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भाकृअनुप-म.गाँ.स.कृ.अ.सं.
एक परिचय
ICAR-MGIFRI
at a glance

भाकृअनुप-महात्मा गाँधी समेकित कृषि अनुसंधान संस्थान
ICAR-MAHATMA GANDHI INTEGRATED FARMING RESEARCH INSTITUTE
Piprakothi, Motihari, Bihar, India 845 429

संक्षिप्त प्रोफ़ाइल

भाकृअनुप–महात्मा गांधी समेकित कृषि अनुसंधान संस्थान आईसीएआर का एक नया संस्थान है, और यह एनआरएम प्रभाग के तहत कार्य कर रहा है। इसे अगस्त, 2015 में आईसीएआर के पत्रांक संख्या 1 (1)/2015–पीआई एंड एम, दिनांक 03/08/2015 के माध्यम से, संस्थापित किया गया था। इसकी आधारशिला 21 अगस्त 2015 को पूर्व केंद्रीय कृषि मंत्री श्री राधा मोहन सिंह ने रखी थी। प्रारंभ में इसे समेकित खेती पर राष्ट्रीय अनुसंधान केंद्र (एनआरसीआईएफ) के रूप में जाना जाता था, बाद में पूरे क्षेत्र में खाद्य और पोषण सुरक्षा सुनिश्चित करने के लिए बाढ़ प्रवण, बाढ़ प्रभावित और जलभराव वाले क्षेत्रों जैसे पारिस्थितिक तंत्र में समेकित कृषि प्रणाली मॉडल पर अपना ध्यान केंद्रित करने के लिए 10 नवंबर 2018 को इसका नाम बदलकर महात्मा गांधी समेकित कृषि अनुसंधान संस्थान (एमजीआईएफआरआई) कर दिया गया। संस्थान का मुख्य फोकस बाढ़–प्रवण और जलभराव वाले क्षेत्रों और अन्य जलवायु चुनौतियों से प्रभावित छोटे और सीमांत किसानों को लाभ पहुंचाने के लिए कृषि प्रणाली मॉडल विकसित करना तथा किसानों सहित सभी हितधारकों के लिए क्षमता निर्माण करना है।

भाकृअनुप–महात्मा गांधी समेकित कृषि अनुसंधान संस्थान, पूर्वी चंपारण जिला, बिहार में स्थित है, जो बुनियादी ढांचे, अनुसंधान क्षेत्रों और तालाबों के निर्माण के साथ लगभग 25 एकड़ के क्षेत्र को कवर करता है। इसके भौगोलिक निर्देशांक लगभग 26° 32' 45" उत्तर अक्षांश और 84° 55' 47" पूर्व देशांतर हैं, जिनकी औसत ऊँचाई 142 मीटर है, जो बिहार के पिपराकोठी में NH 27 पर स्थित है। यह पटना हवाई अड्डे से लगभग 150 किमी और दरभंगा हवाई अड्डे से लगभग 125 किमी दूर स्थित है।

अधिदेश / उद्देश्य

- बाढ़ प्रवण और जलभराव वाले पारिस्थितिक तंत्र के लिए स्थान–विशिष्ट समेकित कृषि प्रणाली मॉडल के लिए अनुकूली अनुसंधान
- समेकित कृषि प्रणालियों को बढ़ावा देने व किसानों के लिए व्यावसायिक और उन्नत प्रशिक्षण केंद्र

पांच प्रमुख कार्य क्षेत्रः

- बाढ़ प्रवण, बाढ़ प्रभावित और जलभराव वाले क्षेत्रों का चित्रण, स्थिति विश्लेषण और मानचित्रण,
- जलभराव पारिस्थितिकी वाले मिट्टी की विशेषता और पोषक स्थिति का आकलन,
- पानी से भरे पारिस्थितिक तंत्र के लिए आईएफएस प्रौद्योगिकी / पैकेज / मॉडल का डिजाइन और विकास,
- बाढ़ के बाद फसल प्रबंधन, कुशल जल प्रबंधन प्रौद्योगिकी का डिजाइन और विकास
- आईएफएस के विभिन्न घटकों पर किसानों और अन्य हितधारकों की क्षमता निर्माण

अनुसंधानः ऑन–स्टेशन और किसानों के क्षेत्र में (दोनों)

- बाढ़ प्रवण और जलभराव वाले क्षेत्रों का चित्रण, स्थिति विश्लेषण और मानचित्रण
- भूमि को आकार देकर समेकित खेती के माध्यम से जलभराव वाले क्षेत्रों का प्रबंधन (फसल–बागवानी–मछली–जल शाहबलूत–मखाना)
- फार्म–तालाब आधारित समेकित मछली, मुर्गी पालन, ऑन–डाइक बागवानी आईएफएस कृषि
- जलभराव वाले क्षेत्रों में चावल–मछली–बतख समेकित खेती
- बाढ़ के बाद फसल प्रबंधन, कुशल जल प्रबंधन प्रौद्योगिकी का डिजाइन और विकास
- जलभराव की स्थिति के लिए कम लागत वाले कृषि उपकरण और मशीनरी का डिजाइन और विकास

अनुसंधान और क्षमता निर्माण

1. सर्दी के मक्का के साथ आलू की अंतरफसल (1:1 अनुपात) और फिर मूंग की बीन की खेती, केवल आलू या मक्का की तुलना में अधिक लाभकारी है। रिकॉर्ड की गई उपज मक्का + आलू प्रणाली में आलू के समकक्ष 246.09 और 246.69 क्यू/हेक्टेयर थी, जबकि केवल आलू में 221.43 क्यू/हेक्टेयर थी, और सबसे कम मक्का में केवल 51.53 क्यू/हेक्टेयर थी। यह प्रथा पारंपरिक मक्का या आलू की प्रणाली से बेहतर है और आय में वृद्धि और मक्का चारे की उपलब्धता भी सुनिश्चित करती है।
2. बाढ़ के बाद के प्रबंधन योजनाओं द्वारा यह पता चला कि समय पर सर्दी के मक्का की बुवाई और सर्दी के सब्जियों की खेती से अतिरिक्त शुद्ध आय प्राप्त की जा सकती है। बाढ़ के बाद के प्रबंधन हस्तक्षेपों से B:C अनुपात 1.55 से 3.05 तक बढ़ गया। मक्का जैसी वैकल्पिक फसलों की समय पर बुवाई से नियंत्रण की तुलना में लगभग 16,700/– प्रति हेक्टेयर अतिरिक्त शुद्ध आय हुई। सब्जियों की खेती से किसानों की शुद्ध आय 33,200 से 37,700 प्रति हेक्टेयर बढ़ी।
3. अध्ययन किए गए पारिस्थितिकी तंत्रों से कुल 43 मछली की प्रजातियों का रिकॉर्ड और पहचान की गई है। विविधता सूचकांकों के अनुसार महुआवा मौन मछलियों की प्रजातियों के हिसाब से सबसे विविध था। जल के मानकों के विश्लेषण से पता चला कि मोतीझील अन्य जल निकायों की तुलना में सबसे अधिक प्रदूषित था, क्योंकि यह मोतिहारी नगर के बीच में स्थित है और लाखों लीटर अवचालित सीवेज सीधे इस झील में बहा दिया गया है। करिया मौन से नोटप्टेरस नोटप्टेरस की स्टॉक मूल्यांकन की गई और अत्यधिक शिकार दर के कारण पॉपुलेशन पैरामीअर मे जनसंख्या की स्थिति को अत्यधिक शोषित पाया।
4. गन्ने की पंक्तियों के बीच इंटरक्रॉप के रूप में सेस्बानिया एकुलेटा, फिर 15 दिन बाद जिंक का मिट्टी में प्रयोग और खुदाई से 93.52 टन/हेक्टेयर गन्ने की उपज और 11.27 टन/हेक्टेयर गन्ना की उपज मिली। शुद्ध लाभ और B:C अनुपात भी अधिक था (139353/हेक्टेयर और 1.88) जबकि अनुशंसित प्रथा में जिंक के बेसल आवेदन से (109493/हेक्टेयर और 1.74) कम था।
5. पूर्वी चंपारण जिले, बिहार में जलमग्न पारिस्थितिकी तंत्र के तहत छोटे और सीमांत किसानों के लिए बकरियों पर आधारित समेकित कृषि प्रणाली (IFS) का विकास।
6. संरक्षण कृषि (CA) प्रथा के तहत विभिन्न अवशेष पुनः उपयोग स्तरों में गेहूं और धान की फसलों का प्रदर्शन किया गया और पारंपरिक जुताई प्रथाओं के साथ तुलना की गई। यह पाया गया कि संरक्षण कृषि (CA) प्रथा में पारंपरिक जुताई प्रथा की तुलना में महत्वपूर्ण रूप से उच्च अनाज की उपज दर्ज की गई। सभी संरक्षण कृषि प्रथाओं में 50% अवशेषों के साथ बिना जुताई का प्रदर्शन सर्वोत्तम पाया गया।
7. उत्तर बिहार की स्थितियों में धान–मक्का प्रणाली में सर्दी की मक्का में सिंचाई जल बचत तकनीकों का मूल्यांकन किया गया। इसमें यह पाया गया कि 15 सेंटीमीटर गहराई पर वैकल्पिक फर्रो सिंचाई (AFI) से 38% अधिक उपज मिलती है और जल उपयोग दक्षता 43 किग्रा–1 मिमी–1 है, जो पानी की बचत में 54% की वृद्धि करती है, जो सामान्य सिंचाई की तुलना में अधिक है।
8. बिहार के पूर्वी चंपारण जिले में प्रमुख फलों और सब्जियों के पोस्ट–हार्वेस्ट नुकसान के अध्ययन से यह पता चला कि खुदरा स्तर पर अधिकतम नुकसान (18-30%) और भौतिक प्रकार के नुकसान (2-9%) अन्य प्रकार के नुकसान से अधिक था। भंडारण सुविधा की कमी और पोस्ट–हार्वेस्ट प्रबंधन प्रथाओं की जानकारी और कौशल की कमी के कारण प्रत्येक निर्भर और स्वतंत्र चर के बीच सकारात्मक संबंध पाया गया।
9. मछली/बकरी/मुर्गी आधारित IFS तकनीक, मशरूम उत्पादन तकनीकों, अपशिष्ट और जल प्रबंधन प्रथाओं आदि पर लगभग 90 प्रशिक्षण कार्यक्रम आयोजित किए गए और 1100 से अधिक किसानों और विभिन्न हितधारकों को लाभ हुआ।

रोडमैप

- संरचना विकास–ICAR-MGIFRI एक नया संस्थान है, इसलिए निम्नलिखित संरचना विकास की आवश्यकता है–निदेशक का आवास, कर्मचारी क्वार्टर, प्रयोगशाला उपकरण, वैज्ञानिकों के लिए बैठक व्यवस्था, फर्नीचर, कृषि भूमि सड़क, बायोफ्लॉक, मछली हैचरी, परिसर सौंदर्यकरण और विकास, वाहन पार्किंग शेड, उपकरण शेड, ब्रॉडबैंड इंटरनेट कनेक्टिविटी, टेलीफोन, CCTV आदि।

अनुसंधान और विकास गतिविधियाँ

- जलमग्न और बाढ़ प्रभावित पारिस्थितिकी तंत्रों में मौजूदा कृषि परिस्थितियों पर मृदा, जल, कृषि–विविधीकरण और पर्यावरण पर एक व्यापक डेटाबेस तैयार करने के लिए बेसलाइन सर्वेक्षण का संचालन।
- बाढ़ प्रभावित, बाढ़–प्रवण और जलमग्न क्षेत्रों की पहचान, स्थिति विश्लेषण और मानचित्रण।
- जल–संवेदनशील पारिस्थितिकी तंत्रों में मृदा और पोषक तत्वों की स्थिति की पहचान और निगरानी।
- जल–जमॉव पारिस्थितिकी तंत्रों के लिए IFS प्रौद्योगिकी/पैकेज/मॉडल का विकास।
- डायरा/चौर भूमि में फसल प्रबंधन में सुधार; जल प्रबंधन प्रौद्योगिकी और स्थानीय मछली और फसल प्रजातियों के माध्यम से जल कृषि में विविधीकरण।
- जल उत्पादकता बढ़ाने और उर्वरक उपयोग को घटाने के लिए पारिस्थितिकी–क्षेत्रीय खेती, मांग–आधारित और परिणाम–आधारित अनुसंधान को प्राथमिकता देना; पारिस्थितिकी–क्षेत्र में भूमि उत्पादकता बढ़ाने में सूक्ष्म–जल सिंचाई की क्षमता को प्रदर्शित करना।
- जलमग्न परिस्थितियों के लिए कम लागत वाले कृषि उपकरण और मशीनों का विकास।
- वन हेल्थ के लिए कृषि प्रणाली अनुसंधान।

दृष्टिकोण

देश में लगभग 40.0 मिलियन हेक्टेयर क्षेत्र विभिन्न प्रकार के बाढ़ क्षेत्रों और मौसमी जलमग्न क्षेत्रों के तहत आता है, जिसमें लगभग 11.6 मिलियन हेक्टेयर की जलमग्न भूमि है, जिस पर खाद्य पोषण और अजीविका सुरक्षा के लिए, विशेष रूप से वैश्विक जलवायु परिवर्तन और कृषि योग्य भूमि के क्षरण संदर्भ में, तत्काल ध्यान देने की आवश्यकता हैं।

The Institute- ICAR-MGIFRI

The ICAR-Mahatma Gandhi Integrated Farming Research Institute (MGIFRI), formerly known as the National Research Center on Integrated Farming, was established on August 21, 2015, to serve as a national hub for research and development in integrated farming systems. The foundation stone of MGIFRI was laid on August 21, 2015, at Piprakothi, Motihari, covering an area of 25 acres (10 ha). The construction of the office-cum-laboratory building, the boundary wall, and the development of the farm area commenced in June 2017. Currently, the institute's research farm spans 5.1 hectares. Additionally, the foundation stone for the Farmers' Hostel and Training Hall was laid. In May 2017, six scientists joined the institute, and a camp office was established at KVK, Piprakothi, Motihari, and effective July 1, 2017. Initially, administrative operations were managed from the camp office of ICAR-RCER, Patna. However, with the appointment of F&AO, AO, and AAO, an independent administrative setup was formally established at ICAR-MGIFRI in 2023. The institute saw significant progress under the leadership of its first regular director, Dr. K.G. Mandal, who led from July 2021 to October 2024. However, currently 45% of scientific positions and regular RMP remain vacant, posing a challenge to the full implementation of multidisciplinary research. To strengthen the institute's workforce, several administrative, technical, and assistant positions are in the process of being filled, ensuring a more robust working capacity.

Mission

Developing site-specific, cost-effective and demand-driven integrated farming systems for flood-prone and waterlogged ecosystems

Mandate

- Adaptive research for location-specific integrated farming system models for flood-prone and waterlogged ecosystems
- Centre for vocational and advanced training to the farmers to promote integrated farming systems

Vision

Sustainable management of natural resources and diversified farming for achieving food, nutrition and livelihood security in the country

Objectives

- To develop and demonstrate location-specific and farmer-centric integrated farming system models involving fishery and animal components.
- To act as a repository of information on all aspects of integrated farming.
- To facilitate and promote coordination and dissemination of the technology for integrated farming through network/consortia approach involving ICAR institutes, state agricultural universities, and other agencies.
- To provide scientific leadership and act as a centre for vocational as well as advanced training to promote the technologies related to integrated farming.
- To collaborate with relevant national and international agencies in liaison with state and central government departments for technology dissemination.
- To provide need-based consultancy and advisory support in promoting integrated farming.

Flooding & waterlogging and genesis, rational of the Institute

In eastern India, waterlogging problems are associated mainly due to riverine, cyclonic floods and, flash floods. Expansion of urbanization and infrastructural developments (express highways, industries etc.) has also increased the waterlogging areas particularly during normal to heavy rainfall condition. In Bihar, waterlogging problem is the most serious and it occurs in about 0.8 million ha every year due to flooding from Nepal-based rivers viz. Gandak, Burhi Gandak, Bagmati, Koshi, Kamla-Balan etc. In Bihar, 28 districts out of 38 are flood-prone, and 15 are the most vulnerable accounting for 17% of total flood-affected area of the country. Some of the major causes of waterlogging in the Gandak command include release of excess water during monsoon season in the canal system. The damage due to riverine flood is widespread in Bihar, as the overflow affects rivers in their downstream. The degree of riverine flood is increased over years due to high siltation in the river catchment areas making them disastrous. The excess water causes anaerobic environments in the rhizosphere of the plants which results in poor gas exchange. Available data show that perennial and seasonal waterlogging occurs in about 11.6 million ha in the country. Hence, natural resource management of these

agroecosystems is very challenging for sustainable agricultural development and farmers' welfare. Integrated Farming System (IFS) offers a sustainable solution by diversifying agricultural activities, optimizing resource use, and enhancing resilience to extreme weather conditions under flood-prone and waterlogged ecosystem. With this background, Scientists of ICAR-MGIFRI, Motihari are working with five major action areas.

Action areas of institute

- Delineation, situation analysis and mapping of flood-prone, flood-affected and waterlogged areas.
- Characterization and monitoring of soils and nutrient status of water congested ecologies.
- Design and development of IFS technology/ packages/ model for water congested ecosystems.
- Post-flood crop management, design and development of efficient water management technology.
- Capacity building of farmers and other stakeholders on different components of IFS.

Achievements So Far….

Externally funded project:

Development of fish-based integrated farming system models for water congested ecologies of eastern India

Crop+fish+duck IFS Model:

- Location & Farmer Details: Established on 1200 m² at Madhubani Panchayat, Sangrampur, East Champaran, Bihar (26°32'15" NL, 84°46'34" EL); Farmer: Sh. Manoj Tiwari.
- Yield Performance: Average fish equivalent yield recorded at 5.75±0.50 t/ha/year.

Fish+goat IFS model:

- IFS model was established at Bariaria village, Sangrampur, East Champaran, Bihar (26°29'9.22" NL, 84°42'31.56" EL) on 2000 m² (1000 m² for crops, 1000 m² for fish pond); Farmer: Sh. Yetendra Kashyap.
- Yield Performance: Average fish productivity recorded at 5.36±0.28 t/ha/year.

Fish+poultry IFS model:

- This IFS model was established at Hardiyabaad village, Chakia, East Champaran, Bihar (26°48'19.08" NL, 84°95'33.68" EL) on 1200 m²; Farmer: Sh. Satyapriya Ranjan.
- Yield Performance: Average fish equivalent yield recorded at 4.75±0.35 t/ha/year.

Fish+buffalo IFS model:

- An old pond 3000 m^2 was adopted and developed as a fish-cum-buffalo IFS model at Bedivan Madhuban village, Pipra, East Champaran, Bihar (26°51'41.77" NL, 85°00'19.65" EL): Farmer: Sh. Baua Pandey.
- Yield Performance: Average fish equivalent yield recorded at 4.25±0.26 t/ha/year.

Fish-cattle IFS model:

- This IFS model was developed in 1200 m^2 at 26034'31.32" NL and 84056'11.45" EL in Surajpur village, Piprakothi, East Champaran. The name of the farmer is Sh. Rajesh Kumar Singh.

Fish-based IFS models:

- A fish + poultry + on-dyke fruit crops (model 1) & a fish + poultry + duck + on-dyke fruit crops (model 2) IFS models were evaluated the research farm of ICAR-MGIFRI, Piprakothi ($26^0$32'55.21" NL and $84^0$56'17.60" EL). The average fish equivalent yield found to be 5.7 t/ ha/ year and 6.25 t/ ha/ year from model 1 and model 2, respectively.

Assessment of Ichthyofaunal biodiversity & stock assessment of the selected fish species from wetland ecosystems in Bihar

- A total of 43 fish species have been recorded and identified from the studied ecosystems based on their morphological features. Diversity indices resulted that Mahuawa maun was the most diverse in terms of number of fish species. Water parameter analysis revealed that Motijheel was the most polluted water body than that of others, as it is situated at the middle of Motihari town hence millions of litres untreated sewage has been directly discharged into this lake. Stock assessment of Notopterus notopterus from Karariya Maun was done, and its population parameters revealed status of population as overexploited due to high fishing mortality rate.

Soil application of zinc after in-situ green manure as intercrop in sugarcane in calcareous soil

- Best practice: Green manuring of Sesbania aculeata in sugarcane rows, followed by zinc application (15 days after turning & hoeing), resulted in 93.52 t/ha cane yield and 11.27 t/ha sugar yield.

- Economic benefits: Highest net return (1,39,353/ha) and B:C ratio (1.88) compared to other zinc application methods.

Performance of intercrop maize with potato after flood in East Champaran

- Intercropping of winter maize with potato (1:1 ratio) followed by cultivation of moong bean is beneficial over sole potato or maize. Yields recorded were similar to potato equivalent yield of 246.09 and 246.69 q/ha under potato + maize as compared to 221.43 q/ha under potato sole, with while lowest being in maize sole (51.53 q/ha).
- This practice has benefits over the traditional system of sole maize or potato and also leads to increased income and availability of maize fodder.

Assessment of fish-based integrated farming models under floodplain

IFS Components & Management:

1. IFS-1: 800 poultry birds (Vanraja) per hectare and on-dyke crops (banana, lemon, guava).
2. IFS-2: Khaki Campbell ducks were added alongside poultry.
3. Water quality parameters (pH, temperature, dissolved oxygen, alkalinity, hardness) were monitored.

Economic & Energy Efficiency:

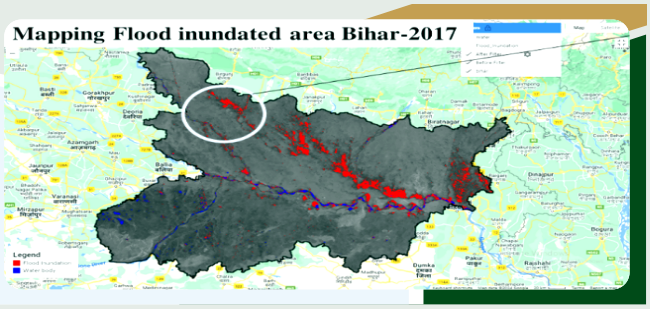
1. B:C ratio: 1.32 (control) vs. 1.60 (IFS models), indicating better profitability in IFS.
2. Energy use efficiency: Highest in IFS-2 (0.69), followed by IFS-1 and control

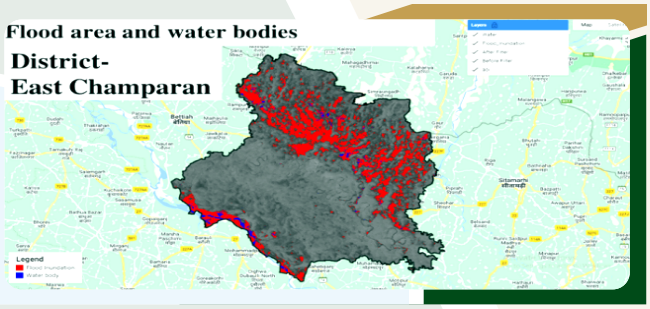
Multi-Output Benefits:

1. IFS models provided multiple outputs such as fish, eggs, and fruits, making them more economically viable and sustainable.

Delineation of flood-prone and waterlogged areas of Bihar

- The study effectively delineated and mapped flooded areas of Bihar using Sentinel SAR 1 A, C band image from 2017-2023 in google earth engine. Among the different river basin, districts falling in Kosi, Gandak, Bagmati were largely affected due to flood from 2017-2023.
- Darbhanga was the most affected district due to the flood in August 2017. Apart from this, the eastern part of Samastipur, Khagaria, Katihar, Purnia, Bhagalpur, East Champaran, Munger, and Muzaffarpur were affected by floods in 2017.
- Additionally, Bihar experienced flood during 2020 and 2021 in July, August and September. During 2020, distircts falling in Bagmati river basin, Kosi river basin Kamal-balan river basin, and gandak river basin e.g., Supula, Saharsa, Khagaria, Araria, Madhepura, Muzaffarpur, Sheohar, Darbhanga, Begusarai, Samastipur, East Champaran, West Champaran and Madhubani were found largely affected by flood during July-September. Similar results were seen in flood situation during 2021





- More than 1.13-1.60 lakh ha area in Bihar and 5900-9800 ha in East Champaran district were found high to very high flood-prone category respectively.
- The study will be helpful for future flood preventative actions, better land use planning and flood risk management under climate change.

Design and development of low-cost farm implements and machineries for water-logged situations

- Automatic Water Depth Measurement System:

- Battery-Operated Weeder: Innovative, cost-effective solution for efficient weed control.
- Multi-Row Manual Seed Drill:

These are currently in trial & testing to assess real-world performance.

Land shaping for diversification and horti-based IFS models

- Raised & sunken bed system with water depth of 1.0, 1.4, & 1.8 m implemented for better economic output.
- Crop diversification on raised bed and aquatic crops in the sunken beds along with fish based on rainwater availability are being grown.
- The study found that irrespective of models land shaping in form of raised and sunken bed had highly significant yields, productivity and economic returns as compared to non-land shaped waterlogged areas.

Goat based integrated farming models in wetland ecosystem

- Model Comparison: Two models were developed — Model I (Goat-Crop Integration) and Model II (Goat-Crop-Fish Integration) — to support small and marginal farmers in waterlogged areas of North Bihar.
- Land Utilization (0.8 ha): The system allocated 20% for goatery, 45% for field crops, and 35% for horticulture, with an additional 0.2 ha for fishery in Model II. Fruit crops like papaya, guava, and lemon were grown on pond dykes.
- Highly cost effective. B:C ratio in IFS was 3.36 as compare to simple goat farming (1.83)
- This technology has ample potential to increase the income by 2 to 2.5 times, especially for the farmers belonging to small and marginal categories in the region who mostly rear goats as their source of livelihood.
- Innovations & Infrastructure: A low-cost goat housing and feeding manger was developed to reduce input costs and improve farm efficiency.

Post-harvest losses study of major fruit and vegetable crops

- Conducted survey in three villages each from Chakiya, Madhubani, and Pakridayal blocks in East Champaran, covering 15 mango & litchi growers, 15 wholesalers, and 30 retailers per block.
- Post-harvest losses study of major fruits and vegetables of E. Champaran district of Bihar shown that maximum losses at retailer level (18-30%) and physiological type of losses (9-2%) was highest in comparison to other types of losses. Lack of storage facility and lack of knowledge & skill of post-harvest management practices had shown a positive relationship between each dependent and independent variable.
- Causes of Losses: Physiological & pathological losses (>10%) were highest at storage and retailer levels, mainly due to poor cleaning, lack of storage, and inadequate post-harvest management skills.
- Key Findings: Limited storage facilities and lack of awareness were major factors contributing to losses, highlighting the need for improved post-harvest handling and management practices.

Water saving irrigation techniques for winter maize:

- Evaluation of irrigation water saving techniques in winter Maize in rice maize system under North Bihar conditions revealed that Alternate furrow irrigation (AFI) at 30 cm depth gives the 38% higher yield with a water use efficiency of 43 $kg^{-1}mm^{-1}$ resulting in a water-saving of 54% compared to flooding irrigation

Technology developed by ICAR-MGIFRI

Goat-based integrated farming system for small and marginal farmers in waterlogged ecosystem of Bihar (PI- Dr. P.K. Bharti, Co-PI- Dr. S.K. Purbey, Mr. Ravi Kumar)

- Total area IFS model: 0.8 ha (400 m^2 for goat housing etc., 1200 m^2 fodder, 3200 m^2 crop, 2400 m^2 horti, 800 m^2 fish pond;
- Return on investment IFS (ROI): 2.77
- Return on investment goat farming (ROI): 1.47

System benefits

- It is highly remunerative for small and marginal farmers
- Increases bioenergy use efficiency
- Increases resource recycling and
- Reduces use of fertilizer in crops

Farmers FIRST Programme- Improving livelihood of small farmers through good practices in agriculture, fisheries and animal husbandry in the East Champaran region

- Input/ agri-items provided (direct benefit to farmers): 3378 beneficiary
- Training/ capacity building of farmers: 8 Nos, 376 beneficiary
- Animal health camp: 3 Nos, 304 beneficiary
- On-farm demonstration: 249 Nos, beneficiary 1984

SC-SP Scheme

- Beneficiary Reach: Over 20,000 SC farmers (69.9% male, 30.1% female) benefited through training, awareness programs, input distribution, and infrastructure development.
- Capacity Building: 38 HRD programs (trainings, awareness sessions, goshthis, and kisan melas) conducted, focusing on integrated farming, goatery, poultry, fishery, and value addition; benefitting 9,867 SC farmers (65.6% male, 34.4% female).
- Farm Input Distribution: Farm tools/machineries (sprayers, threshers, weeders, chaff cutters, storage bins, plastic crates, etc.) provided to SC farmers (70% male, 30% female).
- Livestock & Poultry Support: goats (Black Bengal, Barbari, Sirohi) and chicks (Vanraja, Grampriya, Sonali, Kadaknath) distributed, benefiting SC farmers (69.5% male, 30.5% female).
- Seed & Input Assistance: Quality wheat, maize, mustard, moong bean, and guava saplings provided to 1,500 farmers, along with fertilizers, fish fingerlings, and poultry feed for 4,500 farmers.

Capacity building/training programmes

- The institute is having the mandate to conduct training to major stakeholders. The institute has conducted 48 three-day training programs on Integrated Farming System.
- Develop training programs and capacity-building activities for farmers and stakeholders to promote sustainable integrated farming in waterlogged ecosystems.
- Establishing monitoring and evaluation mechanisms to track the impact of IFS interventions on soil health, water quality, biodiversity, and farmers' livelihoods.

Infrastructure Facilities (Auditorium, Guest house)

A number of instruments were procured such as Kjeldahl Aparatus unit with fume hood, pH meter, EC meter, Hot Air Oven, Single Distillation unit, Double Distillation unit, BOD Incubator, UV double beam Spectrophotometer, Ice-flake machine, PCR, Gel electrophoresis unit, Laminar air flow, Autoclave, Egg incubator, Elisa reader, Digital multi-water parameter analyzer, Deep freezer (-200 °C), Refrigerated centrifuge, Trinocular micrscope-Carl Zeiss, Microscope, Lactoscan milk analyser, Colony counter for research activities. The institute is having laboratories, Main Office Building, Auditorium (500 seating capacity) & Farmer's Hostel-cum-Guest House, Fish ponds, Fish nursery pond, small poultry unit, small cattle shed, feed store, goat unit, animal post-mortem house, small duck shed, rain shelter, small threshing floor, small implement shed.




Budget

Total budget approved for different heads of ICAR-MGIFRI is 31.17 cr 2021-2026.

Scientific and Administrative Cadre Strength

The institute has currently only 12 scientific, 5 technicals, 3 administrative and 4 assistants staff against the sanctioned strength of 1 RMP, 22 scientific, 10 technical, 12 administrative position. The sanctioned scientific position represent the various disciplines of Agronomy, Livestock Production Management, Land & Water Conservation Engg, Farm Machinery & Power Engg, Horticulture, Soil Science, Pathology, Entomology, Economics, Extension, Agricultural Meteorology, Poultry Science, Fisheries Resource Management, Agroforestry and Computer Applications.

Services Provided by MGIFRI

- Training to major stakeholders, entrepreneurs, students.
- Need based advisory services on IFS, animal vaccination, health camp.
- Demonstration/exhibition of technologies developed.

New Initiatives: Digital Outreach

- Outreaching through Facebook, Twitter, website, YouTube and What's app
- Newspaper publication since 2021: 53
- Kisan Mela-7
- MoU with a-IDEA, ICAR-NAARM, Hyderabad for promotion of entrepreneurship in IFS, ICAR-NRC Litchi, Muzaffarpur for Collaborative Research and Training on IFS, SNS College, Motihari (B.R. Ambedakar Bihar Univ, Muzaffarpur), Bihar for training on industrial fisheries, DrRPCAU for research and dissertation (MSc & PhD students).

Plan for Coming 5 Years- ICAR-MGIFRI

R & D activities

- Delineation, characterization and monitoring of soils and nutrient status of water-congested ecologies
- Development of IFS technology/ packages/ model for water-congested ecosystems
- Improved crop management in diara/ chaur lands; efficient water management technology
- Diversification in aquaculture through indigenous fish species
- Aquatic crop and horticulture-based IFS
- Low-cost farm implements & machineries for waterlogging situations

Revenue generation

- Mobilization through external funding, CSR funding, state Govt dept, sponsored training, consultancy; Sapling, seed production etc.

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Director, ICAR-MGIFRI
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Editorial team
Dr. S.K. Purbey
Dr. A.K. Singh
Dr. P.K. Bharti
Dr. Ravi Kumar
Dr. Shreya Nivesh
Dr. Koushik Banerjee
Er. Vikas Paradkar

Compiled and designed by
Dr. Koushik Banerjee
Scientist
ICAR-MGIFRI

For further information please contact:
Director, ICAR-MGIFRI
Piprakothi, Motihari
Bihar-845429
Email. director.mgifri@icar.gov.in
Web: https://mgifri.icar.gov.in/-2281162