a crucial role in transferring these new grass pea varieties (Ratan and Prateek) to farmers through on-farm trials (OFT) and front-line demonstrations (FLD). In addition to these demonstrations, comprehensive farmer training and awareness campaigns were conducted through initiatives such as Kisan Chaupal and leveraging the power of social media. A technical film on grass pea cultivation is also available at this link: https://www.youtube.com/watch?v=4Z3NJyEumdk&feature=youtu.be)

iv. Technology Adoption: In the 2018-19 rabi season, a total area of 30 acres of farmers' fields was designated for the demonstration of the two grass pea varieties, Ratan and Prateek. During the subsequent rabi season (2019-2020), the cultivation of these two varieties expanded to cover 210 acres of farmers' fields, spanning districts such as Patna, Lakhisarai, and Gaya. While the previous year witnessed the adoption of technology by just twenty-five farmers, the current fiscal year (2019-2020) saw a substantial increase, with a hundred and fifty farmers embracing and practicing this technology.

v. Output, Market & Consumer Choice: Being grass pea was once popular pulse among farmers and also in food habit, fodder and climate resilience, it has already unexplored market. For the last one and half years, the crop received huge attention among farmers and local media. Accordingly, the area under grass pea cultivation has increased seven folds.

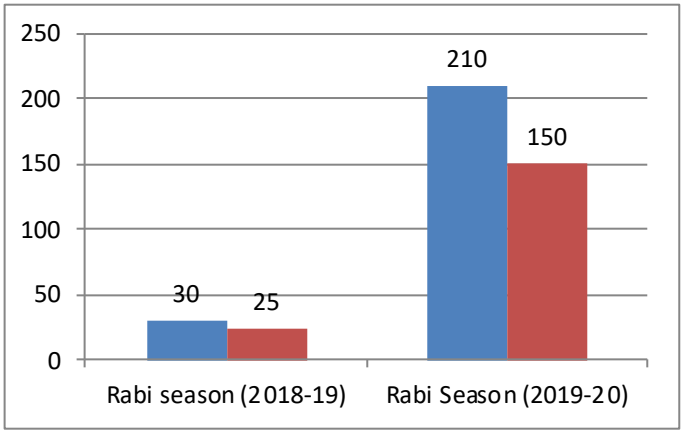


Figure 1. Change in area (in acres) and number of farmers in technology adoption of grass pea (var. Ratan & Prateek) cultivation.

Impact of the Model

a. Enhancing Quality Seed Production: Producing high-quality grass pea seeds, specifically varieties Ratan and Prateek, was a significant challenge due to the lack of a well-established seed chain for these strains in the state. To address this issue, seed demonstrations were conducted in farmers' fields. In the initial year (Fiscal Year 2018-19), a total of 46 demonstrations were organized across 33 acres of farmland in Gaya, Lakhisarai, and Patna districts. The following year (Fiscal Year 2019-20), these demonstrations expanded to cover 210 acres of farmland, totaling 215 demonstrations. Remarkably, within just one year, seed production increased from 160 quintals to an impressive 1050 quintals.

b. Empowering Farmers through Capacity Building: Given the discontinuation of grass pea cultivation for several years, it became essential to enhance farmers' capabilities for cultivating and managing this crop. Training programs were conducted at Krishi Vigyan Kendras and the university's main campus. Each year, every KVK conducted two training programs, focusing on the scientific cultivation, management, and value addition of grass pea. Furthermore, a training program at the university level was organized to raise awareness about scientific practices and strengthen Farmers Interest Groups.

c. Promoting Grass Pea: To encourage grass pea cultivation among farmers, several initiatives were launched by BAU. The university created dramatized audio and video clips for circulation among farmers. Specialized training programs and field day events were organized to promote lathyrus cultivation. Extension literature was distributed to over 2000 farmers through meetings, demonstration programs, and university Kisan melas. Information and Communication Technology played a significant role, as a technical film on the scientific cultivation of grass pea was developed and shared on social media platforms like YouTube, WhatsApp, and Facebook, reaching 9,715 viewers since October 2019. A dedicated WhatsApp group was created for lathyrus farmers to provide instant information and address queries. The technical film was also screened before farmers through the university's Kisan Gyan Rath and distributed via SD cards for areas with limited internet access. Farmers received advisory support through the university's toll-free Kisan Call Centre (Toll-Free Phone No. 18003456455) and the university's WhatsApp Group, Crop Doctor (WhatsApp No. 7004528893).

d. Farmers Interest Group (FIG) in Participatory Grass Pea Seed Production:

With a limited number of recommended grass pea varieties with low ODAP content, it was crucial to establish an effective quality seed production chain. To achieve this, a FIG was formed in each district under the project. BAU introduced a seed buyback policy, aiming to increase growers' income and ensure a sufficient seed supply. Since 2018, when crop promotion began, the university has been purchasing growers' produce for seed production at a rate of Rs. 4500 per quintal. FIGs, consisting of 100 to 115 members, were established in Gaya, Lakhisarai, and Patna districts. Apart from seed production in a participatory mode, FIG activities include facilitating input supply and distribution, promoting lathyrus cultivation among fellow farmers, participating in Kishan Chaupal/Gosthi, training programs, organizing field days in collaboration with KVKs, adding value to lathyrus produce, motivating farmers to join FIGs, and supplying quality seeds to KVKs for distribution before the sowing season.

e. Value Addition of Grass Pea: Efforts have been initiated to help lathyrus growers increase their income through value addition of their produce. Lathyrus, consumed as Khesari Dal with rice and chapati, can also be used in preparing besan. Innovative processes for value addition, such as Gahana Bori, Phul Bori, and extruded products like Kurkure, have been introduced, involving women's Self Help Groups.

Figure 1: Ghahana Bori (Lathyrus-50% & Black Gram-50%). Ready to consume

Figure 2 : Ghahana Bori (Lathyrus-100%) Ready to consume

Figure 3 : Phul Bori ready to consume

Figure 4: Kurkure Ready to Serve

Economic Returns of the model

The economics of the grass pea cultivation model demonstrates its viability and economic sustainability. With a total cost of Rs. 10,836 per acre, the returns are substantial, with a total income of Rs. 36,420 per acre. The benefit-cost ratio (B:C) stands at an impressive 3.36, indicating that for every rupee invested, there is a return of Rs. 3.36, highlighting the profitability of grass pea cultivation. This B:C ratio surpasses that of lentil (1.94) and gram (2.27), underscoring the superior economic prospects of growing grass pea. In summary, the model's economics reveal that grass pea cultivation is not only financially rewarding but also outperforms other legume crops like lentil and gram in terms of profitability. Hence this 'System Approach Extension Model for Popularising Grass Pea(Lathyrus sativus L) Cultivation under Climate Resilient Agriculture in Bihar' may be recommended for out-scaling

Success storie of model

Story of Successful Grass Pea Grower
Name of Farmer: Mr. Sanjit Kumar Kushwaha
Father Name: Shri Surya Kumar
Address: Manjhla Bigha, Pandark,
Dist.: Patna
Total Area: 2 Acres (Year 2020)
Yield Received: 4.87 Quintals/Acre

Project Benefit Accrued:

Land Situation	Utilisation of land before 2018	Utilisation of land after 2018
Rice Fallow	Fallow & Zero Return	Cultivation of Grass pea. Net Income Rs.10,740/ acre

It was altogether a new experience for Shri Sanjit Kumar Kushwaha a small farmer of Manjhla Bigha village in Pandark block of Patna district when he started Grass pea cultivation a little more than two years back. Almost a forgotten crop, cultivation of Lathyrus or grass pea commonly referred as Khesari has picked up substantially in state since crop is being promoted by Bihar Agriculture University (BAU), Sabour under Biotech KISAN Hub project, funded by Department of Biotechnology, Ministry of Science & Technology, Govt. of India. Cultivation of two new varieties of grass pea Ratan and Prateek is being promoted by BAU of late. Encouraged by BAU scientists it was first time in 2018 Kushwaha decided to take up cultivation of

climate resilient remunerative crop with support from Krishi Vigyan Kendra, Patna. Initially hesitant about beginning cultivation of a crop discouraged in past it was institutional support apart from encouragement of scientists that helped immensely in motivating him for lathyrus cultivation in his one acre of agricultural land. Khesari or grass pea however was not a new crop for ancestors of Kushwaha. The crop used to be cultivated by them more than a decade back since Kushwaha took to farming. Grass pea cultivation was gradually discontinued by family of Kushwaha after it became matter of common knowledge lathyrus is not safe for human consumption. It was not alone family of Kushwaha in their village had discontinued cultivation of grass pea. Many cultivators in the village alike his ancestors had stopped cultivating grass pea in past because of same reason. In surrounding villages also grass pea cultivation gradually lost popularity as cultivation was discouraged on ground consumption of grass pea was not safe for human health. However, reintroduction of crop that his ancestors had once discarded proved beneficial for Kushwaha. By taking to cultivation of Ratan and Prateek the new varieties of grass pea, Kushwaha increased his income and also ensured better utilization of his rice fallow land. After a small beginning in 2018 in subsequent year he cultivated new varieties of grass pea in two acres land. He said in forthcoming sowing season he intends to further increase cropping area. Kushwaha is not a solitary example who has increased his income and ensured better utility of his rice fallow land by cultivation of grass pea. Alike him many others have taken to cultivation of forgotten crop during last two years. Corroborating farmers in increased number are showing interest in lathyrus cultivation Kushwaha said grass pea produce also having fodder value could fetch further increased profit for growers provided better facilities are available for marketing produce. He is also active member of Farmer Interest Group formed for increasing area under lathyrus cultivation and also for creation of robust seed chain that could ensure supply of quality seeds to farmers involved in lathyrus cultivation.

(**Acknowledgment:** Biotech KISAN Hub Project, Department of Biotechnology, Ministry of Science and Technology, Govt. of India)

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के सहयोग से जीविका समूहो द्वारा कृषि यंत्र बैंक की स्थापना

CHAPTER - 8

Community Animal Health Centers (CAHC) for creation of affordable & Accessible Animal Health Services

Community Animal Health Centers (CAHC) for creation of affordable & Accessible Animal Health Services

Introduction

In India, the livestock sector plays a significant role in the economy, contributing over nine thousand crore rupees annually. However, its potential remains largely untapped, particularly in states like Bihar, where there is a lack of awareness about scientific animal health management practices and poor access to essential veterinary and nutrition services. These challenges are even more pronounced in remote tribal areas. This is where the innovative concept of Community Animal Health Centers (CAHC) comes into play. CAHC is a model developed by Bihar Agricultural University (BAU) to deliver affordable and accessible animal health services to the doorstep of farmers in these underserved regions. This model seeks to empower local communities, improve access to quality veterinary care and inputs, and continuously monitor and support the provision of animal health services.

Design of the Model

The CAHC model was conceived in response to the lack of awareness and inadequate access to veterinary and animal health services, especially in remote tribal areas of Bihar, where farmers faced considerable challenges in providing adequate care for their livestock. The model, developed under the Tribal Sub Plan Project, consists of three fundamental principles:

Capacity Building of Locals: In each village where the model was implemented, three motivated and interested youth were selected and trained in basic animal health practices, breed management, and nutrition, including artificial insemination, first aid for injured animals, deworming, and vaccination. This capacity building component aimed to equip local youth with the skills and knowledge needed to address the day-to-day

health concerns of livestock effectively.

Creating Access to Quality Inputs: The model ensured that the required stock of medicines, equipment, and veterinary supplies was readily available at the village level. These resources were made accessible to the local community, and their proper utilization was ensured through the maintenance of stock usage and distribution records. The veterinary services and supplies were monitored and backed by the Animal Husbandry Subject Matter Specialist of Krishi Vigyan Kendras (KVKs).

Continuous Monitoring and Backstopping: Regular monitoring of the CAHC activities was carried out to ensure the proper functioning and utilization of resources. The community-operated animal health centers were established within existing government buildings and premises, serving as avenues for seeking animal health services and disseminating awareness about scientific animal health and nutrition management practices.

Implementation of the Model

The CAHC model was initially implemented in five scheduled tribe (ST) dominated villages in Banka district, Bihar, under the Tribal Sub Plan Scheme and the Biotech KISAN hub project. In each selected village, three local youth were trained by Krishi Vigyan Kendra (KVK) Banka to provide paravet services, including vaccination, deworming, artificial insemination, diagnosis of common diseases, and advisories regarding pre and postnatal care of ruminants.

The infrastructure of village Panchayats was utilized to establish Community Animal Health Centers, where basic veterinary facilities were established, and essential products, including veterinary medicines and feed supplements, were stored. Initially, vaccination drives, animal health camps, and awareness programs were organized to sensitize livestock owners to the importance of animal health care and to create a conducive environment for the sustainable functioning of the CAHC. A

mutually agreed-upon arrangement was reached with livestock owners and paravet service providers, who agreed to pay service charges to the trained paravets based on the type of service provided. Initially, all veterinary medicines and vaccinations were provided free of charge to those in need, gradually transitioning toward a partially cost-recovery model.

Impact of the Model

The CAHC model has had a profound impact on the accessibility and affordability of animal health services in remote tribal areas. Some notable outcomes and impacts of the model include:

- A remarkable 79.71 percent reduction in the average cost paid per visit to veterinary service providers.
- 44.92 percent decrease in average transportation charges incurred by livestock owners seeking animal health services.
- 4.7 percent increase in the average number of free animal health services received in the last year.
- Enhanced effectiveness and timeliness of services, with a 1.2 point increase on a 1 to 10 scale and a 52.8 percent improvement, respectively.

Recognition of the Model

The success and effectiveness of the CAHC model have been recognized and celebrated through prestigious awards, such as the National Rural Film Fare Award organized by NIRD, Hyderabad, for the film "UMMEED" featuring the achievements of the model. Furthermore, the model has been recognized and recommended by the Extension Council of Bihar Agricultural University, Sabour. Building on this success, the CAHC model is being scaled up to reach 23 tribal villages in Banka district, nine villages in Kishanganj district, and one village in Katihar district. This expansion aims to further empower rural youth, create employment opportunities for local paravet service providers, and enhance the overall livestock productivity. The CAHC model is bridging critical gaps in delivering veterinary services to farmers' doorsteps, promoting sustainable animal health practices, and improving the livelihoods of communities in remote and underserved regions.

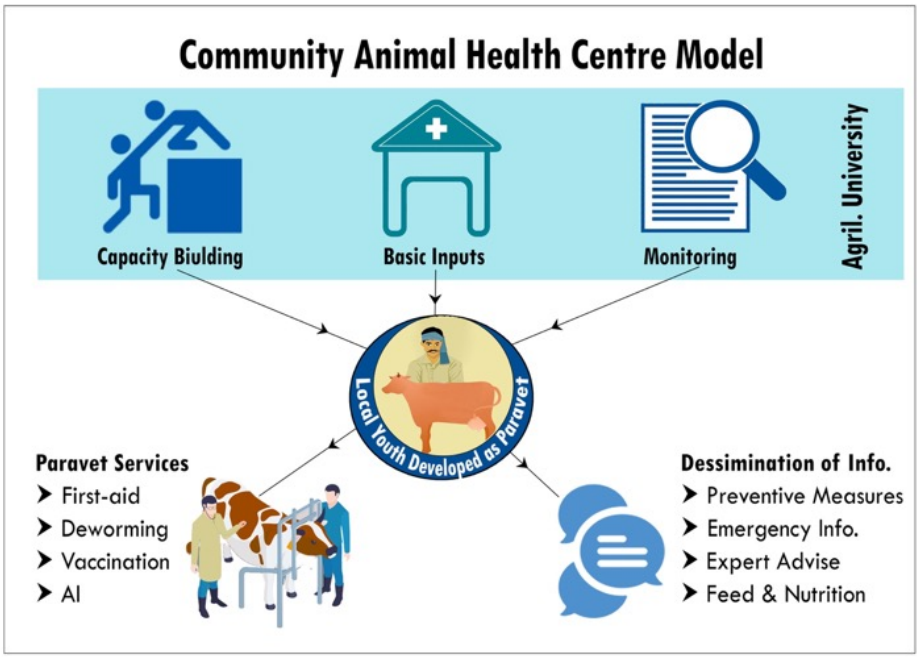
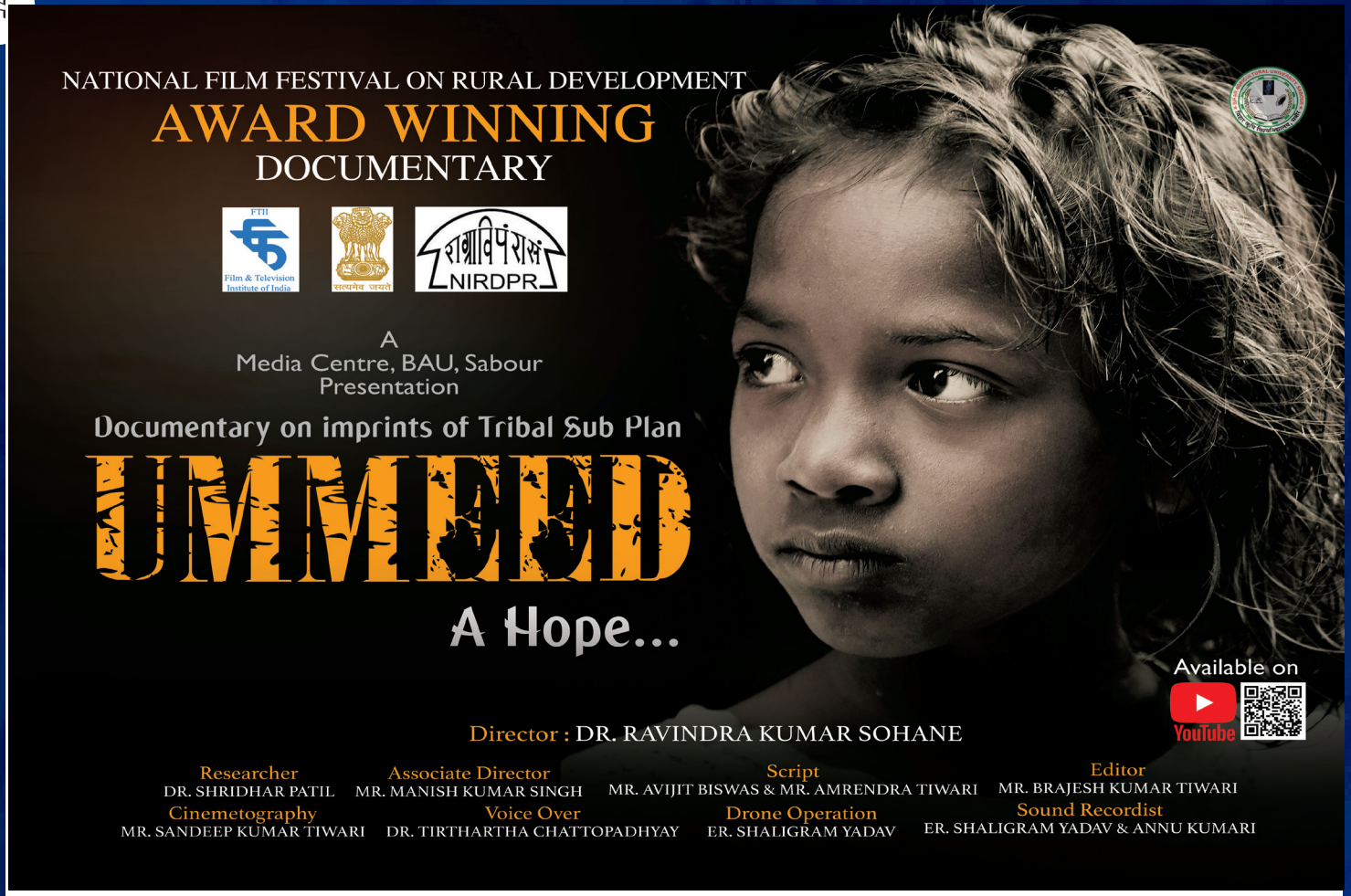


Figure 1. Schematic Representation of Community Animal Health Model

Contributors of the Model: R K Sohane, R N Singh, Mueshwar Prasad, Dharmendra Kumar, Shridhar Patil and Raghubar Sahu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CHAPTER - 9

A model for efficient utilization of paddy straw to avoid crop residue burning and also for providing additional income to farmers

A model for efficient utilization of paddy straw to avoid crop residue burning and also for providing additional income to farmers

Introduction

In India, the issue of crop residue burning, particularly within the rice-wheat cropping system, has emerged as a pressing concern. A shortage of labor and time has forced many farmers to resort to burning rice residues to prepare their fields for the next crop, a practice that contributes to air pollution and reduces the net productivity of the rice-wheat system. This issue is particularly acute in Bihar, with the Rohtas district, known as the rice bowl of the state, experiencing a significant problem with paddy straw burning. Simultaneously, the dairy industry in the region faces a fodder shortage, affecting milk yield. To address these intertwined challenges, Bihar Agricultural University, Sabour, has developed a model that not only curbs paddy straw burning but also provides an innovative solution for utilizing paddy straw as cattle feed, thereby offering an additional source of income to farmers.

Design of the Model:

The model was conceived as a response to the growing concern of crop residue burning in Bihar, particularly in the rice-wheat cropping system. The primary objective is to utilize paddy straw as fodder, thereby reducing the

practice of residue burning. To tackle the labor shortage issue, the model introduces a mechanized straw baler, which efficiently packs rice straw into transportable bales. The collected straw is then procured by the Bihar State Milk Co-Operative Federation Ltd (COMFED) and used for the preparation of feed blocks for cattle.

Implementation:

The implementation of the model was initiated in the Rohtas district of Bihar, specifically in five villages, as a pilot project with financial support from the Bihar government under the Climate Resilient Agriculture Program during Rabi 2020. To achieve its objectives, the model introduced a round straw baler, a cost-effective tool for collecting paddy straw in a transport-efficient form. The round straw baler creates round bundles of straw, each weighing approximately 20-25 kg. This method ensures that the straw is easy to transport and suitable for animal feed production.

To further enhance the model, a linkage was established with COMFED, providing a reliable market for the straw bales. Farmers sell the straw bales to COMFED, with data indicating that an average of 14 quintals of paddy straw was collected from one acre. The average profit from selling paddy straw amounts to Rs. 2800 per acre, far exceeding the additional cost incurred.

The model has been significantly expanded in 2023, thanks to a public-

private partnership. Entrepreneur Banshi Singh successfully collected paddy straw from nearly 1100 acres of land in villages around Bikramganj town. He sold the straw to a Compressed Bio Gas (CBG) plant, which utilizes the paddy straw as raw material for methane and slurry production. This not only benefits the farmers by providing additional income but also helps prevent crop residue burning and significantly reduces greenhouse gas emissions.

Impact:

The model has had a substantial impact on the agricultural landscape in the Rohtas district:

- ❖ It has effectively curbed rice straw burning, reducing environmental pollution.
- ❖ Farmers have gained additional income from selling paddy straw, leading to higher farm productivity.
- ❖ The expansion of the model has demonstrated the positive impact of sustainable agricultural practices, waste management, and the utilization of crop residues for the betterment of the environment and the agricultural community.

Recognition:

The model's success has garnered significant recognition and adoption:

- ❖ It was nationally recognized under the Leadership Role in Curbing Parali Burning by the Agriculture Today group.
- ❖ The Government of Bihar has scaled up the model across major rice-growing districts in the state.
- ❖ Approximately 260 tons of rice straws were procured by COMFED in 2021-22.
- ❖ The model has been recognized and adopted by the Extension Council of Bihar Agricultural University, Sabour.

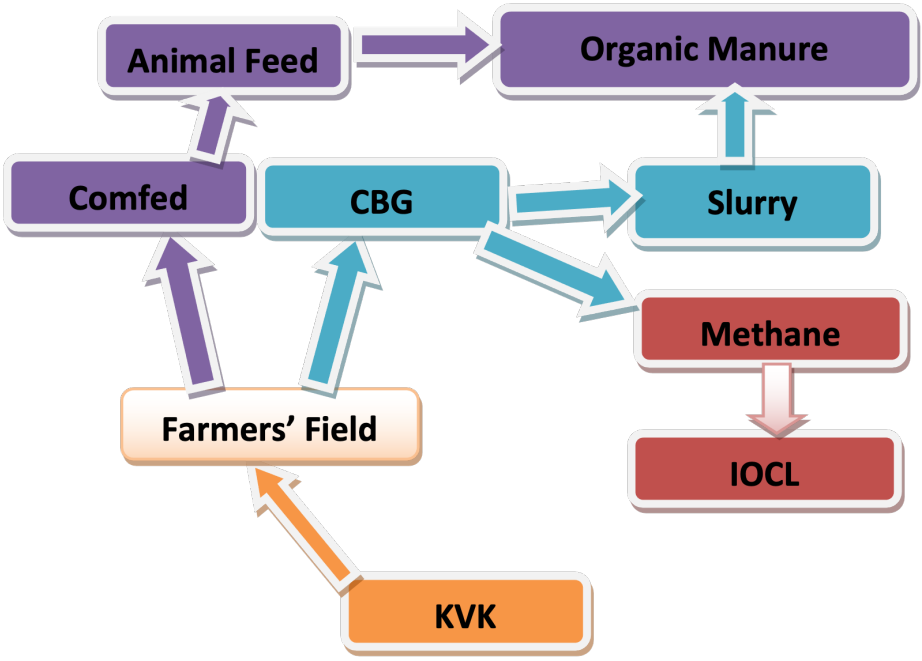

Figure 1. Schematic representation of Utilization model of paddy crop residue

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