STRATEGIC RESEARCH & EXTENSION PLAN

ATMA Rohtas

Department of Agriculture

Government of Bihar

Strategic Research & Extension Plan

[ATMA, ROHTAS]

Disclaimer: The SREP has been prepared based on data provided by the office of PD ATMA, Rohtas.

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FOREWORD

The district of Rohtas was formed as a result of the reorganization of districts in the state in 1972, when it was separated from the Shahabad district. Rohtas is part of the Patna division, with its administrative headquarters located in Sasaram town. The area is bounded by the Son River to the east, the Kaimur hills to the south, and the Karmanasa River to the west. Agriculture serves as the main livelihood for nearly 80% of the population. The four primary cropping seasons in the district are Bhadai, Agahani, Rabi, and Garma. Major crops cultivated here include paddy, maize, wheat, oilseeds, and pulses.

ATMA (Agricultural Technology Management Agency) Rohtas, Sasaram has prepared the SREP in consultation with local farmers, taking into consideration their needs and aspirations through Participatory Rural Appraisal methodology (PRA). The program proposed to be undertaken in the SREP is demand-driven, agro-eco situation-specific, and multi-disciplinary in nature.

'SREP' serves as the basic document that outlines the goals to be pursued in program services, as well as the mode of implementation and effective utilization of all available resources. It has been prepared in consultation with farmers from various blocks in the district, taking into consideration their needs and aspirations through Participatory Rural Appraisal (PRA) methodology.

I extend my sincere thanks to the Project Director, ATMA, Rohtas, and district heads of all departments for coordinating their efforts in bringing out this valuable document. I appreciate the technical feedback and guidance provided by the experts of TRUAGRICO and the Facilitator of BAMETI, Patna in the preparation of this document. I hope this document will go a long way in developing a cost-effective and sustainable farming system and facilitate the farming community in achieving increased productivity and prosperity.

18/05/23

Sri Dharmendra Kumar, IAS
District Magistrate
Rohtas

ACKNOWLEDGEMENT

Rohtas district's economy is primarily based on agricultural production. Agriculture is the main occupation and major source of livelihood for the people here and therefore effective planning for extending the extension coverage in Rohtas district is very important. Agriculture Extension in the district depends mostly on Government Set-up i.e. through Agricultural Technology Management Agency (ATMA). Strategic Research & Extension Plan (SREP) plays an important role as a guiding framework for the planning and implementation of extension related activities in the district.

SREP of Rohtas has been prepared based on an assessment demand for extension related activities from various sectors. Based on the information collected from representative villages, present and future extension requirements have been estimated along with multiple strategies to improve the efficiency of the existing extension system through SREP in Rohtas District.

SREP preparation required coordinated efforts by multiple stakeholders and line departments. The efforts made by the ATMA, Department of Agriculture, and the support received from TransRural Agri Consultancy Services (TRUAGRICO) in the preparation of the SREP of Rohtas are acknowledged.

Sri Sudhir Kumar Roy, BAgS

District Agriculture Officer -Cum- Project Director

ATMA, Rohtas

Executive Summary

The Agricultural Technology Management Agency (ATMA) in Rohtas district is an autonomous institution established to ensure the delivery of extension services to farmers. It is guided by a Governing Board (GB) that sets the overall policy direction, supported by the District ATMA Cell, which includes the Project Director (PD), Deputy PDs, and staff. The ATMA Management Committee executes the scheme, and the District Farmers Advisory Committee (DFAC) provides farmer feedback for district-level planning and implementation. ATMA remains the district-level nodal agency responsible for managing the agricultural extension system, including the preparation of a Strategic Research and Extension Plan (SREP).

At the block level, ATMA activities are coordinated by a Block Technology Manager (BTM) and Assistant Technology Manager (ATM), who focus on providing extension services in agriculture and allied sectors based on the priorities of each block. The SREP for Rohtas district is prepared in collaboration with various stakeholders, including line departments, Krishi Vigyan Kendra (KVK), Minor Irrigation Department, NABARD, Animal Husbandry Department, Fisheries Department, Panchayati Raj Institutions (PRIs), private sector, farmers, and others.

The SREP serves several purposes, such as providing an overview of the district's agricultural landscape, identifying problems and opportunities, facilitating long-term strategic planning, and involving various stakeholders in the development process. It also enables the integration and redesigning of ongoing development programs to benefit farmers, supports annual action plans for each block, and promotes farmer-centered, market-oriented extension research management systems.

Updated every five years, the SREP forms the basis for Block Action Plans (BAPs), which are consolidated at the district level to create District Agriculture Action Plans (DAAPs). These DAAPs are integrated into the Comprehensive District Agriculture Plans (CDAPs) under the Rashtriya Krishi Vikas Yojana (RKVY) and are further consolidated into State Extension Work Plans (SEWPs) and State Agriculture Plans (SAPs).

The development of strategies for extension and research in each Agro-Ecological Situation (AES) is a crucial aspect of agriculture planning, and these strategies are designed with input from line departments, KVK scientists, agricultural extension workers, and TRUAGRICO consultants. The strategies are tailored to address specific strategic issues for both extension and research. To ensure a comprehensive approach, the following categories are taken into account when developing strategies:

- Diversification and intensification of existing farming systems: This involves introducing new crops or livestock, integrating different agricultural practices, and optimizing resource utilization to boost productivity and income.
- Improvement of productivity/income from various enterprises/commodities in existing farming systems: Strategies focus on enhancing the sustainability of natural resources while

empowering both male and female farmers to have greater control over the extension system.

- Sustainability of the production system: Strategies aim to balance productivity with environmental conservation, ensuring long-term viability and resilience of the agricultural sector.
- Capacity building of extensionists, researchers, farmers, market players, and other partners such as NGOs: This includes providing training, technical assistance, and resources to strengthen the capacities of all stakeholders in the agricultural sector.
- Dovetailing and re-designing of ongoing schemes of agriculture and other line departments and research institutions in the public, private, and NGO sectors: Strategies aim to align and integrate various programs and schemes for better coordination and efficiency.
- Market-led extension for enhancing profits with a focus on post-harvest technologies and value addition: This approach seeks to improve market access, increase profits for farmers, and promote innovative post-harvest technologies for better product quality.
- Promotion and use of ICT in extension: Strategies encourage the adoption of digital technologies to improve communication, information sharing, and decision-making processes in agricultural extension.
- Promotion of Public-Private Partnerships: Encouraging collaboration between public and private sectors can lead to improved service delivery, innovation, and resource mobilization.
- Mainstreaming Gender concern (Women Empowerment): Strategies should address gender inequalities and promote the active participation and empowerment of women in the agricultural sector.
- Other program components deemed necessary for the project/area: Additional strategies may be developed to address unique challenges or opportunities in specific agro-ecological situations or areas.

Strategies for Agriculture

The Participatory Rural Appraisal (PRA) exercises conducted in three AES of Rohtas district revealed several critical gaps in agricultural practices, particularly in wheat, maize, pulses, and oilseed crops. These gaps affect crop yield, quality, and sustainability. The PRA findings offer insights into proposed extension strategies to address these challenges and improve agricultural productivity.

In wheat cultivation, the use of untreated seeds, delayed sowing, and imbalanced fertilizer application were identified as critical gaps. Extension strategies to address these issues include promoting seed treatment, implementing zero-tillage and selecting suitable varieties for delayed sowing, and advocating for a balanced dose of fertilizers according to package of practices. Encouraging the use of seed-cum-fertilizer drills can help farmers with both sowing and fertilizer application methods. Additionally, promoting the use of recommended doses of weedicides and organic manures, such as PSB, Azotobactor, green manuring, vermicompost, and FYM, can improve overall crop health and yield.

Maize cultivation faces challenges such as imbalanced fertilizer use, pest management issues, low plant population, and weed management problems. To address these gaps, extension strategies include popularizing Integrated Nutrient Management (INM) practices, promoting Integrated Pest

Management (IPM), encouraging optimum plant population, and supporting Integrated Weed Management (IWM), including chemical weed control. Additionally, creating awareness of Quality Protein Maize (QPM) and promoting intercropping in maize can contribute to improved yields and crop diversity.

Pulses cultivation suffers from imbalanced fertilizer use, non-adoption of biofertilizers, inadequate pest and disease management, and poor adoption of improved varieties. Extension strategies to address these issues include encouraging the use of recommended doses of fertilizers, promoting the application of Rhizobium and PSB culture, supporting integrated pest and disease management, and popularizing improved varieties. Motivating farmers to grow pulse crops in rice fallow areas and encouraging proper drainage techniques can also contribute to increased productivity and efficient land use.

Oilseed cultivation is impacted by imbalanced fertilizer use, non-adoption of biofertilizers, inadequate pest and disease management, and poor adoption of improved varieties. Extension strategies to address these challenges include promoting the recommended dose of fertilizers, encouraging the application of rhizobium, vermicompost, and PSB culture, supporting integrated pest and disease management, and popularizing improved varieties. Furthermore, raising awareness among farmers about the benefits of utilizing apiary boxes in mustard fields can enhance pollination and crop yields.

Strategies for Horticulture

The field study revealed several critical gaps in the cultivation of peas, beans, bulb crops, spices, mangoes, vegetables, and post-harvest management. To address these challenges, various extension strategies have been proposed.

For peas and beans, the lack of seed treatment adoption, inadequate pest and disease management, and low adoption of improved varieties and recommended practices are critical gaps. Extension strategies include encouraging farmers to use recommended seed treatment methods, advocating for the use of Integrated Pest Management (IPM) and Integrated Disease Management (IDM), raising awareness for using quality seeds to increase production and income, and promoting the adoption of Package of Practices (POP) for higher yields and income.

In bulb crops like onions and spices such as turmeric, zinger, and coriander, gaps include the absence of recommended package of practices, unavailability of recommended varieties, and inadequate pest and disease management. Proposed strategies involve promoting the adoption of POP, encouraging quality seed production, and popularizing the adoption of IPM and IDM. For onion cultivation, promoting Integrated Weed Management (IWM), including chemical weed control, is also essential.

Mango cultivation faces challenges such as alternate bearing, low application of basal dose of manure and fertilizers, inadequate plant protection measures, mango malformation/sterility, gummosis, and the presence of very high aged trees. Extension strategies include promoting regular bearing cultivars/hybrids, encouraging basal dose of manure and fertilizers, supporting recommended plant

protection measures, advocating resistant varieties and cultural practices, promoting balanced fertilizers and micronutrients, and encouraging rejuvenation/replacement of aged trees. Motivating farmers to adopt post-harvest technology is also crucial for adding value to their produce.

For vegetable cultivation, low area coverage under organic cultivation, lack of interest in rejuvenating orchards, inadequate availability of good quality planting material, and insufficient availability of quality vegetable seeds are significant gaps. Encouraging organic cultivation of vegetables, motivating farmers to rejuvenate their orchards, and supporting the production of quality planting material and vegetable seeds at farmers' fields can help address these challenges.

Improving soil health requires raising awareness about soil fertility, soil property deterioration, and hazardous element accumulation. Promoting fertilizer application based on soil analysis and organizing farmer trainings on soil analysis can help address these issues.

Lastly, post-harvest management faces significant losses due to the lack of facilities. Extension strategies to address these losses include encouraging farmers to construct packhouses, building capacity on post-harvest management, forming farmer groups, and promoting cold storage facilities. These initiatives can help reduce post-harvest losses and increase overall income for farmers in Rohtas district.

Strategies for Animal Husbandry

The field study conducted in Rohtas district for the animal husbandry and dairy sector identified critical gaps in various aspects of livestock management for cows, buffaloes, and goats. To address these challenges, several extension strategies have been proposed.

For cows, the partial adoption of artificial insemination (AI) is a significant gap. Proposed extension strategies include providing awareness about AI with audio-visual aids, intensifying the availability of technical staff, offering refresher training to technical personnel, improving the availability of semen, storage and transportation facilities, conducting fertility improvement camps, and imparting training to para-vets. Furthermore, gaps in adoption of quality feed and fodder, feeding of minerals and vitamins, and intercalving periods can be addressed through awareness programs about animal production capacity, dairy economics, and the importance of feeding minerals, vitamins, and having "a calf a year" as a target.

In terms of healthcare management for cows, intensifying awareness programs about animal health, hygiene, and vaccination, as well as increasing the conduction of animal health camps and mass deworming programs, will be helpful. Capacity building of technical staff at disease diagnostic labs at the block level can also improve healthcare outcomes. Additionally, addressing the partial gap in average milk yield can be achieved through awareness about improved dairy management and economics.

For buffaloes, breed upgradation through artificial insemination, feed management, and intercalving periods can be improved with awareness programs, training, and field visits. Fertility improvement

camps and buffalo calf rallies can also be organized. In terms of healthcare, promoting the adoption of a deworming schedule can be achieved through awareness programs and conducting deworming camps.

In the case of goats, a large gap in adoption of improved breeds can be addressed through awareness programs, training, field visits, and providing improved varieties of male goats suitable for the area. Feed management can be improved by providing awareness programs about the feed and fodder requirements for goats and intensifying the supply of fodder and multipurpose tree seeds. Lastly, for goat healthcare, imparting awareness about the importance of deworming and ectoparasitic control and conducting health care camps can help improve overall goat health and productivity.

By implementing these extension strategies, Rohtas district can improve the productivity and profitability of its animal husbandry and dairy sector, benefiting both livestock and farmers in the area.

Strategies for Fish Production System

The field study conducted in Rohtas district for the fisheries sector identified several critical gaps that hinder the growth and development of this industry. To address these challenges, various extension strategies have been proposed.

Firstly, there is a lack of awareness about the physicochemical parameters of soil and water in fishponds. Creating awareness about these parameters is essential for maintaining a healthy environment for fish growth. Educational programs and training sessions can be organized to educate farmers about these parameters and how they can monitor and manage them.

Secondly, improper stocking measures are prevalent in the district. Promoting proper stocking measures is crucial to ensure optimal fish growth and prevent overcrowding. Extension services can provide guidelines on appropriate stocking densities and offer training on best practices for various fish species.

Additionally, there is a lack of awareness about composite fish farming. Creating awareness about this farming method can help farmers diversify their fish production, optimize the use of available resources, and increase overall productivity. Training programs and field demonstrations can be organized to teach farmers about the benefits and techniques of composite fish farming.
Unscientific feeding is another issue that negatively affects fish growth and productivity. Promotion of scientific feeding methods through training and educational programs can help farmers understand the nutritional requirements of their fish, ensure proper feeding schedules, and ultimately increase productivity and profitability.

Furthermore, the potential of fish farming in water storage village ponds remains unexploited. Efforts should be made to exploit this potential by providing technical support, training, and financial assistance to farmers interested in utilizing these water sources for fish farming.

The marketing of fish through unorganized sectors limits the growth of the fisheries sector. Promoting marketing through organized sectors can help streamline the supply chain, ensure better quality control, and provide better returns for fish farmers. Support for the establishment of fish marketing cooperatives, cold storage facilities, and market linkages can help achieve this goal.

The lack of availability of quality fish seed at the right time and place is another challenge. Encouraging private entrepreneurs to set up fish seed hatcheries can help address this issue, ensuring a reliable supply of quality seed for fish farmers.

The common practice of monoculture in the district can be diversified by promoting the adoption of polyculture or composite culture practices. This can increase productivity, reduce risks, and contribute to better resource utilization.

Lastly, the low adoption of freshwater prawn culture presents an opportunity for growth. Introduction and intensification of freshwater prawn farming can provide farmers with an additional source of income while also diversifying their production systems.

Strategies for Sustainability of Production/ Income

Strategies for Agriculture Sector

One of the key issues is the inadequate and low use of organic manure. To address this, extension services can focus on popularizing improved methods of composting and vermicomposting. By providing training and support to farmers in these techniques, the use of organic manure can be increased, leading to healthier soil and improved crop yields.

Another challenge is the less use and inadequate availability of biofertilizers. Creating awareness about the importance of biofertilizers and promoting their increased production can help address this issue. Educational programs and field demonstrations can be organized to teach farmers about the benefits of biofertilizers and how to produce and apply them effectively.

Depletion of soil fertility due to injudicious use of fertilizers is another major concern. Extension services can promote the application of fertilizers based on soil testing results, which can help maintain soil health and prevent nutrient imbalances. Regular soil testing and the provision of soil health cards can encourage farmers to adopt this practice.

Deficiency of micronutrients is also a critical gap that needs to be addressed. Extension strategies should include promoting the application of micronutrients on the basis of soil test results. By providing farmers with accurate information about their soil's micronutrient levels, they can apply the appropriate nutrients to improve crop productivity and maintain soil health.

Finally, the prevalence of mono cropping systems presents a challenge to the sustainability of agricultural production in the district. Extension services can encourage the adoption of crop rotation and mixed cropping systems, which can improve soil health, reduce pest and disease pressure, and increase overall productivity. Training programs, field demonstrations, and incentives for farmers to adopt these practices can help promote a shift toward more sustainable cropping systems.

Strategies for Horticulture Sector

Depletion of soil fertility is a significant issue in Rohtas, which can adversely impact crop productivity and farmers' income. To address this, extension services can focus on popularizing Integrated Nutrient Management (INM) programs. These programs can help farmers understand the importance of balancing the use of organic and inorganic fertilizers, maintaining soil health, and ensuring optimal nutrient availability for their crops. By providing training, support, and resources, farmers can adopt INM practices that result in healthier soils and improved crop yields.

Another critical gap is the lack of proper cropping systems, which can lead to unsustainable farming practices and reduced crop productivity. Extension services can encourage the adoption of appropriate cropping systems that promote crop diversification and the efficient use of resources. For example, intercropping, crop rotation, and agroforestry can be introduced as viable options for farmers in Rohtas. Educational programs and field demonstrations can be organized to showcase the benefits of these cropping systems and provide guidance on their successful implementation.

Inadequate pest and disease control is another challenge faced by horticulture farmers in Rohtas. Extension strategies can focus on popularizing Integrated Pest Management (IPM) and Integrated Disease Management (IDM) to address this issue. IPM and IDM approaches emphasize the use of a combination of biological, cultural, and chemical methods to control pests and diseases while minimizing the impact on the environment and human health. By organizing training programs, workshops, and field visits, extension services can help farmers learn about and adopt these sustainable pest and disease management practices.

Strategies for Animal Husbandry & Dairy Sector

One significant challenge is the inadequate adoption of artificial insemination (AI) in buffaloes. To increase AI adoption, extension services can focus on raising awareness about the benefits of AI, such as improved genetics, higher milk production, and better disease control. Training programs, workshops, and demonstrations can be organized to help farmers understand the AI process and its advantages. Additionally, efforts should be made to increase the availability of technical staff, provide refresher training, and ensure the accessibility of quality semen and storage facilities.

Infertility problems, including anoestrus and repeat breeding, are common among livestock in Rohtas. To address this issue, extension services can organize fertility improvement camps and provide training on the diagnosis and treatment of infertility issues. Farmers can be educated about proper nutrition, management practices, and the importance of regular veterinary check-ups to prevent and address these problems.

The deworming problem is another critical gap that leads to poor growth and reduced milk production in dairy animals. Extension strategies can focus on imparting knowledge about the importance of regular deworming and its impact on animal health and productivity. Organizing deworming camps, providing training on deworming schedules, and offering guidance on the proper use of deworming medications can help farmers improve their animals' health, milk production, and overall wellbeing.

Inadequate pest and disease control measures can have a significant impact on livestock productivity and income. To address this challenge, extension services can popularize Integrated Pest Management (IPM) and Integrated Disease Management (IDM) for animal husbandry and dairy farming. By organizing training programs and field visits, farmers can learn about the effective combination of biological, cultural, and chemical methods to control pests and diseases while minimizing environmental and health impacts.

Strategies for Fisheries Sector

Renovating ponds can help enhance water retention and ensure an adequate supply of water for fish farming throughout the year. This can be achieved by conducting a thorough assessment of existing ponds, identifying areas for improvement, and undertaking necessary repair and renovation work. Desilting, strengthening pond embankments, and repairing leakages are some of the critical tasks involved in pond renovation. Additionally, proper maintenance of pond structures can also help prevent water loss and ensure the sustainability of fish farming.

Extension services can provide technical assistance and guidance to fish farmers for pond renovation, covering aspects such as structural design, material selection, and construction techniques. This support can be delivered through workshops, training programs, and on-site consultations. Encouraging farmers to access government schemes and financial assistance for pond renovation can further facilitate the process.

Moreover, promoting sustainable water management practices is essential for the long-term conservation of water resources. Extension services can educate fish farmers about efficient water use, recycling, and rainwater harvesting techniques to minimize water wastage and optimize resource utilization. Training programs on effective water management can help farmers understand the importance of water conservation and equip them with the necessary skills to implement sustainable practices in their fish farming operations.

By focusing on pond renovation and sustainable water management practices, extension strategies can significantly contribute to the conservation of water resources and enhance the sustainability of production and income for fish farmers in Rohtas district. This will ultimately lead to improved livelihoods, food security, and economic development for the region.

Strategies for Community Organizations

In Rohtas district, community organization plays a crucial role in ensuring sustainable agricultural development and resource management. Several proposed strategies can help strengthen and empower these community organizations to achieve their objectives in various thrust areas, including diversification, intensification, and natural resource management (NRM).

Diversification: To promote diversification of the farming system, it is essential to organize farmer groups focused on new commodities. Identifying these commodities and assessing their potential can help in forming groups. Partnering with NGOs can facilitate the organization of farmer groups and

provide necessary training for capacity building. This approach will enable farmers to explore new opportunities in agriculture, leading to increased income and sustainable livelihoods.

Intensification: Commodity-oriented groups can improve access to inputs, marketing, and technological support, resulting in agricultural intensification. Identifying success stories and arranging exposure visits for feasible farmer groups can offer valuable insights. Collaborating with NGOs can help organize these groups and provide skill upgradation and empowerment training. This strategy can enhance productivity and income generation for the farmers involved.

Natural Resource Management (NRM) - Women Self-Help Groups (SHGs): Organizing women SHGs focused on NRM can empower women and promote sustainable resource management. Identifying successful SHGs and arranging exposure visits can offer inspiration and motivation. Local NGOs can be involved in organizing SHGs and providing training on record management and capacity building. Facilitating linkages with other institutions can help with credit, input supply, and economic development of the members. Regular meetings can ensure effective decision-making and smooth functioning of the group.

Natural Resource Management (NRM) - Water User Associations (WUAs): The organization of WUAs is essential for efficient canal water distribution and maintenance of the system. Partnering with NGOs can help establish WUAs and provide exposure visits to successful canal areas. Training on water management, canal maintenance, rational water distribution, crop planning, and water rate collection can empower WUAs. Demonstrations on water management and multiple cropping can further enhance their understanding. System improvement and farmer turnover in canal areas can lead to better water resource management and utilization.

1. Introduction

1.1 Background

Extension Reforms in India were piloted in 28 districts across 7 states under the Innovations in Technology Dissemination (ITD) component of the World Bank-funded National Agricultural Technology Project (NATP) between November 1998 and April 2005. The success of this experiment laid the foundation for the launch of the "Support to State Extension Programmes for Extension Reforms" scheme in its first phase starting from 2005-06. Later, the scheme was scaled up to cover 252 districts during the 10th Plan.

The resolution made by the National Development Council (NDC) in the year 2007 highlighted the need for revamping and strengthening the extension system to provide for improving the skill levels of the farming community and harnessing the potential of ICT in villages.

The National Policy for Farmers, 2007 (NPF) envisaged support to State Governments for strengthening the extension machinery through re-training and re-tooling of existing extension personnel. The NPF also stressed on promoting farmer-to-farmer learning by setting-up Farm Schools in the fields of selected farmers, who could lead by example.

After implementing the Extension Reforms scheme from 2005 to 2009 and consulting with State Governments, the Government of India revised the Centrally Sponsored Scheme "Support to State Extension Programmes for Extension Reforms." The revised scheme was modified and strengthened based on the lessons learned, and a detailed circular was issued on April 16, 2010, to assist State Governments in finalizing their Work Plan in a timely manner.

1.2 Support to State Extension Programmes for Extension Reforms

The earlier version of the scheme, which was revised in April 2010, aimed to benefit farmers by providing training through extension functionaries and engaging them in exposure visits, demonstrations, study tours, exhibitions, etc. This was collectively called the ATMA Cafeteria. The Agriculture Technology Management Agency (ATMA) was established at the district level to coordinate these extension activities, while the State Training Institutes (SAMETIs) were responsible for training extension functionaries at the state level. However, due to a lack of dedicated resources and infrastructure at the SAMETI and ATMA levels, the extension delivery mechanism was not functioning efficiently. The focus had been more on implementing activities rather than systemic reforms, such as bottom-up planning, multi-agency extension strategy, gender mainstreaming, coverage of allied sectors, and convergence. Farm schools were the main formal extension mechanism below the block level, which helped in ensuring farmer-to-farmer extension. However, their outreach was limited, and the pre-revised scheme did not consider the size of the states in terms of the number of blocks.

The Revised Scheme provided for dedicated specialist and functionary support to take up training and extension initiatives at State, District and Block level. Besides this, improvement in extension outreach right down to the village level was expected to be achieved through Farmer Friend. Infrastructure and manpower support to SAMETIs gave a boost to the HRD and capacity building of extension functionaries. The cost norms of selected ongoing activities were also revised, and some need-based activities were introduced under ATMA Cafeteria, 2010.

1.3 Focus of revision in the scheme

The Revised Scheme focused on the following key extension reforms as objectives of the Scheme:

- Providing innovative, restructured, and autonomous institutions at the State /District/ Block level
- Encouraging multi-agency extension strategies involving Public/ Private Extension Service Providers
- Ensuring an integrated, broad-based extension delivery mechanism consistent with farming systems approach
- Adopting group approach to extension in line with the identified needs and requirements of the farmers in the form of CIGs & FIGs,
- Facilitating convergence of programmes in planning, execution, and Implementation, addressing gender concerns by mobilizing farm women into groups and providing training to them, and
- Moving towards sustainability of extension services through beneficiary contribution.

1.4 Agricultural Technology Management Agency (ATMA)

ATMA is an autonomous institution established at the district level to ensure the efficient delivery of extension services to farmers. The Governing Board (GB) is the highest body of ATMA, which provides overall policy direction. The District ATMA Cell, consisting of the Project Director (PD), ATMA, Deputy PDs, and staff, assists the ATMA GB in its functions. The ATMA Management Committee is the executive body responsible for the implementation of the Participatory Extension Management scheme. The District Farmers Advisory Committee (DFAC) is a body that provides feedback from farmers for district-level planning and implementation. ATMA is responsible for the overall management of the agricultural extension system within the district, including the preparation of the Strategic Research and Extension Plan (SREP).

Each district-level ATMA is supported by a Block Technology Manager (BTM) who coordinates the ATMA-related activities at the block level. Additionally, an ATM is placed in each block exclusively for delivering extension services in agriculture and allied sectors based on the priority areas of the respective blocks.

1.5 Aims and Objectives of ATMA

ATMA's primary responsibility is to develop the district's agriculture sector by preparing a Strategic Research and Extension Plan (SREP) using Participatory Rural Appraisal (PRA) techniques to involve all stakeholders. The strategies and activities outlined in the SREP are demand-driven, agro-ecologically relevant, market-oriented, multidisciplinary, and based on a bottom-up approach with practical applications. The major objectives of ATMA are as follows:

- To identify location specific needs of farming community for farming system-based agriculture development.
- To set up priorities for extension reforms to develop sustainable agriculture with a farming system approach.
- To draw plans for production-based system activities to be undertaken by farmers/ ultimate users.
- To execute plan through line departments, training institutions, NGOs farmer's organisations and allied institutions.
- To coordinate efforts being made by various line departments, training institutions, NGOs farmer's organisations and allied institutions through Research-Extension-Farmer linkages (R-E-F-L).
- To facilitate market interventions for value addition of farm produce.
- To promote IPM, INM, IFS and any other activity related with the promotion of sustainable agriculture.

1.6 Need for Strategic Research and Extension Plan (SREP)

The SREP is a detailed plan that identifies research and extension priorities for the district, considering the agro-ecological conditions and existing gaps in technology dissemination in all agriculture and allied sectors. It is prepared through a participatory approach that involves coordination among line departments, Krishi Vigyan Kendra (KVK), Panchayati Raj Institutions (PRIs), private sector, farmers, and other stakeholders at the district level.

The SREP is reviewed and updated every five years to include new gaps and emerging areas of importance. It serves as the basis for preparing annual Block Action Plans (BAPs), which are consolidated at the district level to develop the District Agriculture Action Plans (DAAPs). These plans are subset of the Comprehensive District Agriculture Plans (CDAPs) that are prepared for the district under Rashtriya Krishi Vikas Yojana (RKVY). The DAAPs are further consolidated into the State Extension Work Plan (SEWP), which is integrated into the State Agriculture Plan (SAP). The development and use of SREP helps to ensure effective planning and implementation of agriculture extension activities at the district and state levels.

- Gives an overview of the prevailing scenario in the district.
- Highlights the problems and opportunities in different farming systems, preferences, and priorities of the farming community.
- Facilitates long term visioning and strategic planning for agriculture development in the district in a concerted manner.

- Facilitates involvement of all actors at different levels in the development process and, in the long run, share the load on the public extension system.
- Facilitates integration of and redesigning the on-going developmental programmes for the benefit of the farmers.
- Provides for annual action plan for each block in respect of the prevailing Agro-Ecological Situation.
- Focuses on farmer centred market-oriented extension research management system.

2. Methodology adopted for the preparation of SREP.

One of the first tasks of ATMA is the preparation of Strategic Research and Extension Plan (SREP) of the district. The SREP is prepared through participatory methodologies such as Participatory Rural Appraisal (PRA) involving all the stakeholders especially farmers. The SREP contains detailed analysis of all the information on existing farming systems in the district and research–extension gaps required to be filled-up. It also prioritizes the research-extension strategies within the district. It becomes the basis for development of work plans at district level.

2.1 Selection of District Core Team

The District Core Team for Rohtas was chosen, consisting of representatives from various government development departments, such as Agriculture, Animal Husbandry, Dairy, Fishery, Cooperative, along with NGO representatives and scientists from the Krishi Vigyan Kendra operating in the district. An orientation program was held at the district headquarters to familiarize the Core Team with extension reform concepts and the development of a Strategic Research and Extension Plan (SREP).

Sl.	Designation of Officer	Role
1	District Agriculture Officer, Rohtas	Member
2	Project Director- ATMA, Rohtas	Coordinator
3	District Veterinary Officer, RObtas	Member
4	District Fisheries Officer, Rohtas	Member
5	Assistant Director- Horticulture, Rohtas	Member
6	District Cooperative Officer, Rohtas	Member
7	Assistant Director- Plant Protection, Rohtas	Member
8	Assistant Director - Chemistry, Rohtas	Member
9	Assistant Director- Soil Conservation, Rohtas	Member
10	District Cattle Development Officer, Rohtas	Member
11	Executive Engineer, Sone Canal, Dehri	Member
12	Executive Engineer, Sone Canal, Bikramganj	Member
13	Executive Engineer, Sone Baraj, Indrapuri	Member
14	Executive Engineer, Durgawati, Bayan Tat Pramandal, Chenari	Member
15	Executive Engineer, Durgawati, Dayan Tat Pramandal, Chenari	Member
16	Executive Engineer, Durgawati Work Division, Chenari	Member
17	Executive Engineer, Bhitari Bandh, Chenari (1)	Member
18	Executive Engineer, Bhitari Bandh, Chenari (2)	Member
19	Executive Engineer, Bhitari Bandh, Chenari (3)	Member
20	Executive Engineer, Bhitari Bandh, Chenari (4)	Member
21	Executive Engineer, Bhitari Bandh, Chenari (5)	Member
22	Executive Engineer, Sone Canal Division, Buxar	Member
23	Executive Engineer, Chausa Canal Division	Member
24	Executive Engineer, Sone High Level Canal, Sasaram	Member
25	Executive Engineer, Minor Irrigation Division, Rohtas	Member

Sl.	Designation of Officer	Role
26	Executive Engineer, Electric, Dehri	Member
27	Executive Engineer, Electric, Sasaram	Member
28	Senior Scientist-Cum-Head, Krishi Vigyan Kendra, Rohtas (Dr. Shobha Rani)	Member
29	Representative of NGO working in Agriculture & Allied Sector	Member
30	Sri Abhimanyu Kumar, Agriculture Center, Sasaram (Representative of Agriculture and Allied sector Input Shop)	Member
31	Sri Vishal Kumar, Vishal Beej Bhandar, Dehri (Representative of Agriculture and Allied sector Input Shop)	Member
32	Sri Nityanand Deepak, Grow Grain Agro Farmer Producers Company Ltd. Kargahar (Representative of FPO)	Member
33	Chaudhry Rajendra Singh, Shivsagar Farmer Producers Company Ltd. Shivsagar (Representative of FPO)	Member
34	Sri Ratan Kumar, Subject Matter Specialist Krishi VIgyan Kendra, Bikramganj, Rohtas (Representative of Agriculture and Allied sector Research Center / College / Institute)	Member
35	Dr. Ajay Kumar, Principle, Veer Kunwar Singh Agriculture College, Dumraon, Buxar (Special Invited Member)	Member

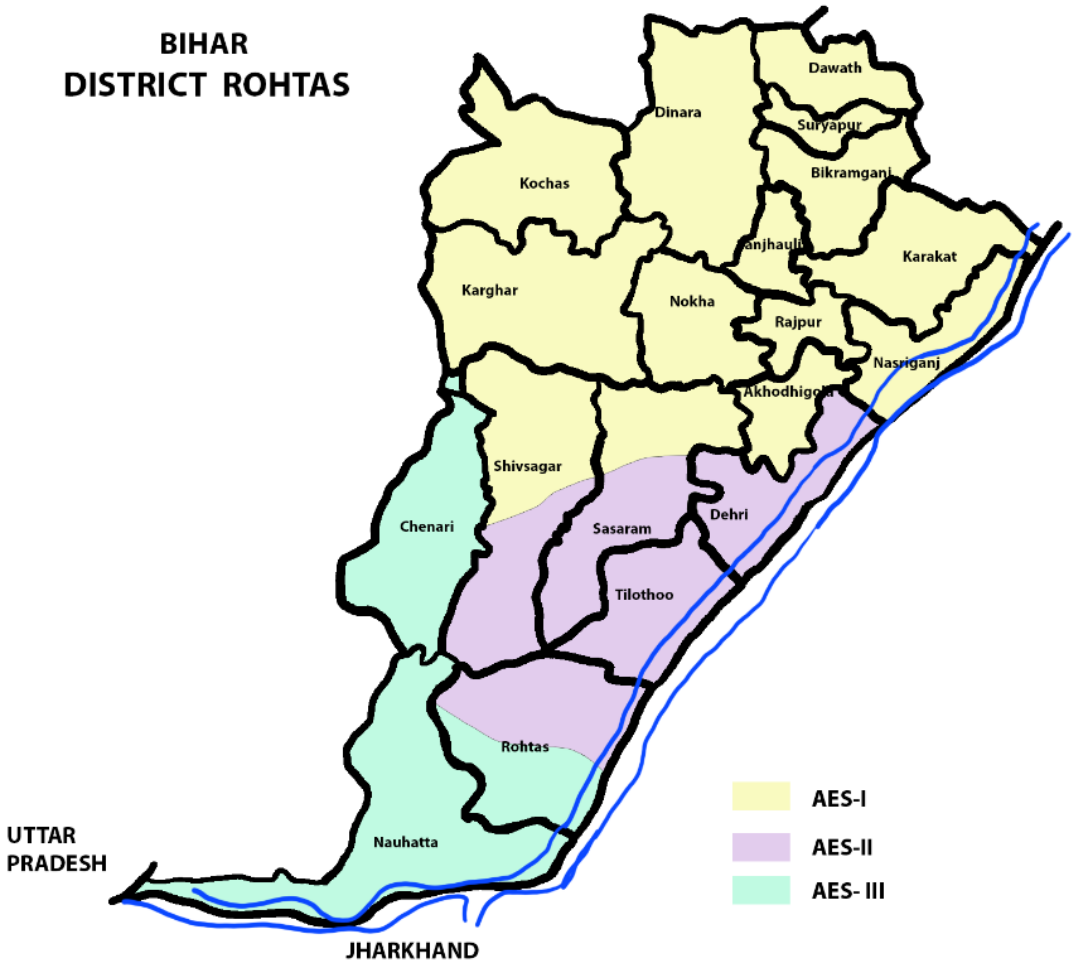
2.2 Identification of major Agro-Ecological Situations (AES) & Representative Villages

The district of Rohtas is categorized under Agro Climatic Sub-Zone III-B, and based on crucial factors such as topography, soil type, crop variety, irrigation sources, and flooding patterns, four Agro-ecological Situations (AES) were identified within the district. This was done to prepare a SREP that is specific to each situation, driven by the demands of the farmers.

Table 1: Identification of Agro-Ecological Situations

Sl.	Name of the ACZ	Name of the AES	Blocks covered	Representative village
1	ACZ- III B	AES-I	Kargahar, Kochas, Dinara, Dawath, Suryapura, Bikramganj, Sanjhauli, Nasriganj, Karakat, Rajpur, Akodhigola, Shivsagar, Sasaram, dehri.	Ayarkotha
2		AES-II	Shivsagar, Sasaram, Tilothoo, Dehri, Rohtas.	Sikariyan
3		AES-III	Nauhatta, Rohtas, Chenari	Rehal

To study the Agro Ecological Situations (AES) in Rohtas district, three villages were selected - one from each AES category. The selection of the representative village was made after thorough discussions among the team members, with the aim of selecting a village that could broadly reflect the farming system and situation of the concerned AES.



Map 2.1: AES Map of Rohtas district

2.3 Training of District Team & AES Team

The training for the individuals involved in the preparation of SREP was conducted at the district level by ATMA Rohtas in collaboration with TRUAGRICO consultants. The objective of the training program was to impart conceptual clarity on relevant management tools, techniques and methodological approaches adopted for the SREP preparation.

Similarly, another training program for the AES teams was organized at the District Headquarter to enable them to carry out surveys in a participatory manner for the collection of data and information required for the preparation of SREP.

2.4 Collection of Primary and Secondary Information

Different governmental departments such as Agriculture, Horticulture, Animal Husbandry, Dairy, Fishery, Cooperative Departments, Lead Bank Office, NABARD, DRDA, District Statistical Office,

NIC, and other published sources were the sources of secondary information used for preparing the SREP.

For the collection of primary information, field exercises were conducted in one representative village from each AES category of the district. The multi-disciplinary group members identified issues and collected data using participatory tools. The primary data collected was cross-checked with various groups in the villages and verified with secondary data collected from the departments.

The AES teams followed a procedure of presenting the collected data/information to the villagers before leaving the village for final consolidation and sharing of information with the villagers. A review workshop was organized at the District Agriculture Office to verify and share the data collected from the field. Each AES team presented the summarized data in the presence of senior officers from all concerned departments, district heads of all departments, and farmers' representatives from the district.

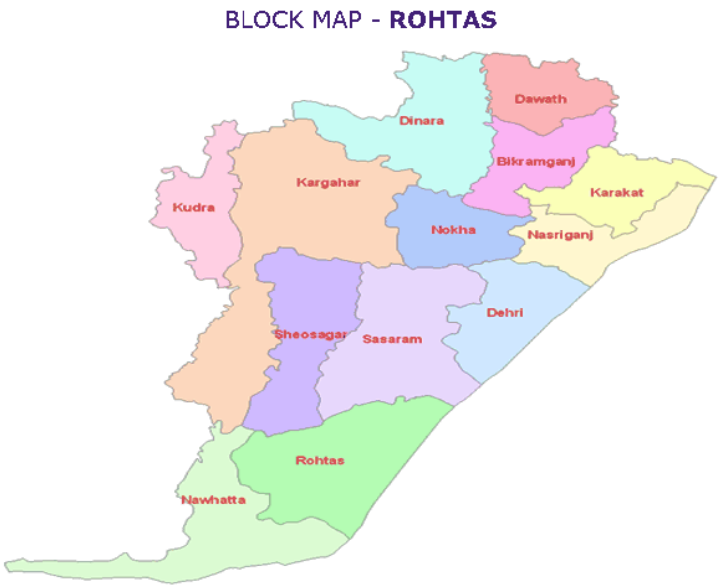
2.5 Summarization and Presentation of Data

The first draft of SREP was prepared by the Core Team consisting of ATMA officials and TRUAGRICO consultants based on the analysis of primary and secondary data and consultation with experts, scientists, and other stakeholders. The draft document emphasized the intensification/diversification, value addition, agro-processing, post-harvest management of the produce, public-private partnership, formation of farmers group, and development of a committed army of service providers and marketing aspects to make it a meaningful document for the district.

The draft SREP was submitted for approval to the Governing Board after thorough scrutiny by the ATMA Management Committee. The suggestions provided by the Governing Board were incorporated in the final version of the SREP, which was again submitted to the AGB for final approval. This SREP is an authentic document and serves as the basis for agricultural development in the district.

3. Background Information of the District

3.1 General Profile of the district



Map 3.1: Location of the District

Location and Boundaries

"Rohtas district falls in 24° 30' and 25° 20' North latitudes and 83° 14' and 83° 20' East longitudes. The Rohtas district in Bihar, India, is located in the central part of the state and shares its borders with several neighboring districts. To the north of Rohtas lies Bhojpur and Buxar districts, while to the south lie Palamu and Garwah districts. The eastern boundary of Rohtas district is shared with Aurangabad and a part of Gaya district, and to the west lies Kaimur district. The district covers a total area of approximately 3,847.82 Sq KM, and the boundaries are defined by natural landmarks such as rivers and hills. The blocks of the district include Sasaram, Chenari, Kargahar, Tilouthu, Nokha, Dehri, Akorhi Gola, Dawath, Rajpur, Rohtas, Sheosagar, Shivsagar, Dinara, Nauhatta, Sanjhauli, Nawanagar, Kochas, Karakat, and Dalmianagar."

Demographics

Rohtas district of Bihar has total population of 2,959,918 as per the Census 2011. Out of which 1,543,546 are males while 1,416,372 are females. In 2011 there were total 460,345 household (Normal, Institutional & Houseless) residing in Rohtas district. The Average Sex Ratio of Rohtas district is 918.

As per Census 2011 out of total population, 14.45% people live in Urban areas while 85.55% lives in the Rural areas. The literacy rate in urban areas is 78.35% while that in the rural areas is 72.5%. Also, the Sex Ratio of Urban areas in Rohtas district is 899 while that of Rural areas is 921.

The population of Children of age 0-6 years in Rohtas district is 443797 which is 15% of the total population. There are 229547 male children and 214250 female children between the age 0-6 years. Thus, as per the Census 2011 the Child Sex Ratio of Rohtas is 933 which is greater than Average Sex Ratio (918) of Rohtas district.

Workers profile

The total working population of Rohtas comprises 924879 individuals who are either main or marginal workers. Out of the total workers, 707939 are male and 216940 are female. Among the workers, 453866 are classified as main workers, with 386394 being male and 67472 being female. Rohtas has a total of 357153 marginal workers.

3.2 Agro-Ecological features of the district

There are two sub-basin in the Rohtas district. The western part of the district is situated on 'Ghaghra confluence to Gomti confluence' sub-basin which is a part of Upper Ganga Basin whereas the narrow eastern part, along with the river Sone, falls in Sone Sub-basin which is a part of Lr. Ganga Basin.

The Sone is a main river in the district which originates in the plateau area of Amarkantak in Madhya Pradesh State. It enters the district at the junction of Palamu, Mirzapur (U.P.) Kaimur and Rohtas district and forms southern and eastern boundary of the district. The small tract of land in the western part of the district between Kaimur plateau knows as Sone valley is formed by this river. The river is the main source of the famous Sone-sand used extensively for the construction of building.

The climate of the district is characterized by hot and dry summers, while winters are cool and pleasant. Winter begins in mid-October, after the rains have ceased, and temperatures start to drop. The coldest month is January, with temperatures falling to around 8°C. The onset of hot weather is marked by the blowing of westerly winds, accompanied by dust storms around mid-March. Temperatures start rising, and May is the hottest month, with maximum temperatures reaching up to 42°C. Summer continues until the end of June when the onset of rains brings relief, although the humidity remains high, making the heat more oppressive during the rainy season, which lasts until the end of September. From November to February, the climate is pleasant. The district receives some winter rain.

According to data from the Directorate of Statistics and Evaluation of the State, the average annual rainfall in the district ranges from 866 to 1,144.2 mm, with the maximum rainfall occurring during June to September, accounting for almost 90% of the average total rainfall. December receives the minimum rainfall. The rainy season is characterized by hot and humid weather conditions.

3.3 Agriculture & Allied Sector of the district

Agriculture: The primary economic activity in the district is agriculture, with dairy, horticulture, transport, housing, small businesses, and other service sector activities also playing important roles. Paddy and wheat are the major food crops, while pulses, oilseeds, and maize are also significant. The district has also seen a rise in commercial horticultural crops such as potato, onion, and vegetables. Medicinal and aromatic plants have also begun to gain traction on a small scale.

The Agricultural Road Map of the Government of Bihar has emphasized the expansion of area and improvement of productivity for various fruit crops, such as mango, litchi, guava, banana, and anwla. The plan also prioritizes the growth of medicinal and aromatic crops, such as lemon grass, mint, citronella, artemisia, safed musli, asparagus, and aloe vera, as well as floriculture crops like marigold, rose, gerbera, gladiolus, arhul, lotus, chameli, aparajita, and allied products such as mushroom, azola, beekeeping, and honey production. The government has committed to providing all possible support, including subsidies modeled after the National Horticulture Mission (NHM). The Agriculture Road Map (2017-22) identifies guava and vegetable cultivation, including peas, tomato, musk melon, and cabbage/cauliflower, as major horticultural crops for Rohtas district.

The promotion of horticultural activities in the district is carried out under the Mukhya Mantri Bagwani Mission, which includes the creation of necessary infrastructures such as nurseries, processing and marketing facilities, and the provision of planting materials. While these activities do not have a credit component associated with them, they do generate awareness which may lead to potential credit opportunities. Rohtas district is known for the cultivation of popular medicinal and aromatic plants such as Mentha, Lemongrass, Palmarose, Safed Musli, Kalmegh, and Ashwagandha.

The fertile strip of land between the river Ganga in the north and the main line of East Central Railway in the south receives a low-lying deposit of silt from the Ganges almost every year, making it extremely fertile. This region is regarded as the best area for wheat cultivation in Bihar.

The district has diverse features, ranging from alluvium in the northern part to the sub-hilly region in the south. The flat terrain in the major (northern) part of the district has no undulation except for isolated rocky patches. The flat terrain has an elevation of 80-90 m above mean sea level and slopes towards the north, with a gradient of 0.60 m/km from south to north. The eastern narrow part of the district, along the river Sone, slopes towards Sone (East).

The district is predominantly characterized by alluvium soil, which is poorly drained. The soil composition varies depending on the proximity to the rivers Ganga, Sone, Dharmawati, and Gangi. Sandy loam, loamy sand and sand are commonly found in the areas adjacent to these rivers, while silty sand to sandy silt are found in the areas further away from the river channels. The texture of the soil is generally fine away from the river course and rivulets, and coarse along their courses. The irrigation system in the area has caused the coarse textured soil to mix with silt and fine sand due to the use of canal water.

The net annual replenishable ground water resource as on 31st March 2009 has been worked out to be 107053 ha.m. The gross annual draft for all uses stands at 38519 ha.m. The average stage of ground

water development for the district is 36%; the maximum being in the block Tilouthu (79.8.1%) and the minimum at Chenari and Nasriganj (21.8.4%). Except Tilouthu, The stage of ground water development in all the blocks is less than 70%. There is no significant long-term decline in water levels recorded in the blocks. Thus, all the blocks are categorised under 'safe' category.

Fishery: The fisheries sector in Rohtas district has been a significant contributor to the local economy and livelihoods, offering opportunities for employment, food security, and income generation. This sector has witnessed steady growth due to a combination of favorable natural conditions, policy support, and the involvement of local communities. Here are some key aspects of the fisheries sector in Rohtas district:

Aquaculture resources: Rohtas district is endowed with diverse water resources, such as rivers, ponds, reservoirs, and tanks, which provide suitable conditions for fish farming. The region is particularly known for its production of freshwater fish species like carp, catfish, and murrel.

Traditional and modern practices: The local fisherfolk have been engaging in traditional fishing practices for generations, using indigenous knowledge and techniques to sustainably harvest fish. In recent years, modern aquaculture practices have been introduced, including scientific fish farming methods, feed management, and water quality management, contributing to increased productivity and sustainable growth.

Government support: The government has been actively promoting the fisheries sector by providing subsidies, training, and technical assistance to fish farmers. Initiatives such as the establishment of fish seed farms, hatcheries, and training centers have been implemented to boost the sector's growth.

Community participation: The involvement of local communities, NGOs, and cooperative societies has played a crucial role in the development of the fisheries sector in Rohtas. These groups have worked together to facilitate the sharing of knowledge, resources, and market linkages, ultimately helping to improve the livelihoods of those involved in the industry.

Marketing and value addition: The Rohtas district has seen improvements in the marketing and value addition of fishery products, with better transportation facilities, cold storage chains, and processing units being established. This has led to increased access to both domestic and international markets, resulting in higher returns for fish farmers.

Challenges and future prospects: Despite the progress made in the fisheries sector in Rohtas district, there remain challenges such as limited access to credit, inadequate infrastructure, and the impacts of climate change on aquatic ecosystems. Continued efforts towards enhancing the capacity of fish farmers, improving resource management, and addressing environmental concerns will be crucial to ensure the sustainable growth of the sector in the long term.

Dairy: Dairy and animal husbandry play a vital role in the rural economy of Rohtas district, contributing significantly to employment, income generation, and food security. This sector is characterized by a blend of traditional practices and modern techniques, supported by government

initiatives and community involvement. Here is an overview of the dairy and animal husbandry sector in Rohtas district:

Livestock population: Rohtas district has a diverse livestock population, including cattle, buffaloes, goats, and sheep. The cattle breeds found in the region are primarily indigenous, known for their adaptability to local conditions and disease resistance. Buffaloes are also prevalent, contributing substantially to milk production.

Dairy farming: Dairy farming is an essential part of the rural economy, providing a regular income source for many households. Small-scale and marginal farmers primarily engage in this activity, with milk production being predominantly based on local cattle and buffalo breeds. The district has also witnessed the introduction of crossbred cattle, which have higher milk yields, leading to increased dairy productivity.

Animal husbandry: Apart from dairy farming, animal husbandry practices such as goat and sheep rearing are common in Rohtas district. These animals serve multiple purposes, providing meat, milk, and fiber, as well as acting as a valuable asset for small-scale farmers. Poultry farming has also gained traction in the region, contributing to local egg and meat production.

Government support: The government has been actively promoting dairy and animal husbandry in Rohtas district through various schemes and initiatives. These include providing subsidies for livestock rearing, veterinary services, artificial insemination, and feed and fodder development. Additionally, training and capacity building programs are organized to equip farmers with the necessary skills and knowledge to improve productivity.

Cooperative and private sector involvement: The cooperative sector has played a significant role in the development of the dairy industry, particularly through the establishment of milk cooperatives and dairy processing units. These cooperatives facilitate the procurement, processing, and marketing of milk and milk products, ensuring better returns for farmers. Private sector involvement in the form of dairy companies and input providers has further boosted the industry's growth.

Challenges and future prospects: Despite the progress made in the dairy and animal husbandry sector, challenges such as inadequate infrastructure, limited access to credit, and low adoption of modern technologies persist. Addressing these issues and focusing on enhancing the genetic potential of local livestock breeds, improving animal health and nutrition, and strengthening market linkages will be crucial for the sustainable development of this sector in Rohtas district.

Poultry: The poultry sector in Rohtas district has experienced growth in recent years, contributing to local food security, employment, and income generation. The industry encompasses various aspects of poultry farming, including broiler and layer production, as well as the marketing and processing of poultry products. Here is a profile of the poultry sector in Rohtas district:

Poultry population: The district has a thriving poultry population consisting of various breeds of chickens, including both indigenous and commercial varieties. Indigenous breeds are more resilient

to local conditions, while commercial breeds are reared mainly for their higher productivity in terms of egg and meat production.

Broiler production: Broiler farming has gained popularity in Rohtas district, with farmers engaging in the rearing of fast-growing commercial breeds for meat production. The relatively short production cycle and high demand for poultry meat have made broiler farming a profitable enterprise for many small and medium-scale farmers.

Layer production: Layer farming, which focuses on egg production, is another important aspect of the poultry sector in Rohtas. Farmers rear layer birds, which are primarily commercial breeds selected for their high egg-laying capacity. The eggs produced are sold in local markets, providing a regular income for poultry farmers.

Poultry feed and healthcare: The availability of quality poultry feed and healthcare services is essential for the growth and productivity of the poultry sector. The district has witnessed the establishment of feed manufacturing units and veterinary services that cater to the nutritional and health needs of poultry birds.

Processing and marketing: Rohtas district has seen improvements in the processing and marketing of poultry products, with better transportation facilities, cold storage chains, and processing units being established. This has resulted in increased access to regional and national markets, ensuring better returns for poultry farmers.

Government support: The government has provided support to the poultry sector through various schemes and initiatives, including subsidies for poultry farming, technical assistance, and training programs. These interventions have played a crucial role in the growth and development of the poultry industry in the district.

The promotion of poultry farming has become a focus of the Bihar State Government, with poultry farming being accorded agriculture status. The government is offering free training to aspiring poultry farmers/entrepreneurs in batches and is sending them to Bhuvaneshwar and Chandigarh for specialized training. The Murgi Gram Yojana is being implemented in the district to benefit families from the BPL/Mahadalit community, where each family will receive 45 birds to rear in their backyard. It is expected that each family will earn around `2000 per month under this scheme. The Egg Sufficiency Scheme, Integrated Poultry Development Scheme 2019 of GoB, and EDEG under National Livestock Mission have been instrumental in boosting the development of poultry farming in the district.

Sheep/Goat/Piggery: Sheep, Goat and Piggery (SGP) enterprise has traditionally been associated with resource poor people, particularly belonging to scheduled castes and scheduled tribes. However, recently, these activities have emerged as a separate economic activity for all segments of society. The sector has undergone several changes from stray grazing to stall-fed farming and new dimensions such as crossbreeding and grading-up of sheep, goat and pig have been added. Due to the significant population of conventional SGP rearing in the district and increasing demand for mutton and pork in the domestic market, the sector has become a relevant investment activity. The Livestock Census of

2019 indicates that Bihar has a livestock population of 364.54 lakh, out of the total livestock population of 5358 Lakh in India. Bihar's livestock population increased from 329.39 lakh in 2012 to 364.54 lakh in 2019, registering an increase of 10.94 percent.

The Agriculture Road Map of the GOB has prioritized infrastructure development for animal husbandry, improving the quality of local breeds, and establishing hybrid breeding farms. However, the level of utilization of this sector in the district is still very low. Financing for sheep, goat, and pig farming has been provided by banks on a small scale mainly under Government-sponsored programs, and commercial farming is awaiting support from both promoting and financing agencies. Despite the increasing demand for mutton and pork, local production is unable to meet even the local demand.

Table 2: General features of the district

Sl.	Name of the Block	Geographical Area (ha)	No. of revenue villages	Normal Annual Rainfall (mm)	No. of rainy days	Temperature (⁰C)	
						Min	Max
1	SASARAM	32213.2	172	851.4	51	8	41
2	SHIVSAGAR	31949.2	156	924	48	8	41
3	CHENARI	23979.5	155	771	49	8	41
4	KARGAHAR	32523.5	257	843	53	8	41
5	KOCHAS	22474.5	191	843	52	8	41
6	NOKHA	16683.2	88	975.9	50	8	41
7	DEHRI	15837.4	59	1180	51	8	41
8	AKODHIGOLA	9791.95	56	765.6	52	8	41
9	TILOTHU	15549.2	66	1041.4	51	8	41
10	ROHTAS	31650.4	38	1125.2	48	8	41
11	NAUHATTA	41881.9	68	749.8	49	8	41
12	RAJPUR	7003.58	39	793.6	51	8	41
13	BIKRAMGANJ	15576.6	101	862.7	52	8	41
14	SANJHAULI	6716.24	45	862.7	51	8	41
15	NASRIGANJ	11494.6	54	715.2	51	8	41
16	KARAKAT	20395.8	150	732.7	53	8	41
17	SURYAPURA	5645.36	48	744.1	51	8	41
18	DAWATH	11515	67	867.1	50	8	41
19	DINARA	30778.4	229	806	51	8	41

Table 3: Trend in weather parameters in Rohtas district

Sl.	Year	Rainfall (mm)		Temperature (°C)		Relative Humidity (%)	Wind Velocity (km/hr)	Sunshine hours		
		Average	No.of rainy days	Max	Min			Kharif	Rabi	Summer
1	2015	866	51	8	41	58%	9	12	11	12.45

Table 4: Information on occurrence of droughts / floods in district

SL.	Name of the Block	Occurrence of floods	Occurrence of droughts	Severity M/S/VS	% Cropped area affected	Livestock Mortality (Av. No. of animals)	% of farm families affected
1	SASARAM	2000, 2011	2001, 2004, 2009, 2010	M	15%	25	10%
2	SHIVSAGAR	2000, 2003, 2011		M	20%	45	15%
3	CHENARI	2003, 2007, 2011		VS	18%	35	15%
4	KARGAHAR	2004, 2007, 2011		S	18%	35	18%
5	KOCHAS	2000, 2005, 2011		VS	15%	25	14%
6	NOKHA	2003, 2007, 2008		M-VS	20%	40	16%
7	DEHRI	2001, 2003, 2007		S-VS	30%	65	20%
8	AKODHIGOLA	2000, 2004, 2005, 2011		M	40-50%	80	45%
9	TILOTHU	2004, 2005, 2007, 2011		VS	40-50%	89	45%
10	ROHTAS	2000, 2003, 2011		M	22%	65	10%

SL.	Name of the Block	Occurrence of floods	Occurrence of droughts	Severity M/S/VS	% Cropped area affected	Livestock Mortality (Av. No. of animals)	% of farm families affected
11	NAUHATTA	2003, 2007, 2011		S	16%	35	15%
12	RAJPUR	2001, 2005, 2011		S	15%	32	25%
13	BIKRAMGANJ	2003, 2007, 2008, 2011		M	32%	55	48%
14	SANJHAULI	2007, 2011		VS	10%	20	38%
15	NASRIGANJ	2000, 2003, 2011		M-VS	20%	35	17%
16	KARAKAT	2003, 2007, 2008		S-VS	17%	25	23%
17	SURYAPURA	2001, 2003, 2007		M	15%	35	35%
18	DAWATH	2003, 2011		VS	13%	40	28%
19	DINARA	2000, 2004, 2005, 2011		M	25%	50	42%

Note: M – Mild S – SevereVS – Very severe (As per GOI / States parameter)

Table 5: Spread of AES in the district

Name of the ACZ	AES	Area (ha)	% of geographical area of the district under AES	Name of the Blocks	Area (ha)	% of geographical area of the district
ACZ- III B	AES-I	269495.2	69.44%	KARGAHAR	32524	8.38%
				NOKHA	16683	4.30%
				KOCHAS	22474	5.79%
				DINARA	30778	7.93%
				DAWATH	10415	2.68%
				SURYAPURA	5645.4	1.45%
				BIKRAMGANJ	15577	4.01%
				SANJHAULI	6716.2	1.73%
				NASRIGANJ	11492	2.96%
				KARAKAT	20396	5.26%
				RAJPUR	7003.6	1.80%
				AKODHIGOLA	9792	2.52%
				SHIVSAGAR	31949	8.23%
				SASARAM	32213	8.30%
				DEHRI	15837	4.08%
	AES-II	127198	32.77%	SHIVSAGAR	31949	8.23%
				SASARAM	32213	8.30%
				TILOTHU	15549	4.01%
				DEHRI	15837	4.08%
				ROHTAS	31650	8.16%
	AES-III	97512	25.13%	NAUHATTA	41882	10.79%
				ROHTAS	31650	8.16%
				CHENARI	23980	6.18%

Table 6: Representative Village for Each Agro-Ecological Situation for the District

Sl. No	Name of the ACZ	Name of the AES	Blocks covered	Representative villages
1	ACZ- III B	AES-I	Kargahar, Nochas, Dinara, Dawath, Suryapura, Bikramganj, Sanjhauli, Nasriganj, Karakat, Rajpur, Akodhigola, Shivsagar, Sasaram, dehri.	Ayarkotha
2		AES-II	Shivsagar, Sasaram, Tilothoo, Dehri, Rohtas.	Sikariyan
3		AES-III	Nauhatta, Rohtas, Chenari	Rehal

Table 7: Details on crops and cropping systems in the district

Sl.	Block	Crop Type	Kharif (Area in ha)	Rabi (Area in ha)	Summer Crop (Area in ha)	Horti & Plantation Crops (Area in ha)
1	SASARAM	A) Cereals	12545	13795	1814	190
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				
		E) Fibre				
		F) Any other Crop s				
2	NOKHA	A) Cereals	12786	10166	1309	1309
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				
		E) Fibre				
		F) Any other Crop s				
3	SHIVSAGAR	A) Cereals	14629	11614	1546	90
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				
		E) Fibre				
		F) Any other Crop s				
4	CHENARI	A) Cereals	9547	8717	1228	154
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				
		E) Fibre				
		F) Any other Crop s				
5	KARGAHAR	A) Cereals	27902	14512	1840	58
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				
		E) Fibre				
		F) Any other Crop s				
6	KOCHAS	A) Cereals	13877	10887	1389	52
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				
		E) Fibre				
		F) Any other Crop s				
7	DEHRI	A) Cereals	7759	9437	1422	90
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				
		E) Fibre				
		F) Any other Crop s				
8	AKODHIGOLA	A) Cereals	7160	7988	1134	52
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				
		E) Fibre				
		F) Any other Crop s				
9	ROHTAS	A) Cereals	3003	7260	1042	54
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				
		E) Fibre				
		F) Any other Crop s				
10	TILOTHOO	A) Cereals	6220	7988	1132	75
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				

Sl.	Block	Crop Type	Kharif (Area in ha)	Rabi (Area in ha)	Summer Crop (Area in ha)	Horti & Plantation Crops (Area in ha)
		E) Fibre				
		F) Any other Crop s				
11	NAUHATTA	A) Cereals	3425	7984	1143	48
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				
		E) Fibre				
		F) Any other Crop s				
12	BIKRAMGANJ	A) Cereals	11922	8713	1126	51
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				
		E) Fibre				
		F) Any other Crop s				
13	SANJHAULI	A) Cereals	5651	4362	664	54
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				
		E) Fibre				
		F) Any other Crop s				
14	DAWATH	A) Cereals	8615	5815	852	49
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				
		E) Fibre				
		F) Any other Crop s				
15	SURYAPURA	A) Cereals	4334	3631	670	51
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				
		E) Fibre				
		F) Any other Crop s				
16	DINARA	A) Cereals	23690	15970	2251	114
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				
		E) Fibre				
		F) Any other Crop s				
17	KARAKAT	A) Cereals	17237	14516	1883	53
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				
		E) Fibre				
		F) Any other Crop s				
18	NASRIGANJ	A) Cereals	7799	9434	1222	51
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				
		E) Fibre				
		F) Any other Crop s				
19	RAJPUR	A) Cereals	6260	5809	753	190
		B) Coarse Cereals				
		C) Pulses				
		D) Oil seeds				
		E) Fibre				
		F) Any other Crop s				

Table 8: Details of cropping pattern in the district

Sl.	Block	Major Crops						Cropping system
		Name	Area (ha)	Name	Area	Name	Area	
1	SASARAM	Paddy	18764.78	Wheat	5871.86	Pulses	5871.86	Paddy-Wheat/Pulses
2	SHIVSAGAR	Paddy	30978.58	Wheat	13943.72	Pulses	13943.72	Paddy-Wheat/Pulses
3	CHENARI	Paddy	18657.86	Wheat	4825.53	Pulses	4825.53	Paddy-Wheat/Pulses
4	KARGAHAR	Paddy	55413.88	Wheat	27028.21	Pulses	27028.21	Paddy-Wheat/Pulses
5	KOCHAS	Paddy	20049.13	Wheat	4875.4	Pulses	4875.4	Paddy-Wheat/Pulses
6	NOKHA	Paddy	23159.22	Wheat	8675.85	Pulses	8675.85	Paddy-Wheat/Pulses
7	DEHRI	Paddy	15344.1	Wheat	7405.54	Pulses	7405.54	Paddy-Wheat/Pulses
8	AKODHIGOLA	Paddy	14693.2	Wheat	6123.46	Pulses	6123.46	Paddy-Wheat/Pulses
9	TILOTHU	Paddy	16555.4	Wheat	9571.88	Pulses	9571.88	Paddy-Wheat/Pulses
10	ROHTAS	Paddy	2709.06	Wheat	372.81	Pulses	372.81	Paddy-Wheat/Pulses
11	NAUHATTA	Paddy	3815.02	Wheat	40.13	Pulses	40.13	Paddy-Wheat/Pulses
12	RAJPUR	Paddy	4673.84	Wheat	1838.82	Pulses	1838.82	Paddy-Wheat/Pulses
13	BIKRAMGANJ	Paddy	17635.22	Wheat	3716.94	Pulses	3716.94	Paddy-Wheat/Pulses
14	SANJHAULI	Paddy	10878.49	Wheat	5088.81	Pulses	5088.81	Paddy-Wheat/Pulses
15	NASRIGANJ	Paddy	14084.38	Wheat	3904.8	Pulses	3904.8	Paddy-Wheat/Pulses
16	KARAKAT	Paddy	24902.19	Wheat	7177.3	Pulses	7177.3	Paddy-Wheat/Pulses
17	SURYAPURA	Paddy	5573.22	Wheat	694.04	Pulses	694.04	Paddy-Wheat/Pulses
18	DAWATH	Paddy	19193.78	Wheat	9834.76	Pulses	9834.76	Paddy-Wheat/Pulses
19	DINARA	Paddy	45907.41	Wheat	17321.5	Pulses	17321.5	Paddy-Wheat/Pulses

Table 9: Information on livestock status in the district

Sl.	Block	Milch Cows		Milch Buffaloes		Draught	Sheep	Goat	Poultry Birds	Piggery Local
		L	UP	L	UP					
1	SASARAM	4713	18852	3370	13482	186	519	11619	29179	320
2	SHIVSAGAR	5369	21477	3171	12684	106	377	6314	6872	329
3	CHENARI	4184	16737	2847	11386	202	6646	7186	2260	232
4	KARGAHAR	6941	27764	4648	18593	233	619	7726	2798	118
5	KOCHAS	6039	24157	4731	18924	124	4500	8209	52981	1168
6	NOKHA	2758	11032	3015	12061	113	187	14144	5257	383
7	DEHRI	3793	15173	4590	18360	40	508	8203	13264	92
8	AKODHIGOLA	2729	10916	2398	9592	91	1339	12506	47568	306
9	TILOTHU	2987	11947	2846	11383	31	245	13265	3723	314
10	ROHTAS	3069	12276	3423	13693	23	196	16686	2760	470
11	NAUHATTA	7038	28152	4962	19849	4	2578	14848	3780	486
12	RAJPUR	2057	8230	2098	8394	18	360	8422	370	95
13	BIKRAMGANJ	2625	10499	3210	12839	93	158	8176	5254	175
14	SANJHAULI	939	3758	1221	4882	29	120	2519	2100	148
15	NASRIGANJ	3460	13840	5012	20050	20	3097	12842	9883	547
16	KARAKAT	3837	15350	5023	20090	87	1226	14116	5180	330
17	SURYAPURA	914	3655	1719	6877	30	510	2685	5905	237
18	DAWATH	1286	5143	2121	8483	126	333	7064	2082	597
19	DINARA	4993	19974	6120	24480	129	521	10405	11040	584
Total:		**69733**	**278930**	**66525**	**266102**	**1685**	**24039**	**186935**	**212256**	**6931**

L- Local, UP- Upgraded

Table 10: Use of Organic Input in the district

Year	Type of Input	Sources of availability	Quantity used	Area covered (ha)	% of farmers using organic manure
2017-18	Vermicompost	Self made	NA	NA	NA
2018-19	Vermicompost and others	Self and local seller	NA	NA	NA
2019-20	Vermicompost and others	Self and local seller	NA	NA	NA

Table 11: Details of Organic Production in the district

Sl.	Block	Organic produce	Crop*	Area		Production		No. of farmers	
				Ha	%	Tonnes	%	No.	%
1	BIKRAMGANJ	Tomato		80	NA	4000	NA	NA	NA
2	DINARA	Tomato		60	NA	3000	NA	NA	NA
3	KARGAHAR	Tomato		20	NA	1000	NA	NA	NA
4	KOCHAS	Tomato		80	NA	4000	NA	NA	NA
5	SASARAM	Tomato		40	NA	2000	NA	NA	NA
6	TILOTHU	Vegetable & Flower		**80**	NA	4000	NA	NA	NA

Table 12: Details on Medicinal, Aromatic and Minor Forest Produce

Sl.	Crop	Area in ha.		Production in Tons	No. of farmers	
		Organic	Inorganic		No.	%
1	Aromatic Crops	Yes	Yes	NA	NA	NA
2	Medicinal Crops	NA	NA	NA	NA	NA
3	Minor Forest Produce	NA	NA	NA	NA	NA

Table 13: Demographic information of the district

Sl.	Name of the block	Population (2011 census)	% of Literacy			Male No	Female No	Workers		Categories No.	
			Male	Female	Total			Agri.	Non-agri	SC	ST
1	AKODIGOLA	120145	83.13	60.54	72.33	62,634	57,511	27,272	12,266	27952	69
2	BIKRAMGANJ	163565	85.56	63.33	74.96	85989	77576	34,299	19,237	28163	316
3	CHENARI	131528	79.72	59.24	69.93	68,501	63,027	33,670	10,759	35271	1088
4	DAWATH	108455	83.49	60.09	72.15	55891	52564	24,411	6,938	17797	177
5	DEHRI	275014	84.62	62.66	74.09	143965	131049	33,827	43,440	38885	636
6	DINARA	225468	81.52	60.49	71.43	117,073	108,395	57,382	15,159	42551	862
7	KARAKAT	209284	85.26	61.61	73.94	109,007	100,277	49,164	19,318	37804	455
8	KARGAHAR	225082	84.82	66.11	75.92	117,949	107,133	54,267	16,935	47305	595
9	KOCHAS	170025	83.82	65.87	75.24	88,726	81,299	38,382	8,860	30945	608
10	NASRIGANJ	138936	83.35	60.05	72.13	72024	66912	31,405	11,394	22237	80
11	NAUHATTA	94065	74.05	51.03	63.07	49,103	44,962	31,529	5,487	18317	11179
12	NOKHA	173327	82.6	61.15	72.37	90573	82754	36,821	17,418	31787	174
13	RAJPUR	75213	85.89	65.16	75.99	39,280	35,933	17,314	6,349	12964	17
14	ROHTAS	86049	76.2	55.97	66.38	44,258	41,791	13,443	12,970	15794	6885
15	SANJHAULI	62621	86.71	65.3	76.47	32,692	29,929	15,098	3,936	10714	7
16	SASARAM	358283	80.29	61.64	71.36	187456	170827	43,357	59,451	59031	5636
17	SHIVSAGAR	176080	81.42	61.37	71.79	91,268	84,812	45,163	14,908	40118	1962
18	SURYAPURA	57529	82.98	60.13	72.06	29,994	27,535	13,593	4,449	8895	113
19	TILOTHU	109249	81.24	60.18	71.21	57,163	52,086	23,234	11,974	23016	791
Total:		**2959918**	**82.57**	**61.53**	**72.5**	**1543546**	**1416372**	**6,23,631**	**3,01,248**	**549546**	**31650**

Table 14: Information on operational land holdings in the district (Nos.- Number, Ha-Area in Ha)

Sl.	Name of the block	Operational holding (number and area)								
		Large*		Medium*		Small		Marginal*		Landless
		Nos.	Ha.	Nos.	Ha.	Nos.	Ha.	Nos.	Ha.	Nos.
1	AKODIGOLA	5	61	1442	3642	2520	2644	13624	4545	9010
2	BIKRAMGANJ	17	198	1429	4803	1344	1941	4949	7536	17170
3	CHENARI	14	164	2221	6026	2365	2533	12060	3822	8931
4	DAWATH	0	0	430	1217	1124	1728	9958	5920	7170
5	DEHRI	0	0	1335	3434	1177	1794	10369	6017	19220
6	DINARA	9	92	2191	6466	3851	5811	33751	14633	25875
7	KARAKAT	12	125	1618	5074	2830	3011	15109	9840	20166
8	KARGAHAR	13	170	3130	8433	3498	4086	10833	10600	9369
9	KOCHAS	0	0	2209	8361	2172	2560	21701	6786	32270
10	NASRIGANJ	26	282	1266	4221	1288	1804	9303	6670	11776
11	NAUHATTA	17	188	350	1306	477	585	3344	3822	5152
12	NOKHA	14	150	1628	6089	1620	2273	16226	9492	29914
13	RAJPUR	5	60	760	2703	798	1096	2180	2057	4564

Sl.	Name of the block	Operational holding (number and area)								
		Large*		Medium*		Small		Marginal*		Landless
		Nos.	Ha.	Nos.	Ha.	Nos.	Ha.	Nos.	Ha.	Nos.
14	ROHTAS	1	13	234	750	2085	2198	2846	3799	4753
15	SANJHAULI	13	139	456	2114	624	735	3765	2842	11174
16	SASARAM	7	79	3248	11996	2887	3370	18462	7111	31748
17	SHIVSAGAR	14	185	1657	5470	2067	2465	10601	7157	16140
18	SURYAPURA	1371	1117	1919	1563.8	1371	1117	274	223.4	4331
19	TILOTHU	12	166	929	3403	744	941	1215	1336	1856
Total :		**1550**	**3189**	**28452**	**87071.8**	**34842**	**42692**	**200570**	**114208.4**	**270589**

Table 15: Information on land use pattern in the district (Area in Ha)

Sl.	Name of the Block	TGA	Cultivatable area	NCA	Culturable waste	Current Fallow
1	SASARAM	32213.19	18764.78	12892.92	2207.45	5871.86
2	SHIVSAGAR	31949.18	30978.58	17034.86	70.71	13943.72
3	CHENARI	23979.51	18657.86	13832.32	1279.67	4825.53
4	KARGAHAR	32523.53	55413.88	28385.68	4137.85	27028.21
5	KOCHAS	22474.47	20049.13	15173.73	100.9	4875.4
6	NOKHA	16683.23	23159.22	14483.37	869.12	8675.85
7	DEHRI	15837.41	15344.1	7938.56	476.84	7405.54
8	AKODHIGOLA	9791.95	14693.2	8569.74	0	6123.46
9	TILOTHU	15549.16	16555.4	6983.52	979.66	9571.88
10	ROHTAS	31650.4	2709.06	2336.25	2060.63	372.81
11	NAUHATTA	41881.85	3815.02	3774.9	12123.47	40.13
12	RAJPUR	7003.58	4673.84	2835.03	3176.8	1838.82
13	BIKRAMGANJ	15576.63	17635.22	13918.28	13.18	3716.94
14	SANJHAULI	6716.24	10878.49	5789.68	0	5088.81
15	NASRIGANJ	11494.59	14084.38	10179.58	0	3904.8
16	KARAKAT	20395.76	24902.19	17724.89	17.17	7177.3
17	SURYAPURA	5645.36	5573.22	4879.18	12.21	694.04
18	DAWATH	11514.97	19193.78	9359.02	0	9834.76
19	DINARA	30778.4	45907.41	28585.91	565.06	17321.5
Total :		**383659.39**	**362988.77**	**224677.42**	**28090.716**	**138311.36**

TGA: Total Geographical Area, NCA: Net Cultivated Area,

Sl.	Block	Forest	Pasture	Land put on non agri. Use	Land under misc. plantation	Waste land
1	SASARAM	7238.37		9874.45		2207.45
2	SHIVSAGAR	9158.16		5685.45		70.71
3	CHENARI	5828.49		3039.02		1279.67
4	KARGAHAR	0		0		4137.85
5	KOCHAS	0		2324.44		100.9
6	NOKHA	0		1330.74		869.12
7	DEHRI	0		7422.01		476.84
8	AKODHIGOLA	0		1222.21		0
9	TILOTHU	3191.97		4394.02		979.66
10	ROHTAS	16236.08		11017.44		2060.63
11	NAUHATTA	0		25983.48		12123.47
12	RAJPUR	0		991.74		3176.8
13	BIKRAMGANJ	0		1645.18		13.18
14	SANJHAULI	0		926.56		0
15	NASRIGANJ	0		1312		0
16	KARAKAT	0		2653.7		17.17
17	SURYAPURA	0		753.96		12.21
18	DAWATH	0		1055.94		0
19	DINARA	0		1627.43		565.06
Total :		41653.068		83259.8		28090.716

Table 16: Information on Soil Type in blocks

Sl.	Block	Red Soil		Sandy Soil		Sandy looms		Alluvail soil	
		Area	%	Area	%	Area	%	Area	%
1	AKODIGOLA	1835	18.74	1835	18.74	6906.952	70.54	7957	81.26
2	BIKRAMGANJ	3582	23.00	3582	23.00	10044.632	64.49	11995	77.00
3	CHENARI	16332	68.11	16332	68.11	4969.508	20.72	7648	31.89
4	DAWATH	935	8.98	935	8.98	8128.968	78.05	9480	91.02
5	DEHRI	4781	30.19	4781	30.19	9325.408	58.88	11056	69.81
6	DINARA	0	0.00	0	0.00	22342.4	72.59	28586	92.88
7	KARAKAT	2331	11.43	2331	11.43	15217.764	74.61	18065	88.57
8	KARGAHAR	0	0.00	0	0.00	26920.528	82.77	28386	87.28
9	KOCHAS	2354	10.47	2354	10.47	17123.468	76.19	20120	89.53
10	NASRIGANJ	5833	50.75	5833	50.75	4782.588	41.61	5662	49.25
11	NAUHATTA	0	0.00	0	0.00	14142.228	84.77	14483	86.81
12	NOKHA	33225	79.33	33225	79.33	5632.852	13.45	8657	20.67
13	RAJPUR	1455	20.78	1455	20.78	4244.576	60.61	5549	79.22
14	ROHTAS	25923	81.90	25923	81.90	2487.396	7.86	5727	18.10
15	SANJHAULI	0	0.00	0	0.00	5408.236	80.52	5790	86.20
16	SASARAM	14442	44.83	14442	44.83	13905.6054	43.17	17771	55.17
17	SHIVSAGAR	6948	21.75	6948	21.75	19367.18	60.62	25001	78.25
18	SURYAPURA	285	5.05	285	5.05	4072.356	72.14	5360	94.95
19	TILOTHU	11942	76.80	11942	76.80	2151.164	13.83	3607	23.20
Total :									

Table 17: Information on problem soil in the district

District	Saline	Alkaline	Acidic	Soil Erosion	Iron Toxicity	Micro-nutrients deficiency	Waterlogged	other
Rohtas	Yes	Yes	Yes	Yes	Yes	Yes	NA	Yes

Table 18: Information on Rainfed and Irrigated area in the district

Sl.	Name of Block	Irrigated (Area in ha)		Rainfed (Area in ha)	
		Gross Irrigated Area	Net Irrigated Area	Partially Irrigated /Protective Irrigation	Un- Irrigated or Totally Rainded
1	AKODIGOLA	14068	8459	400	933
2	BIKRAMGANJ	17158	10505	1522	3550
3	CHENARI	18076	9096	11907	2977
4	DAWATH	18577	10457	317	741
5	DEHRI	14588	8044	2338	5455
6	DINARA	44736	25204	5017	557
7	KARAKAT	24337	12304	2428	5665
8	KARGAHAR	55181	27855	1401	3268
9	KOCHAS	14455	11508	3290	7677
10	NASRIGANJ	13656	8447	914	2133
11	NAUHATTA	3091	2083	7960	31839
12	NOKHA	22468	13567	935	2181
13	RAJPUR	4182	2645	1308	3051
14	ROHTAS	2250	1961	11876	17814
15	SANJHAULI	10837	6085	189	442
16	SASARAM	17852	9920	17835	4459
17	SHIVSAGAR	29658	17753	12776	1420
18	SURYAPURA	5551	4004	492	1149
19	TILOTHU	15746	11391	2079	2079
	Total	**346466.486**	**145867.736**	**42517.57**	**8854.888**

4. Description of Ongoing Extension Activities

ATMA is a society consisting of important participants engaged in agricultural activities to ensure sustainable agricultural development in the district. Its main objective is to integrate research and extension activities and decentralize the day-to-day management at the district level. Being a society, it is authorized to receive and spend project funds, establish contracts and agreements, and maintain revolving accounts that can be utilized to collect fees and recover operational expenses.

The farmers and communities in all blocks of the district have greatly benefited from ATMA Rohtas. Farmer-oriented activities such as trainings, demonstrations, exposure tours, formation of FIGs/CIGs/FSGs, Farm Schools, Exhibitions, and Farmers Awards have become popular in every farming household.

To disseminate information, different interactive and innovative methods such as pico projectors, low-cost films, handheld devices, and mobile-based services are utilized. Convergence is brought among extension efforts under different programmes and schemes at the village level through ATMA.

The implementation of the extension programmes has brought a significant impact and notable changes in the working system, with a coordinated approach being adopted. This can be attributed to the "bottom-up approach" being followed in the formulation of the BAP and DAP, which takes into consideration the block and district requirements through the participation of all stakeholders.

The aims and objectives for which the ATMA is formed are:

- Identify the specific needs of the farming community based on their location for the development of sustainable agriculture.
- Prioritize the areas for sustainable agricultural development using a Farming Systems Approach.
- Develop plans for production-based system activities to be implemented by farmers and other stakeholders.
- Implement plans through line departments, training institutions, NGOs, farmers' organizations, and allied institutions.
- Coordinate the efforts of various line departments, NGOs, farmers' organizations, and allied institutions to strengthen research-extension-farmer linkages and promote collaboration and coordination between State-funded technical departments.
- Facilitate the empowerment of farmers and producers by providing assistance in mobilizing and organizing into associations, cooperatives, etc. for increased participation in planning, marketing, technology dissemination, and agro processing.
- Facilitate market interventions to add value to farm produce.

4.1 Farmer Oriented Activities in Rohtas District

ATMA, Rohtas has introduced a Certificate course for input suppliers based on the training module of MANAGE, Hyderabad. The demonstration unit set up by ATMA on Solar Dryer, quail farming, mushroom cultivation, etc. has been beneficial to the farmers in the district. In addition, ATMA is conducting training programmes on scientific cultivation and better management of horticultural crops suitable for the district. They are also providing required scientific inputs such as soil and water testing facilities, quality planting materials, and promoting the economic benefits of these crops.

Among the routine programmes, ATMA organizes following programs under Farmer Oriented Activities.

A. Farmer Training
    a. Inter State
    b. Within State
    c. Within District
B. Farmers Tours/ Exposure Visits
    a. Inter State
    b. Within State
    c. Within District
C. Promotion of Farmers Interest Group
    a. Capacity Building Program
    b. Seed Money/ Revolving Funds
    c. Formation of FSG
D. Farmers Group Formation and Developments
E. Block Level Farmer Awards
F. Conduct of Farm School
G. Conduct of Demonstrations for farmers engaged with activities in agriculture and allied sector.

4.2 Farm Information Dissemination in Rohtas District

A. District Level Exhibition,
B. Farmer Fair (Kissan Mela),
C. Fruit-Vegetable Shows
D. Agriculture Information Broadcasting
E. Low-Cost Publication
F. Development of Technology Package in electronic form

4.3 Agricultural Technology Refinement, Validation & Adoption in Rohtas

A. Farmer-Scientist Interaction
B. District level technical assistance to KVK/ SAU in visits
C. Joint visits of Extension Workers and Scientists
D. Farmers Seminar/Field Day Organization
E. Assessment, refinement, validation and adoption of frontline technologies and other short-term researchable issues through KVKs and other local research centres.

4.4 Kissan Chaupal

Kisan Chaupal is a unique initiative undertaken by the Agricultural Technology Management Agency (ATMA) of Rohtas district to bring farmers, extension workers, and other stakeholders together to discuss and share agricultural knowledge, practices, and experiences. The primary objective of Kisan Chaupal is to facilitate the exchange of ideas, address farmers' concerns, and promote the adoption of sustainable farming practices to enhance productivity and income.

Rohtas district is composed of 19 administrative blocks, further subdivided into a total of 229 panchayats. Annually, each of these panchayats hosts two Kisan Chaupals, aligning with the Kharif and Rabi cropping seasons. Additionally, Nukkad Natak, a form of street theatre, and LED Rath events, which use audio-visual aids, are also held to raise awareness during the Kharif and Rabi Mahotsav festivals.

These gatherings provide a platform for farmers to interact with agricultural experts, scientists, government officials, and representatives from other organizations involved in agricultural development. The Kisan Chaupals focus on addressing local issues, showcasing success stories, and creating awareness about government schemes and programs related to agriculture and allied sectors.

During Kisan Chaupal sessions, farmers have the opportunity to raise their concerns and seek guidance on various aspects of farming, such as crop production, soil health, pest management, and water conservation. Experts share information about the latest technologies, best practices, and government schemes designed to help farmers improve their productivity and income. Additionally, Kisan Chaupals offer training sessions and demonstrations to equip farmers with practical skills and knowledge that can be applied to their farms.

5. Analysis of Existing Farming System under Each AES

5.1 General Profile of the Representative villages

A. Profile of Ayarkotha Village, Derhi

Ayarkotha village is situated in Tehsil Derhi, District Rohtas and in State of BIHAR India. Village has population of 1138 as per census data of 2011, in which male population is 590 and female population is 548. Total geographical area of Aayorkotha village is 53 Hectares. Population density of Ayarkotha is 21 persons per Hectares. Total number of households in village is 166.

Gram Panchayat name of the Ayar Kotha village is MAJHIAWN. CD Block name is Dehri and Teshil/Taluk or sub-district is Dehri. Data Reference year is 2009 of Census 2011. Sub District HQ Name is Dehri and Sub District HQ Distance is 12 Km from the village. District Head Quarter name is Sasaram and its distance from the village is 30KM. Nearest Town of the Ayar Kotha village is DEHRI and nearest town distance is 12 km. Pincode of Ayar Kotha village is N/A. As per census 2011 village code of village Ayar Kotha is 252546.

Sex Ratio of Village Ayarkotha -Census 2011

As per the Census Data 2011 there are 929 Femals per 1000 males out of 1138 total population of village. There are 1042 girls per 1000 boys under 6 years of age in the village.

Literacy of Ayarkotha Village

Out of total poplation total 757 people in Ayar Kotha Village are literate, among them 446 are male and 311 are female in the village. Total literacy rate of of Ayar Kotha is 80.19%, for male literacy is 90.1% and for female literacy rate is 69.27%.

Ayarkotha Village Census 2011 Data -Census 2011

Description	Census 2011 Data
Village Name	**Ayarkotha**
Tehsil Name	**Dehri**
District Name	**Rohtas**
State Name	**Bihar**
Total Population	**1,138**
Total Area	**53.00**
Total No of House Holds	**166**
Total Male Population	**590**
Total Female Population	**548**
0-6 Age group Total Population	**194**
0-6 Age group Male Population	**95**

Description	Census 2011 Data
0-6 Age group Female Population	**99**
Total Person Literates	**757**
Total Male Literates	**446**
Total Male Literates	**311**
Total Person Illiterates	**381**
Total Male Illiterates	**144**
Total Female Illiterates	**237**
Scheduled Cast Persons	**167**
Scheduled Cast Males	**92**
Scheduled Cast Females	**75**

Worker's profile of Ayarkotha Village

Total working population of Ayar Kotha is 265 which are either main or marginal workers. Total workers in the village are 265 out of which 246 are male and 19 are female. Total main workers are 218 out of which female main workers are 201 and male main workers are 17. Total marginal workers of village are 47.

Particulars	Total	Male	Female
Total Workers	**265**	**246**	**19**
Main Workers	**218**	**201**	**17**
Main Workers Cultivators	**52**	**48**	**4**
Agriculture Labourer	**62**	**55**	**7**
Household Industries	**3**	**3**	**-**
Other Workers	**101**	**95**	**6**
Marginal Workers	**47**	**45**	**2**
Non-Working Persons	**873**	**344**	**529**

Ayarkotha Village Data -Census 2011

Description	Data
Village Name	**Ayarkotha**
Gram Panchayat Name	**Majhiawan**
CD Block Name	**Derhi**
Tehsil Name	**Derhi**
Reference Year	**2009**
Sub District HQ Name	**Derhi**
Sub District HQ Distance	**12 Km**
District HQ Name	**Sasaram**
District HQ Distance	**30 Km**
Nearest Town	**Derhi**
Nearest Town Distance	**12 Km**
Pincode	**821307**


कृषि विभाग
सामरिक अनुसंधान एवं विस्तार योजना
(SREP) निर्माण हेतु तीन दिवसीय
प्रशिक्षण कार्यक्रम
तिथि - 4 फरवरी से 6 फरवरी 2020, समय - 11:00 am से
स्थान - संयुक्त कृषि भवन सभागार


कृषि विभाग
न एवं विस्तार योजना
ग हेतु तीन दिवसीय
1:00 am से


विस्तार योजना
हेतु तीन दिवसीय
2020, सम
कृषि भवन

Agro-ecological situations (AES I)
Irrigated Plain.
Village-Ayarkotha &
Village-Akodha.

Photo: PRA Exercise and Data Collection work executed by AES Team

Agro-ecological situations (AES II)
Rainfed
Village-Sikariyan.
Village-Samahuta

Photo: PRA Exercise and Data Collection work executed by AES Team

Agro-ecological
Situations (AES)-III
Hilly Upland
Village- Rehal
Village- Ugahani

Photo: PRA Exercise and Data Collection work executed by AES Team

B. Profile of Sikariyan Village, Sasaram

Sikaria village is situated in Teshil Sasaram, District Rohtas and in State of BIHAR India. Village has population of 4934 as per census data of 2011, in which male population is 2574 and female population is 2360. Total geographical area of Sikaria village is 1171.9 Hectares. Population density of Sikaria is 4 persons per Hectares. Total number of households in village is 866.

Gram Panchayat name of the Sikaria village is Sikaria. CD Block name is Sasaram and Teshil/Taluk or sub-district is Sasaram. Data Reference year is 2009 of Census 2011. Sub District HQ Name is Sasaram and Sub District HQ Distance is 10 Km from the village. District Head Quarter name is Sasaram and its distance from the village is 10KM. Nearest Town of the Sikaria village is SASARAM and nearest town distance is 10 km. Pincode of Sikaria village is N/A. As per census 2011 village code of village Sikaria is 252335.

Sex Ratio of Sikariyan Village -Census 2011

As per the Census Data 2011 there are 917 Femals per 1000 males out of 4934 total population of village. There are 897 girls per 1000 boys under 6 years of age in the village.

Literacy of Sikariyan Village

Out of total poplation total 2427 people in Sikaria Village are literate, among them 1488 are male and 939 are female in the village. Total literacy rate of of Sikaria is 62.17%, for male literacy is 73.26% and for female literacy rate is 50.13%.

Sikariyan Village Census 2011 Data -Census 2011

Description	Census 2011 Data
Village Name	**Sikariyan**
Tehsil Name	**Sasaram**
District Name	**Rohtas**
State Name	**Bihar**
Total Population	**4934**
Total Area	**1172**
Total No of House Holds	**866**
Total Male Population	**2574**
Total Female Population	**2360**
0-6 Age group Total Population	**1030**
0-6 Age group Male Population	**543**
0-6 Age group Female Population	**487**
Total Person Literates	**2427**
Total Male Literates	**1488**
Total Female Literates	**939**
Total Person Illiterates	**2507**
Total Male Illiterates	**1086**
Total Female Illiterates	**1421**
Scheduled Cast Persons	**1734**
Scheduled Cast Males	**914**
Scheduled Cast Females	**820**
Scheduled Tribe Persons	**4**

Description	Census 2011 Data
Scheduled Tribe Males	**3**
Scheduled Tribe Females	**1**

Worker's profile of Sikariyan Village

Total working population of Sikaria is 1280 which are either main or marginal workers. Total workers in the village are 1280 out of which 1087 are male and 193 are female. Total main workers are 1016 out of which female main workers are 956 and male main workers are 60. Total marginal workers of village are 264.

Particulars	Total	Male	Female
Total Workers	**1280**	**1087**	**193**
Main Workers	**1016**	**956**	**60**
Main Workers Cultivators	**256**	**238**	**18**
Agriculture Labourer	**510**	**483**	**27**
Household Industries	**24**	**22**	**2**
Other Workers	**226**	**213**	**13**
Marginal Workers	**264**	**131**	**133**
Non-Working Persons	**3654**	**1487**	**2167**

Sikariyan Village Data -Census 2011

Description	Data
Village Name	**Sikaria**
Gram Panchayat Name	**Sikaria**
CD Block Name	**Sasaram**
Tehsil Name	**Sasaram**
Reference Year	**2009**
Sub District HQ Name	**Sasaram**
Sub District HQ Distance	**10 Km**
District HQ Name	**Sasaram**
District HQ Distance	**10 Km**
Nearest Town	**Sasaram**
Nearest Town Distance	**10 Km**

C. Profile of Rehal Village, Nauhatta

Rehal village is situated in Teshil Nauhatta, District Rohtas and in State of BIHAR India. Village has population of 3160 as per census data of 2011, in which male population is 1604 and female population is 1556. Total geographical area of Rehal village is 3396 Hectares. Population density of Rehal is 1 person per Hectares. Total number of households in village is 589.

Gram Panchayat name of the Rehal village is Jayantipur. CD Block name is Nauhatta and Teshil/Taluk or sub-district is Nauhatta. Data Reference year is 2009 of Census 2011. Sub District HQ Name is Nauhatta and Sub District HQ Distance is 9 Km from the village. District Head Quarter name is Sasaram and its distance from the village is 90KM. Nearest Town of the Rehal village is DEHRI, and nearest town distance is 65 km. Pincode of Rehal village is 821304. As per census 2011 village code of village Rehal is 252081.

Sex Ratio of Rehal Village -Census 2011

As per the Census Data 2011 there are 970 Females per 1000 males out of 3160 total population of village. There are 1119 girls per 1000 boys under 6 years of age in the village.

Literacy of Rehal Village

Out of total population total 1127 people in Rehal Village are literate, among them 771 are male and 356 are female in the village. Total literacy rate of Rehal is 45.1%, for male literacy is 59.67% and for female literacy rate is 29.49%.

Rehal Village Census 2011 Data -Census 2011

Description	Census 2011 Data
Village Name	**Rehal**
Tehsil Name	**Nauhatta**
District Name	**Rohtas**
State Name	**BIHAR**
Total Population	**3160**
Total Area	**3396**
Total No of House Holds	**589**
Total Male Population	**1604**
Total Female Population	**1556**
0-6 Age group Total Population	**661**
0-6 Age group Male Population	**312**
0-6 Age group Female Population	**349**
Total Person Literates	**1127**
Total Male Literates	**771**
Total Female Literates	**356**
Total Person Illiterates	**2033**
Total Male Illiterates	**833**
Total Female Illiterates	**1200**
Scheduled Cast Persons	**128**
Scheduled Cast Males	**61**
Scheduled Cast Females	**67**

Description	Census 2011 Data
Scheduled Tribe Persons	**1077**
Scheduled Tribe Males	**1088**
Scheduled Tribe Females	**1077**

Worker's profile of Rehal Village

Total working population of Rehal is 1217 which are either main or marginal workers. Total workers in the village are 1217 out of which 745 are male and 472 are female. Total main workers are 635 out of which female main workers are 565 and male main workers are 70. Total marginal workers of village are 582.

Particulars	Total	Male	Female
Total Workers	**1217**	**745**	**472**
Main Workers	**635**	**565**	**70**
Main Workers Cultivators	**145**	**133**	**12**
Agriculture Labourer	**435**	**389**	**46**
Household Industries	**11**	**11**	**0**
Other Workers	**44**	**32**	**12**
Marginal Workers	**582**	**180**	**402**
Non-Working Persons	**1943**	**859**	**1084**

Rehal Village Data -Census 2011

Description	Data
Village Name	**Rehal**
Gram Panchayat Name	**Jayantipur**
CD Block Name	**Nauhatta**
Tehsil Name	**Nauhatta**
Reference Year	**2009**
Sub District HQ Name	**Nauhatta**
Sub District HQ Distance	**9 Km**
District HQ Name	**Sasaram**
District HQ Distance	**90 Km**
Nearest Town	**DEHRI**
Nearest Town Distance	**65 Km**

Table 19: Information on operational land holdings

Sl.	Name of the Village	Large		Medium		Small & Marginal		Landless (Nos. only)
		Nos.	Area (Ha)	Nos.	Area (Ha)	Nos.	Area (Ha)	
1	Ayarkotha	0	0	6	15	91	42	14
2	Sikaria	15	91	70	275	420	805	110
3	Rehal	70	265	920	2705	315	426	-

Table 20: Demographic Information of the village

Sl.	Name of the village	Population (2011)	Male	Female	Children	Literacy (%)	Agri. worker	Non-agri worker	Categories	
									SC	ST
1	Ayarkotha	1,138	590	548	194	80.19	62		167	0
2	Sikaria	4934	2574	2360	1030	62.17	510		1734	4
3	Rehal	3160	1604	1556	661	45.1%	435		128	1077

Table 21: Information on irrigated area in the village

Sl.	Name of the village	Rainfed Agri		Irrigated area (source wise)					Total (Ha)
		Area (Ha)	Percentage	Major	Medium	Minor	Lift	Wells	
1	Ayarkotha	0	0%	-	-	30	-	22	52
2	Sikaria	231	20%	-	-	231		693	1155
3	Rehal	2583	90%	-	-	115	-	172	-

Table 22: Information on Land use pattern (Area in Ha)

Sl.	Name of the village	TGA	CA	NCA	CW	CF	Forest	Pasture	LNA	MsP	WaL
1	Ayarkotha	57	54	52	0.5	-	-	0.5	3	-	1
2	Sikaria	1171	1160	1155	3	-	4	3	4	-	2
3	Rehal	3396	3216	2870	236	-	-	180	44	66	-

TGA: Total Geographical Area **CA**: Cultivable Area **NCA**: Net Cultivated Area **CW**: Cultivable waste
CF: Current Fallow **LNA**: Land put to non-agri use **MsP**: Miscellaneous plantation **WaL**: Waste Land

Table 23: Information on Soils for the Representative Villages

Sl.	Name of the village(s)	Black Soil		Red Soil		Alluvial Soil		Sandy Soil		Sandy Loam		Others	
		Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
1	Ayarkotha	-	-	-	-	42	73.68	-	-	15	26.32	-	-
2	Sikaria	-	-	-	-	468.4	40	-	-	702.6	60	-	-
3	Rehal	-	-	2377	70	-	-	-	-	1019	30	-	-

Table 24: Details about number of families under each kind of resource situation in the representative village of the AES

Name of village : Ayarkotha Type of Agro-ecological situation : Rainfed		Agro-ecological situation : I			
Sl.	Categories	No. of families and their percentage			
		Large & Medium		Small & Marginal	
		No.	%	No.	%
01	Resource Rich	06	6.18	-	-
02	Resource Poor	-	-	91	93.82
Total :		97			

Name of village : Sikaria Type of Agro-ecological situation : Rainfed		Agro-ecological situation : II			
Sl.	Categories	No. of families and their percentage			
		Large & Medium		Small & Marginal	
		No.	%	No.	%
01	Resource Rich	85	16.83	-	-
02	Resource Poor	-	-	420	83.17
Total :		505			

Name of village : Rehal Type of Agro-ecological situation : Rainfed		Agro-ecological situation : III			
Sl.	Categories	No. of families and their percentage			
		Large & Medium		Small & Marginal	
		No.	%	No.	%
01	Resource Rich	990	75.86	-	-
02	Resource Poor	-	-	315	24.14
Total :		1305			

Table 25: Details about predominant EFS in the representative village of AES

Name of village : Ayarkotha Type of Agro-ecological situation : Rainfed		Agro-ecological situation : I Resource Situation : **RR**	
Sl.	Existing farming system	No. & percentage of families associated	
		Number	Percentage
01	Agriculture + Horticulture	2	33.33%
02	Agriculture + Animal Husbandry	4	66.66%
Total :		6	100.00%

Name of village : Aayarkotha Type of Agro-ecological situation : Rainfed		Agro-ecological situation : I Resource Situation : **RP**	
Sl.	Existing farming system	No. & percentage of families associated	
		Number	Percentage
01	Agriculture	70	76.92%
02	Agriculture + Horticulture	8	8.8%
03	Agriculture + Animal Husbandry	13	14.28%
Total :		91	100.00%

Name of village : Sikaria Type of Agro-ecological situation : Rainfed		Agro-ecological situation : II Resource Situation : **RR**	
Sl.	Existing farming system	No. & percentage of families associated	
		Number	Percentage
01	Agriculture	64	75.30%
02	Animal Husbandry	3	3.53%
03	Agriculture + Animal Husbandry	6	7.06
04	Agriculture + Horticulture	12	14.12%
Total :		85	100%

Name of village : Sikaria Type of Agro-ecological situation : Rainfed		Agro-ecological situation : II Resource Situation : **RP**	
Sl.	Existing farming system	No. & percentage of families associated	
		Number	Percentage
01	Agriculture	315	75%
02	Animal Husbandry	-	-
03	Agriculture + Horticulture	50	12%
04	Agriculture + Animal Husbandry	55	13%
Total :		420	100%

Name of village : Rehal Type of Agro-ecological situation : Rainfed		Agro-ecological situation : III Resource Situation : **RR**	
Sl.	Existing farming system	No. & percentage of families associated	
		Number	Percentage
01	Agriculture	743	75%
02	Agriculture + Animal Husbandry	128	13%
03	Agriculture + Horticulture	119	12%
04	Animal Husbandry	-	-
Total :		990	100.00%

Name of village : Rehal Type of Agro-ecological situation : Rainfed		Agro-ecological situation : III Resource Situation : **RP**	
Sl.	Existing farming system	No. & percentage of families associated	
		Number	Percentage
01	Agriculture	236	75%
02	Agriculture + Horticulture	32	10.15%
03	Agriculture + Animal Husbandry	40	12.69%
04	Agriculture + Labour (Migrate)	7	2.22%
Total :		315	100.00%

Table 26: Major enterprises associated with each EFS under each resource situation in representative villages

Name of village : Aayorkotha		Agro-ecological situation : I Resource Situation : RR			
Sl.	Type of enterprises/ commodities	No. of families (%) associated with 2-3 dominant enterprises/commodities			
		EFS-I Agri	EFS-II A.H	EFS-III Agri + hot.	EFS- IV Agri + A.H
01	Agricultural Crops				
	Irrigated				
	–Wheat	100%	33.33%	66.66%	-
	–Pea				
	–Mustard Lentil				
	Rainfed				
	– Maize				
02	–Horticultural crops				
	–Orchards		30%		
	–Vegetable (Potato)		70%		
	–Floriculture				
03	–Animal husbandry				35%
	–Cows				45%
	–Buffalos				20%
	–Goat				

Name of village : Aayorkotha		Agro-ecological situation : I Resource Situation : RP			
Sl.	Type of enterprises/ commodities	No. of families (%) associated with 2-3 dominant enterprises/commodities			
		EFS-I Agri	EFS-II A.H	EFS-III Agri + hot.	EFS- IV Agri + A.H
01	Agricultural Crops				
	Irrigated				
	–Wheat	100%	80.8%	14.28%	-
	–Pea				
	–Mustard Lentil				
	Rainfed				
	– Maize				
02	–Horticultural crops				
	–Orchards		30%		
	–Vegetable (Potato)		70%		
	–Floriculture				
03	–Animal husbandry				30%
	–Cows				28%
	–Buffalos				42%
	–Goat				

Name of village : Sakaria		Agro-ecological situation : II Resource Situation : RR			
Sl.	Type of enterprises/ commodities	No. of families (%) associated with 2-3 dominant enterprises/commodities			
		EFS-I Agri	EFS-II A.H	EFS-III Agri + hot.	EFS- IV Agri + A.H
01	Agricultural Crops				
	Irrigated				
	–Wheat	100%	3.53%	7.06%	14.12%
	–Lentils				
	–Mustard				
	Rainfed				
	– Maize				
02	–Horticultural crops				
	–Orchards				30%
	–Vegetable (Potato)				70%
	–Floriculture				
03	–Animal husbandry		37%	42%	
	–Cows		28%	35%	
	–Buffalos		25%	23%	
	–Goat				

Name of village : Sakaria		Agro-ecological situation : II Resource Situation : RP			
Sl.	Type of enterprises/ commodities	No. of families (%) associated with 2-3 dominant enterprises/commodities			
		EFS-I Agri	EFS-II A.H	EFS-III Agri + hot.	EFS- IV Agri + A.H
01	Agricultural Crops				
	Irrigated				
	–Wheat				
	–Pea				13%
	–Mustard Lentil			12%	
	Rainfed	100%			
	– Maize				
02	–Horticultural crops				
	–Orchards			30%	
	–Vegetable			70%	
	–Floriculture				
03	–Animal husbandry				31%
	–Cows				26%
	–Buffalos				43%
	–Goat				
04	Agriculture labour	-	-	-	

Name of village : Rehal Type of Agro-ecological situation : Irrigated		Agro-ecological situation : III Resource Situation : RR			
Sl.	Type of enterprises/ commodities	No. of families (%) associated with 2-3 dominant enterprises/commodities			
		EFS-I Agri	EFS-II Agri + A.H	EFS-III Agri + hort.	EFS- IV Agri+Labour (M)
01	Agricultural Crops				
	Irrigated				
	–Wheat				
	–Lentils	100%	13%	12%	-
	–Mustard Lentil			12%	
	Rainfed				
	– Maize				
02	–Horticultural crops				
	–Orchards			30%	
	–Vegetable			70%	
	–Floriculture				
03	–Animal husbandry				
	–Cows		42%		31%
	–Buffalos		40%		26%
	–Goat		18%		43%
04	Agriculture labour	-	-	-	

Name of village : Rehal Type of Agro-ecological situation : Irrigated		Agro-ecological situation : III Resource Situation : RP			
Sl.	Type of enterprises/ commodities	No. of families (%) associated with 2-3 dominant enterprises/commodities			
		EFS-I Agri	EFS-II Agri + A.H	EFS-III Agri + hort.	EFS- IV Agri+Labour (M)
01	Agricultural Crops				
	Irrigated				
	–Wheat				
	–Lentils				
	–Mustard Lentil				
	Rainfed	100%	10.15%	12.69%	2.22%
	– Maize				
02	–Horticultural crops				
	–Orchards		30%		
	–Vegetable		70%		
	–Floriculture				
03	–Animal husbandry				
	–Cows			32%	
	–Buffalos			18%	
	–Goat			50%	
04	Agriculture labour	-	-	-	

Table 27: Contribution of different enterprises towards annual income under each EFS

AES	Type of enterprises/ commodities	Contribution of different enterprises /Commodities (P/S/T/Q) towards annual net income in each EFS			
		Resource Rich		Resource Poor	
		EFS-I	EFS-II	EFS-I	EFS-II
AES-I	*Agriculture*	P 48000	P 38000	P 29000	P 29000
	Horticulture		S-21000		S-21000
	Animal husbandry	S 21000	S 21000	S 21000	S 15000
	Fisheries	T (48000)	T (48000)	T (30000)	T (35000)
	Poultry	S (15000)	T (10000)	S (5000)	T (5000)
	Agriculture labour				
AES-II	*Agriculture*	P 58000	P 50000	P 30000	P 30000
	Horticulture		S-20000		S-12000
	Animal husbandry	S 24000	S 20000	S 15000	S 15000
	Fisheries	T (46000)		T (28000)	T (25000)
	Poultry	S (14500)		S (7500)	T (10000)
	Agriculture labour				
AES-II	*Agriculture*	P 50000	P 50000	P 30000	P 30000
	Horticulture		S 22000		S-12000
	Animal husbandry	S 22000	S 20000	S 15000	S 15000
	Fisheries	T (45000)		T (30000)	T (25000)
	Poultry	S (13000)		S (7500)	T (10000)
	Agriculture labour				

P- Primary, S-Secondary, T- Tertiary

Table 28: Type of IFS evolved by innovative farmers or recommended by research scientists for each resource situation.

District: Rohtas		**AES-I**		Village: Aayorkotha	
Sl.	Type of enterprises/ commodities	Percentage of farmers following Improved Farming System			
		Resource Rich		Resource Poor	
		EFS-I	EFS-II	EFS-I	EFS-II
1	***Irrigated Agricultural***				
	Paddy	33	32	28	29
	Wheat	38	34	33	36
	Maize	34	38	28	30
	Pulses	30	29	25	26
	Oil Seeds	25	23	28	29
	Rainfed Agriculture				
	Paddy	27	30	24	26
	Wheat	25	32	21	27
	Maize	29	28	23	24
	Pulses				
	Oilseeds				
2	***Horticulture***				
	Orchards		28		23
	-Vegetables-		28		23
	-Floriculture				
3	***Animal husbandry***				
	-Cows	34	34	34	34
	Buffalos	42	42	42	42
	Sheep				
	Goat	23	23	23	23
4	***Fisheries***				
5	***Poultry***				

District: Rohtas		AES-II		Village: Sakaria	
Sl.	Type of enterprises/ commodities	Percentage of farmers following Improved Farming System			
		Resource Rich		Resource Poor	
		EFS-I	EFS-II	EFS-I	EFS-II
1	*Irrigated Agricultural*				
	Paddy	36	33	30	35
	Wheat	34	38	33	33
	Maize	39	35	28	32
	Pulses	32	29	28	28
	Oilseeds	28	33	28	23
	Rainfed Agriculture				
	Paddy	30	34	24	33
	Wheat	29	31	26	29
	Maize	30	33	25	32
	Pulses				
	Oilseeds				
2	*Horticulture*				
	Orchards		23		17
	-Vegetables-		32		23
	-Floriculture				
3	Animal husbandry				
	-Cows	38	32	33	34
	Buffalos	40	42	40	46
	Sheep				
	Goat	23	21	24	26
	Pigs				
4	Fisheries				
5	Poultry				

District: Rohtas		AES-I		Village: Rehal	
Sl.	Type of enterprises/ commodities	Percentage of farmers following Improved Farming System			
		Resource Rich		Resource Poor	
		EFS-I	EFS-II	EFS-I	EFS-II
1	***Irrigated Agricultural***				
	Paddy	33	33	30	31
	Wheat	35	37	31	33
	Maize	30	32	33	35
	Pulses	26	30	25	28
	Oil Seeds	30	28	26	30
	Rainfed Agriculture				
	Paddy	26	33	23	26
	Wheat	28	30	26	29
	Maize	29	26	24	27
	Pulses				
	Oilseeds				
2	***Horticulture***				
	Orchards		32		23
	-Vegetables-		30		25
	-Floriculture				
3	***Animal husbandry***				
	-Cows	33	35	37	32
	Buffalos	43	44	41	40
	Sheep				
	Goat	22	22	20	24
4	***Fisheries***				
5	***Poultry***				

Table 29: Contribution of different enterprises towards annual income under each IFS

District: Rohtas		**AES-I**		Village: Aarykotha	
Sl. No	Type of enterprises/ commodities	Resource Rich		Resource Poor	
		EFS-I	EFS-II	EFS-I	EFS-II
1	*Irrigated Agricultural*				
	Paddy	47000	48000	32000	35000
	Wheat				
	Maize				
	Pulses				
	Oilseeds				
	Rainfed Agriculture				
	Paddy	30000	33000	27000	28000
	Wheat				
	Maize				
	Pulses				
	Oilseeds				
2	*Horticulture*				
	Orchards		27000		20000
	-Vegetables-				
	-Floriculture				
3	Animal husbandry				
	-Cows	18000	18000	14000	12000
	Buffalos				
	Sheep				
	Goat				
	Pigs				
4	Fisheries	48000	48000	32000	32000
5	Poultry	17000	18000	10000	10000

District: Rohtas		**AES-II**		Village: Sakaria	
Sl. No	Type of enterprises/ commodities	Resource Rich		Resource Poor	
		EFS-I	EFS-II	EFS-I	EFS-II
1	*Irrigated Agricultural*				
	Paddy	42000	46000	26000	28000
	Wheat				
	Maize				
	Pulses				
	Oilseeds				
	Rainfed Agriculture				
	Paddy	30000	35000	22000	25000
	Wheat				
	Maize				
	Pulses				
	Oilseeds				
2	*Horticulture*				
	Orchards				19000
	-Vegetables-				
	-Floriculture				
3	Animal husbandry				
	-Cows	18000	20000	15000	15000
	Buffalos				
	Sheep				
	Goat				
	Pigs				
4	Fisheries	47000	48000	30000	30000
5	Poultry	15000	15000	10000	10000

District: Rohtas		AES-III		Village: Rehal	
Sl. No	Type of enterprises/ commodities	Resource Rich		Resource Poor	
		EFS-I	EFS-II	EFS-I	EFS-II
1	*Irrigated Agricultural*				
	Paddy	42000	46000	30000	30000
	Wheat				
	Maize				
	Pulses				
	Oilseeds				
	Rainfed Agriculture				
	Paddy	30000	32000	22000	23000
	Wheat				
	Maize				
	Pulses				
	Oilseeds				
2	*Horticulture*				
	Orchards				18000
	-Vegetables-				
	-Floriculture				
3	Animal husbandry				
	-Cows	17000	19000	16000	16000
	Buffalos				
	Sheep				
	Goat				
	Pigs				
4	Fisheries	42000	42000	30000	30000
5	Poultry	15000	15000	10000	10000

Table 30: Trend about growth of existing enterprise/ commodities/ livestock in the representative villages

District: Rohtas, AES-I (Aayarkotha)							
Sl.	**Name of enterprises / commodities / livestock**	**Unit**	**Trend about no. of units in the village**				
			2019	**2015**	**2010**	**2005**	**2000**
I	***Irrigated Agricultural***	Nos.					
	Paddy		147	127	117	105	80
	Wheat						
	Maize						
	Pulses						
	Oilseeds						
	Rainfed Agriculture	Nos.					
	Paddy		95	105	122	128	148
	Wheat						
	Maize						
	Pulses						
	Oilseeds						
2	**Horticulture**						
	Vegetables		44	39	33	28	23
3	**Animal husbandry**	Nos.					
	Goat		32	37	38	42	42
	Buffalo						
	Cow						
4	Fisheries		3	0	0	0	0
5	Poultry		2	0	0	0	0

Trend about growth of existing enterprise/ commodities/ livestock in the representative villages

District: Rohtas, AES-II (Sakaria)							
Sl.	**Name of enterprises / commodities / livestock**	**Unit**	**Trend about no. of units in the village**				
			2019	**2015**	**2010**	**2005**	**2000**
I	***Irrigated Agricultural***	Nos.					
	Paddy		295	268	240	216	189
	Wheat						
	Maize						
	Pulses						
	Oilseeds						
	Rainfed Agriculture	Nos.					
	Paddy		236	268	295	320	348
	Wheat						
	Maize						
	Pulses						
	Oilseeds						
2	**Horticulture**						
	Vegetables		63	58	52	47	43
3	**Animal husbandry**	Nos.					
	Goat		53	62	67	72	77
	Buffalo						
	Cow						
4	Fisheries		0	0	0	0	0
5	Poultry		2	1	0	0	0

Trend about growth of existing enterprise/ commodities/ livestock in the representative villages

District: Rohtas, AES-III (Rehal)							
Sl.	**Name of enterprises / commodities / livestock**	**Unit**	**Trend about no. of units in the village**				
			2019	**2015**	**2010**	**2005**	**2000**
I	***Irrigated Agricultural***	Nos.					
	Paddy		292	266	238	210	170
	Wheat						
	Maize						
	Pulses						
	Oilseeds						
	Rainfed Agriculture	Nos.					
	Paddy		230	262	293	317	350
	Wheat						
	Maize						
	Pulses						
	Oilseeds						
2	**Horticulture**						
	Vegetables		61	53	49	47	40
3	**Animal husbandry**	Nos.					
	Goat		51	66	70	75	80
	Buffalo						
	Cow						
4	Fisheries		2	0	0	0	0
5	Poultry		2	0	0	0	0

Table 31: Analysis of problems with regard to existing farming system

District: Rohtas, AES-I (Resource Rich)							
Sl.	**Type of enterprises/ commodities**	**Combination of enterprises in EFS**	**Specific problems with each enterprise**	**Affected persons (%)**	**Proposed solution**	**Reasons for non-adoption of proposed solution**	**Proposed strategy**
EFS-I	Agriculture	P 48000	Lack of Quality input, Lack of Irrigation, Lack of awareness, Lack of Infra.	60%	Input Supply, Awareness on crop rotation, Appropriate cultivation practices	Lack of awareness, Unavailability of quality inputs with retailers.	Awareness program for farmers & input suppliers.
	Horticulture						
	Animal husbandry	S 21000	Poor health condition, Poor AI facility, Lack of green fodder round the year	65%	Feeding Management, Promotion of fodder crops, AI facility in time	Lack of awareness, lack of facilities	Awareness program for farmers, feed suppliers and Liasioning with ANHS dept.
	Fisheries	T 48000	Poor Feed Management, Floods & Droughts	5%	Awareness Program	Lack of awareness, poor practices	Awareness Program, Training & Demo
	Poultry	S 15000	Mortality problem, Fear of loss	5%	Training Programs	Lack of expertise	Awareness Program, Exposure visits
EFS-II	Agriculture	P 38000	Lack of Quality input, Lack of Irrigation, Lack of awareness, Lack of Infra.	60%	Input Supply, Awareness on crop rotation, Appropriate cultivation practices	Lack of awareness, Unavailability of quality inputs with retailers.	Awareness program for farmers & input suppliers.
	Horticulture	S 21000	Lack of irrigation, Lack of quality planting material, lack of awareness	50%	Soil and water management, supply of planting material, awareness programs	Lack of awareness, Less extension activity.	Extensive extension activity, training, and exposure visit.
	Animal husbandry	T 21000	Poor health condition, Poor AI facility, Lack of green fodder round the year	65%	Feeding Management, Promotion of fodder crops, AI facility in time	Lack of awareness, lack of facilities	Awareness program for farmers, feed suppliers and Liasioning with ANHS dept.
	Fisheries	T 48000	Poor Feed Management, Floods & Droughts	5%	Awareness Program	Lack of awareness, poor practices	Awareness Program, Training & Demo
	Poultry	T 10000	Mortality problem, Fear of loss	5%	Training Programs	Lack of expertise	Awareness Program, Exposure visits

P- Primary, S-Secondary, T- Tertiary

Analysis of problems with regard to existing farming system

District: Rohtas, AES-I (Resource Poor)							
Sl.	**Type of enterprises/ commodities**	**Combination of enterprises in EFS**	**Specific problems with each enterprise**	**Affected persons (%)**	**Proposed solution**	**Reasons for non-adoption of proposed solution**	**Proposed strategy**
EFS-I	Agriculture	P 29000	Lack of Quality input, Lack of Irrigation, Lack of awareness, Lack of Infra.	75%	Input Supply, Awareness on crop rotation, Appropriate cultivation practices	Lack of awareness, Unavailability of quality inputs with retailers.	Awareness program for farmers & input suppliers.
	Horticulture						
	Animal husbandry	S 21000	Poor health condition, Poor AI facility, Lack of green fodder round the year	75%	Feeding Management, Promotion of fodder crops, AI facility in time	Lack of awareness, lack of facilities	Awareness program for farmers, feed suppliers and Liasioning with ANHS dept.
	Fisheries	T 30000	Poor Feed Management, Floods & Droughts	5%	Awareness Program	Lack of awareness, poor practices	Awareness Program, Training & Demo
	Poultry	S 5000	Mortality problem, Fear of loss	5%	Training Programs	Lack of expertise	Awareness Program, Exposure visits
EFS-II	Agriculture	P 29000	Lack of Quality input, Lack of Irrigation, Lack of awareness, Lack of Infra.	65%	Input Supply, Awareness on crop rotation, Appropriate cultivation practices	Lack of awareness, Unavailability of quality inputs with retailers.	Awareness program for farmers & input suppliers.
	Horticulture	S 21000	Lack of irrigation, Lack of quality planting material, lack of awareness	65%	Soil and water management, supply of planting material, awareness programs	Lack of awareness, Less extension activity.	Extensive extension activity, training, and exposure visit.
	Animal husbandry	T 15000	Poor health condition, Poor AI facility, Lack of green fodder round the year	55%	Feeding Management, Promotion of fodder crops, AI facility in time	Lack of awareness, lack of facilities	Awareness program for farmers, feed suppliers and Liasioning with ANHS dept.
	Fisheries	T 35000	Poor Feed Management, Floods & Droughts	5%	Awareness Program	Lack of awareness, poor practices	Awareness Program, Training & Demo
	Poultry	T 5000	Mortality problem, Fear of loss	5%	Training Programs	Lack of expertise	Awareness Program, Exposure visits

P- Primary, S-Secondary, T- Tertiary

Analysis of problems with regard to existing farming system

District: Rohtas, AES-II (Resource Rich)							
Sl.	**Type of enterprises/ commodities**	**Combination of enterprises in EFS**	**Specific problems with each enterprise**	**Affected persons (%)**	**Proposed solution**	**Reasons for non-adoption of proposed solution**	**Proposed strategy**
EFS-I	Agriculture	P 58000	Lack of Quality input, Lack of Irrigation, Lack of awareness, Lack of Infra.	55%	Input Supply, Awareness on crop rotation, Appropriate cultivation practices	Lack of awareness, Unavailability of quality inputs with retailers.	Awareness program for farmers & input suppliers.
	Horticulture						
	Animal husbandry	S 24000	Poor health condition, Poor AI facility, Lack of green fodder round the year	40%	Feeding Management, Promotion of fodder crops, AI facility in time	Lack of awareness, lack of facilities	Awareness program for farmers, feed suppliers and Liasioning with ANHS dept.
	Fisheries	T 48000	Poor Feed Management, Floods & Droughts	5%	Awareness Program	Lack of awareness, poor practices	Awareness Program, Training & Demo
	Poultry	S 15000	Mortality problem, Fear of loss	5%	Training Programs	Lack of expertise	Awareness Program, Exposure visits
EFS-II	Agriculture	P 50000	Lack of Quality input, Lack of Irrigation, Lack of awareness, Lack of Infra.	80%	Input Supply, Awareness on crop rotation, Appropriate cultivation practices	Lack of awareness, Unavailability of quality inputs with retailers.	Awareness program for farmers & input suppliers.
	Horticulture						
	Animal husbandry	S 20000	Poor health condition, Poor AI facility, Lack of green fodder round the year	20%	Feeding Management, Promotion of fodder crops, AI facility in time	Lack of awareness, lack of facilities	Awareness program for farmers, feed suppliers and Liasioning with ANHS dept.
	Fisheries						
	Poultry						

P- Primary, S-Secondary, T- Tertiary

Analysis of problems with regard to existing farming system

District: Rohtas, AES-II (Resource Poor)							
Sl.	**Type of enterprises/ commodities**	**Combination of enterprises in EFS**	**Specific problems with each enterprise**	**Affected persons (%)**	**Proposed solution**	**Reasons for non-adoption of proposed solution**	**Proposed strategy**
EFS-I	Agriculture	P 30000	Lack of Quality input, Lack of Irrigation, Lack of awareness, Lack of Infra.	75%	Input Supply, Awareness on crop rotation, Appropriate cultivation practices	Lack of awareness, Unavailability of quality inputs with retailers.	Awareness program for farmers & input suppliers.
	Horticulture						
	Animal husbandry	S 15000	Poor health condition, Poor AI facility, Lack of green fodder round the year	20%	Feeding Management, Promotion of fodder crops, AI facility in time	Lack of awareness, lack of facilities	Awareness program for farmers, feed suppliers and Liasioning with ANHS dept.
	Fisheries	T 28000	Poor Feed Management, Floods & Droughts	5%	Awareness Program	Lack of awareness, poor practices	Awareness Program, Training & Demo
	Poultry	S 7500	Mortality problem, Fear of loss	5%	Training Programs	Lack of expertise	Awareness Program, Exposure visits
EFS-II	Agriculture	P 30000	Lack of Quality input, Lack of Irrigation, Lack of awareness, Lack of Infra.	80%	Input Supply, Awareness on crop rotation, Appropriate cultivation practices	Lack of awareness, Unavailability of quality inputs with retailers.	Awareness program for farmers & input suppliers.
	Horticulture	S 12000	Lack of irrigation, Lack of quality planting material, lack of awareness	80%	Soil and water management, supply of planting material, awareness programs	Lack of awareness, Less extension activity.	Extensive extension activity, training and exposure visit.
	Animal husbandry	S 15000	Poor health condition, Poor AI facility, Lack of green fodder round the year	15%	Feeding Management, Promotion of fodder crops, AI facility in time	Lack of awareness, lack of facilities	Awareness program for farmers, feed suppliers and Liasioning with ANHS dept.
	Fisheries	T 25000	Poor Feed Management, Floods & Droughts	5%	Awareness Program	Lack of awareness, poor practices	Awareness Program, Training & Demo
	Poultry	T 10000	Mortality problem, Fear of loss	5%	Training Programs	Lack of expertise	Awareness Program, Exposure visits

P- Primary, S-Secondary, T- Tertiary

Analysis of problems with regard to existing farming system

District: Rohtas, AES-III (Resource Rich)							
Sl.	**Type of enterprises/ commodities**	**Combination of enterprises in EFS**	**Specific problems with each enterprise**	**Affected persons (%)**	**Proposed solution**	**Reasons for non-adoption of proposed solution**	**Proposed strategy**
EFS-I	Agriculture	P 50000	Lack of Quality input, Lack of Irrigation, Lack of awareness, Lack of Infra.	55%	Input Supply, Awareness on crop rotation, Appropriate cultivation practices	Lack of awareness, Unavailability of quality inputs with retailers.	Awareness program for farmers & input suppliers.
	Horticulture						
	Animal husbandry	S 24000	Poor health condition, Poor AI facility, Lack of green fodder round the year	40%	Feeding Management, Promotion of fodder crops, AI facility in time	Lack of awareness, lack of facilities	Awareness program for farmers, feed suppliers and Liasioning with ANHS dept.
	Fisheries	T 48000	Poor Feed Management, Floods & Droughts	5%	Awareness Program	Lack of awareness, poor practices	Awareness Program, Training & Demo
	Poultry	S 15000	Mortality problem, Fear of loss	5%	Training Programs	Lack of expertise	Awareness Program, Exposure visits
EFS-II	Agriculture	P 50000	Lack of Quality input, Lack of Irrigation, Lack of awareness, Lack of Infra.	80%	Input Supply, Awareness on crop rotation, Appropriate cultivation practices	Lack of awareness, Unavailability of quality inputs with retailers.	Awareness program for farmers & input suppliers.
	Animal husbandry	S 20000	Poor health condition, Poor AI facility, Lack of green fodder round the year	20%	Feeding Management, Promotion of fodder crops, AI facility in time	Lack of awareness, lack of facilities	Awareness program for farmers, feed suppliers and Liasioning with ANHS dept.

P- Primary, S-Secondary, T- Tertiary

Analysis of problems with regard to existing farming system

District: Rohtas, AES-III (Resource Poor)							
Sl.	**Type of enterprises/ commodities**	**Combination of enterprises in EFS**	**Specific problems with each enterprise**	**Affected persons (%)**	**Proposed solution**	**Reasons for non-adoption of proposed solution**	**Proposed strategy**
EFS-I	Agriculture	P 30000	Lack of Quality input, Lack of Irrigation, Lack of awareness, Lack of Infra.	75%	Input Supply, Awareness on crop rotation, Appropriate cultivation practices	Lack of awareness, Unavailability of quality inputs with retailers.	Awareness program for farmers & input suppliers.
	Horticulture						
	Animal husbandry	S 15000	Poor health condition, Poor AI facility, Lack of green fodder round the year	20%	Feeding Management, Promotion of fodder crops, AI facility in time	Lack of awareness, lack of facilities	Awareness program for farmers, feed suppliers and Liasioning with ANHS dept.
	Fisheries	T 30000	Poor Feed Management, Floods & Droughts	5%	Awareness Program	Lack of awareness, poor practices	Awareness Program, Training & Demo

District: Rohtas, AES-III (Resource Poor)							
Sl.	**Type of enterprises/ commodities**	**Combination of enterprises in EFS**	**Specific problems with each enterprise**	**Affected persons (%)**	**Proposed solution**	**Reasons for non-adoption of proposed solution**	**Proposed strategy**
	Poultry	S 7500	Mortality problem, Fear of loss	5%	Training Programs	Lack of expertise	Awareness Program, Exposure visits
EFS-II	Agriculture	P 30000	Lack of Quality input, Lack of Irrigation, Lack of awareness, Lack of Infra.	80%	Input Supply, Awareness on crop rotation, Appropriate cultivation practices	Lack of awareness, Unavailability of quality inputs with retailers.	Awareness program for farmers & input suppliers.
	Horticulture	S 12000	Lack of irrigation, Lack of quality planting material, lack of awareness	80%	Soil and water management, supply of planting material, awareness programs	Lack of awareness, Less extension activity.	Extensive extension activity, training and exposure visit.
	Animal husbandry	S 15000	Poor health condition, Poor AI facility, Lack of green fodder round the year	15%	Feeding Management, Promotion of fodder crops, AI facility in time	Lack of awareness, lack of facilities	Awareness program for farmers, feed suppliers and Liasioning with ANHS dept.
	Fisheries	T 25000	Poor Feed Management, Floods & Droughts	5%	Awareness Program	Lack of awareness, poor practices	Awareness Program, Training & Demo
	Poultry	T 10000	Mortality problem, Fear of loss	5%	Training Programs	Lack of expertise	Awareness Program, Exposure visits

P- Primary, S-Secondary, T- Tertiary

Table 32: Type of changing scenario in rural areas which is having a bearing on EFSs.

Sl.	**Type of changing scenario**	**Effect of each scenario on farming system (H/M/L)**		
		AES-I	**AES-II**	**AES-III**
1	Migration of people to urban areas	H	M	H
2	Lack of animal draught power	L	L	M
3	Increase in farm machinery	M	H	M
4	Shortage of labour	M	H	M
5	Reduction in availability of fodder	H	M	L
6	Increase in number of unemployed rural youth	H	H	H
7	Increase in level of education	M	M	M
8	Reduction in availability of irrigation water	M	M	H
9	Increase in rural indebtedness	H	H	H
10	Better transport facilities	H	H	H
11	Milk collection centers/route	H	H	H
12	Marketing facilities at the village level	M	M	M
13	Slackness towards agriculture	M	L	M
14	Low relative profitability from farming	H	H	H
15	Absentee landlordism	M	H	M
16	Selling land to others	M	M	M
17	Purchasing land from others	L	L	L
	H= High; M= Medium; L= Low			

Table 33: Type of new market opportunities in urban / rural areas which are having bearings on FS

Sl.	Type of changing scenario	Effect of each opportunity on farming system (H/M/L)		
		AES-I	AES-II	AES-III
1	Vegetables	M	M	H
2	Fruits	H	M	H
3	Mulberry Silk	L	L	L
4	Oilseeds	H	M	M
5	Pulses	M	H	H
6	Mushroom	M	M	H
7	Flowers	M	M	L
8	Meat (Goat/Sheep)	M	M	M
9	Export of Seeds	L	L	L
10	Export of Organic Products	M	M	M
11	Basmati Rice	M	L	L
12	Honey	L	L	L
13	Handicraft	L	L	L
	H= High; M= Medium; L= Low			

Table 34: Diversification and Intensification of Farming Systems in AES-I

Sl.	Type of enterprises/ commodities	Contribution of different enterprises / commodities in terms of net income				Intervention (Diversification / Intensification)
		EFS OP-I	Proposed		Mutually Agreed upon OP-IV	
			OP-II	OP-III		
	EFS-I: Resource Rich					
1	Agricultural Crops	P 48000		70000	65000	Intensification
2	Horticultural Crops	-		48000	30000	Diversification
3	Animal Husbandry	S 21000		28000	25000	Intensification
4	Fisheries	T 48000	-	70000	60000	Diversification
5	Poultry	S 15000	-	30000	25000	Diversification
	EFS-I: Resource Poor					
1	Agricultural Crops	P 29000		45000	45000	Intensification
2	Horticultural Crops	-		28000	20000	Intensification
3	Animal Husbandry	S 21000		32000	25000	Intensification
4	Fisheries	T 30000	-	45000	40000	Diversification
5	Poultry	S 5000	-	15000	10000	Diversification
	EFS-II: Resource Rich					
1	Agricultural Crops	P 38000		55000	50000	Intensification
2	Horticultural Crops	S 21000	-	30000	25000	Diversification
3	Animal Husbandry	S 21000	-	25000	20000	Intensification
4	Fisheries	T 48000	-	55000	50000	Diversification
5	Poultry	T 10000	-	20000	15000	Diversification
	EFS-II: Resource Poor					
1	Agricultural Crops	P 29000	-	40000	40000	Intensification
2	Horticultural Crops	S 21000	-	30000	30000	Diversification
3	Animal Husbandry	S 15000	-	30000	20000	Intensification
4	Fisheries	T 35000	-	50000	45000	-
5	Poultry	T 5000	-	15000	10000	Diversification

Diversification and Intensification of Farming Systems in AES-II

Sl.	Type of enterprises/ commodities	Contribution of different enterprises / commodities in terms of net income				Intervention (Diversification / Intensification)
		EFS OP-I	Proposed		Mutually Agreed upon OP-IV	
			OP-II	OP-III		
	EFS-I: Resource Rich					
1	Agricultural Crops	P 58000		80000	70000	Intensification
2	Horticultural Crops	-		40000	35000	Intensification
3	Animal Husbandry	S 24000		40000	35000	Diversification
4	Fisheries	T 48000		65000	55000	Diversification
5	Poultry	S 15000		25000	20000	Diversification
	EFS-I: Resource Poor					
1	Agricultural Crops	P 30000		45000	45000	Intensification
2	Horticultural Crops	-		25000	20000	Diversification
3	Animal Husbandry	S 15000		25000	20000	Intensification
4	Fisheries	T 28000		45000	40000	Diversification
5	Poultry	S 7500		15000	12000	Diversification
	EFS-II: Resource Rich					
1	Agricultural Crops	P 50000		70000	65000	Intensification
2	Horticultural Crops					Intensification
3	Animal Husbandry	S 20000		30000	30000	Diversification
4	Fisheries					Diversification
5	Poultry					Diversification
	EFS-II: Resource Poor					
1	Agricultural Crops	P 30000		45000	45000	Intensification
2	Horticultural Crops	S 12000		30000	25000	Diversification
3	Animal Husbandry	S 15000		25000	20000	Intensification
4	Fisheries	T 25000		45000	40000	Diversification
5	Poultry	T 10000		20000	15000	Diversification

P- Primary, S-Secondary, T- Tertiary

Diversification and Intensification of Farming Systems in AES-III

Sl.	Type of enterprises/ commodities	Contribution of different enterprises / commodities in terms of net income				Intervention (Diversification / Intensification)
		EFS OP-I	Proposed		Mutually Agreed upon OP-IV	
			OP-II	OP-III		
	EFS-I: Resource Rich					
1	Agricultural Crops	P 50000		70000	65000	Intensification
2	Horticultural Crops	-		45000	35000	Intensification
3	Animal Husbandry	S 24000		40000	30000	Diversification
4	Fisheries	T 48000		60000	55000	Diversification
5	Poultry	S 15000		25000	20000	Diversification
	EFS-I: Resource Poor					
1	Agricultural Crops	P 30000		45000	45000	Intensification
2	Horticultural Crops	-		25000	20000	Diversification
3	Animal Husbandry	S 15000		30000	20000	Intensification
4	Fisheries	T 30000		50000	40000	Diversification
5	Poultry	S 7500		15000	10000	Diversification
	EFS-II: Resource Rich					
1	Agricultural Crops	P 50000		65000	60000	Intensification
2	Horticultural Crops					Intensification
3	Animal Husbandry	S 20000		30000	30000	Diversification
4	Fisheries					Diversification
5	Poultry					Diversification
	EFS-II: Resource Poor					
1	Agricultural Crops	P 30000		45000	45000	Intensification
2	Horticultural Crops	S 12000		25000	20000	Diversification
3	Animal Husbandry	S 15000		30000	20000	Intensification
4	Fisheries	T 25000		40000	30000	Diversification
5	Poultry	T 10000		20000	15000	Diversification

Table 35: Gap in adoption and proposed strategy for promoting the modified farming system (AES-I)

Sl.	Type of enterprises/ commodities	Contribution of different enterprises / commodity in terms of net income/acre		Gap in adoption of new enterprise (F/P/N)	Reasons for gap in Adoption	Proposed strategy
		EFS	Mutually agreed FS			
		EFS-I: RR				
1	Agricultural Crops	P 48000	65000	P	1,3,5	1,2,3,4,5
2	Horticultural Crops	-	30000	F	1,3,5	1,2,3,4,5
3	Animal Husbandry	S 21000	25000	N	1,3	1,2,3,4,5
4	Fisheries	T 48000	60000	P	1,3	1,2,3,4,5
5	Poultry	S 15000	25000	P	1,3	1,2,3,4,5
		EFS-I: RP				
1	Agricultural Crops	P 29000	45000	P	1,2,3,4,5	1,2,3,4,5
2	Horticultural Crops	-	20000	F	1,2,3,4,5	1,2,3,4,5
3	Animal Husbandry	S 21000	25000	P	1,2,3,4	1,2,3,4,5
4	Fisheries	T 30000	40000	P	1,2,3,4	1,2,3,4,5
5	Poultry	S 5000	10000	P	1,2,3,4	1,2,3,4,5
		EFS-II: RR				
1	Agricultural Crops	P 38000	50000	P	1,3,5	1,2,3,4,5
2	Horticultural Crops	S 21000	25000	P	1,3,5	1,2,3,4,5
3	Animal Husbandry	S 21000	20000	P	1,3	1,2,3,4,5
4	Fisheries	T 48000	50000	P	1,3	1,2,3,4,5
5	Poultry	T 10000	15000	P	1,3	1,2,3,4,5
		EFS-II: RP				
1	Agricultural Crops	P 29000	40000	P	1,2,3,4,5	1,2,3,4,5
2	Horticultural Crops	S 21000	30000	P	1,2,3,4,5	1,2,3,4,5
3	Animal Husbandry	S 15000	20000	P	1,2,3,4	1,2,3,4,5
4	Fisheries	T 35000	45000	P	1,2,3,4	1,2,3,4,5
5	Poultry	T 5000	10000	P	1,2,3,4	1,2,3,4,5

P- Primary, S-Secondary, T- Tertiary F- Full, P- Partial, N- Nil

Gap in adoption and proposed strategy for promoting the modified FS (AES-II)

Sl.	Type of enterprises/ commodities	Contribution of different enterprises / commodity in terms of net income/acre		Gap in adoption of new enterprise (F/P/N)	Reasons for gap in Adoption	Proposed strategy
		EFS	Mutually agreed FS			
		EFS-I: RR				
1	Agricultural Crops	P 58000	70000	P	1,3,5	1,2,3,4,5
2	Horticultural Crops	-	35000	F	1,3,5	1,2,3,4,5
3	Animal Husbandry	S 24000	35000	N	1,3	1,2,3,4,5
4	Fisheries	T 48000	55000	P	1,3	1,2,3,4,5
5	Poultry	S 15000	20000	P	1,3	1,2,3,4,5
		EFS-I: RP				
1	Agricultural Crops	P 30000	45000	P	1,2,3,4,5	1,2,3,4,5
2	Horticultural Crops	-	20000	F	1,2,3,4,5	1,2,3,4,5
3	Animal Husbandry	S 15000	20000	P	1,2,3,4	1,2,3,4,5
4	Fisheries	T 28000	40000	P	1,2,3,4	1,2,3,4,5
5	Poultry	S 7500	12000	P	1,2,3,4	1,2,3,4,5
		EFS-II: RR				
1	Agricultural Crops	P 50000	65000	P	1,3,5	1,2,3,4,5
2	Horticultural Crops			P	1,3,5	1,2,3,4,5
3	Animal Husbandry	S 20000	30000	P	1,3	1,2,3,4,5
4	Fisheries			P	1,3	1,2,3,4,5
5	Poultry			P	1,3	1,2,3,4,5
		EFS-II: RP				
1	Agricultural Crops	P 30000	45000	P	1,2,3,4,5	1,2,3,4,5
2	Horticultural Crops	S 12000	25000	P	1,2,3,4,5	1,2,3,4,5
3	Animal Husbandry	S 15000	20000	P	1,2,3,4	1,2,3,4,5
4	Fisheries	T 25000	40000	P	1,2,3,4	1,2,3,4,5
5	Poultry	T 10000	15000	P	1,2,3,4	1,2,3,4,5

Gap in adoption and proposed strategy for promoting the modified FS (AES-III)

Sl.	Type of enterprises/ commodities	Contribution of different enterprises / commodity in terms of net income/acre		Gap in adoption of new enterprise (F/P/N)	Reasons for gap in Adoption	Proposed strategy
		EFS	Mutually agreed FS			
		EFS-I: RR				
1	Agricultural Crops	P 50000	65000	P	1,3,5	1,2,3,4,5
2	Horticultural Crops	-	35000	F	1,3,5	1,2,3,4,5
3	Animal Husbandry	S 24000	30000	N	1,3	1,2,3,4,5
4	Fisheries	T 48000	55000	P	1,3	1,2,3,4,5
5	Poultry	S 15000	20000	P	1,3	1,2,3,4,5
		EFS-I: RP				
1	Agricultural Crops	P 30000	45000	P	1,2,3,4,5	1,2,3,4,5
2	Horticultural Crops	-	20000	F	1,2,3,4,5	1,2,3,4,5
3	Animal Husbandry	S 15000	20000	P	1,2,3,4	1,2,3,4,5
4	Fisheries	T 30000	40000	P	1,2,3,4	1,2,3,4,5
5	Poultry	S 7500	10000	P	1,2,3,4	1,2,3,4,5
		EFS-II: RR				
1	Agricultural Crops	P 50000	65000	P	1,3,5	1,2,3,4,5
2	Horticultural Crops			P	1,3,5	1,2,3,4,5
3	Animal Husbandry	S 20000	30000	P	1,3	1,2,3,4,5
4	Fisheries			P	1,3	1,2,3,4,5
5	Poultry			P	1,3	1,2,3,4,5
		EFS-II: RP				
1	Agricultural Crops	P 30000	45000	P	1,2,3,4,5	1,2,3,4,5
2	Horticultural Crops	S 12000	20000	P	1,2,3,4,5	1,2,3,4,5
3	Animal Husbandry	S 15000	20000	P	1,2,3,4	1,2,3,4,5
4	Fisheries	T 25000	30000	P	1,2,3,4	1,2,3,4,5
5	Poultry	T 10000	15000	P	1,2,3,4	1,2,3,4,5

P- Primary, S-Secondary, T- Tertiary F- Full, P- Partial, N- Nil

** Reasons for gap in adoption
1. Lack of knowledge/ Awareness
2. Lack of Finance
3. Lack of Quality inputs
4. Fear of loss
5. Lack of Irrigation facility

*** Proposed Strategy
1. Training, Demonstration and Exposure Visit
2. Linkage with Agriculture Credit
3. Insuring supply of quality inputs
4. Insuring crop Insurance
5. Irrigation facility should be given

6. Proposed Research & Extension Strategies

Approach towards Research & Extension Strategies

Agricultural Research and Education (R&E) is an essential policy tool for governments to promote growth and reduce poverty in rural areas by increasing farm yields and improving the income of farmers. As a form of public spending on agriculture, R&E has been identified as crucial for achieving these objectives.

The Indian agriculture R&E system is designed in such a way that all state agriculture universities and national institutes of ICAR are responsible for conducting agricultural research, education programs, and extension services. These activities are interconnected, making them complementary segments that work together to promote technological innovation, knowledge dissemination, and skill development for farmers at the grassroots level. Therefore, it is crucial to view these activities in a holistic manner to ensure effective flow of information and technology transfer to the farming community.

The agriculture extension system plays a crucial role in bridging the gap between research labs and the farmer's field. Agricultural research, education, and extension are vital for enhancing farm productivity and increasing farmer's income. In India, the public sector is the primary provider of extension services, but their reach is limited, and they are burdened with non-extension responsibilities such as the distribution of subsidies and inputs, leaving little time for core extension activities. The public extension services in India are highly skewed towards crop husbandry, neglecting allied sectors. Additionally, the understaffed extension departments are overloaded with non-extension work, while the High-Value Agriculture sector continues to grow rapidly, and its extension services remain inadequate. Furthermore, there is a shortage of extension professionals, with less than the recommended ratio of 1:750 at a national level. Hiring and training enough extension professionals in the sector could significantly contribute to improving farmers' income.

India spent just 0.7 per cent of Agriculture GDP on agriculture research and education which includes extension and training, which is par below the recommended 2 per cent by the World Bank. The Government vision of achieving doubling of farmer's income by 2022 without the successful delivery of agricultural extension to rural smallholder farmers is a daunting task if the issues not addressed timely[1].

NGO-led extension models are known to be relatively efficient and responsive to local priorities. However, they often lack the capacity and scale to create a significant impact on a larger scale. In

[1] Ravi Nandi, S Nedumaran, Agriculture Extension System in India: A Meta-analysis, Res. Jr. of Agril. Sci. 10(3): 473-479

addition, non-public extension players tend to offer their services in localized regions without coordinating with other players, including public extension services. As a result, there is a limited transfer of good practices between individual players and a missed opportunity to scale up applications more broadly.

At the district level, the Agricultural Technology Management Agency (ATMA) is responsible for all technology dissemination activities. It maintains linkages with various organizations, including line departments, research organizations, non-governmental organizations, and agencies associated with agricultural development in the district. Members of the ATMA's governing body include research and extension units within the project districts, such as ARS/ZRS or substations, Krishi Vigyan Kendras (KVKs), and key line departments related to agriculture, animal husbandry, horticulture, and fisheries. The strategies proposed in this chapter would be useful for all departments engaged in agriculture or allied sectors.

Proposed Research & Extension Strategies

This section outlines the proposed strategies for extension and research in each Agricultural Extension System (AES) for various program components. The strategies were developed based on prioritized strategic issues, separately for extension and research, by a team consisting of line departments, Krishi Vigyan Kendras (KVKs), scientists in the district, and TRUAGRICO consultants. The strategies were developed while considering the following categories.

Diversification and Intensification of Existing Farming Systems: In the context of Rohtas district, diversifying and intensifying the existing farming systems can bring significant benefits. This approach could involve introducing new crops, livestock, or fish species into the current farming systems and improving the productivity of these systems. For instance, the introduction of high-value crops or varieties, or the integration of livestock or aquaculture into cropping systems, could potentially increase farm income, improve land and labor use efficiency, and mitigate risks associated with market and climate uncertainties.

Improvement of Productivity/Income from Different Enterprises/Commodities in Existing Farming Systems: The Rohtas district stands to gain a lot from improving the productivity and income from different enterprises in the existing farming systems. The focus should be on the sustainable use of natural resources and enabling the farming community, both men and women, to take command of the extension system. For instance, the use of improved seed varieties and advanced agricultural practices in crops like wheat, maize, and pulses can enhance productivity. Simultaneously, encouraging the use of sustainable farming practices can help preserve the district's natural resources.

Sustainability of the Production System: Ensuring the sustainability of the production system in Rohtas district is crucial for long-term productivity and profitability. This involves adopting practices that conserve soil, water, and biodiversity, and reduce dependence on non-renewable resources. Measures such as the use of organic manure, crop rotation, and conservation agriculture can be promoted to maintain soil health. Similarly, water-saving techniques like drip irrigation and rainwater harvesting can enhance water use efficiency.

Capacity Building of Extensionists, Researchers, Farmers, Market Players and Other Partners like NGOs, etc.: It is vital to enhance the skills and knowledge of all stakeholders involved in the agricultural sector in Rohtas district. This includes providing training to extensionists and researchers on the latest agricultural technologies and practices, equipping farmers with knowledge on sustainable farming practices, and enlightening market players about the latest trends in the agricultural market. Partnerships with NGOs can be leveraged to reach out to more farmers and provide them with necessary support and resources.

Dovetailing and Re-designing of Various On-going Schemes of Agriculture and Other Line Departments and Research Institutions in the Public, Private and NGO Sector: It is crucial to streamline and adapt various ongoing agricultural schemes and initiatives in Rohtas district to the local context. This requires close coordination between different departments, research institutions, and NGOs. The existing schemes need to be assessed and redesigned, if necessary, to ensure they address the specific needs and challenges of the district's farmers.

Market Led Extension for Enhancement of Profits with Focus on Post-Harvest Technologies and Value Addition: In Rohtas district, there is a need to shift towards a market-led extension approach. This involves tailoring agricultural practices based on market demand and equipping farmers with post-harvest technologies to reduce losses and add value to their produce. For instance, the promotion of proper storage facilities, processing techniques, and value-added products can enhance farmers' profits.

Promotion and Use of ICT in Extension: The use of Information and Communication Technology (ICT) in agricultural extension can revolutionize farming in Rohtas district. This could involve the use of mobile apps for disseminating agricultural information, using remote sensing for crop monitoring, or setting up digital platforms for connecting farmers with markets. These technologies can make agricultural extension more efficient and effective.

Promotion of Public-Private Partnership: The promotion of public-private partnerships in Rohtas district can be a significant boost to the agricultural and livestock sectors. These partnerships can provide the needed impetus in terms of capital, technology, and expertise. The district's notable agricultural and animal husbandry sector can greatly benefit from such collaborations. For instance, private companies can provide advanced machinery, quality seeds, and effective fertilizers while the public sector can ensure these resources are effectively deployed and managed. Furthermore, partnerships with private entities can help in promoting more efficient marketing strategies, providing a broader and more profitable market reach for the district's agricultural produce.

Mainstreaming Gender Concern (Women Empowerment): Women play a crucial role in Rohtas district's agricultural sector, with many involved in various farming activities including sowing, weeding, harvesting, and post-harvest processing. Despite their significant contribution, women often face gender-based disparities in access to resources, services, and opportunities. Therefore, mainstreaming gender concerns and empowering women is a priority. This can be achieved through targeted policies and programs that aim to enhance women's access to credit, inputs, training, and markets. Furthermore, efforts should be made to promote women's participation in decision-making processes at household and community levels.

Any Other Programme Component Considered Necessary for the Project/Area: Considering the unique needs and conditions of Rohtas district, it's important to be open to other program components as necessary. For instance, addressing the issues related to climate change and its impacts on agriculture could be an additional component. Given the district's vulnerability to erratic rainfall patterns, initiatives to promote climate-resilient agricultural practices such as drought-resistant crop varieties, water conservation techniques, and weather-based crop insurance could be beneficial. Furthermore, promoting farm mechanization could help in reducing labor costs and increasing farm efficiency. It is crucial to ensure that any such additional components are tailored to the specific needs and circumstances of Rohtas district.

Strategies for Agriculture

The Participatory Rural Appraisal (PRA) exercises conducted in three AES of Rohtas district revealed several critical gaps in agricultural practices, particularly in wheat, maize, pulses, and oilseed crops. These gaps affect crop yield, quality, and sustainability. The PRA findings offer insights into proposed extension strategies to address these challenges and improve agricultural productivity.

In wheat cultivation, the use of untreated seeds, delayed sowing, and imbalanced fertilizer application were identified as critical gaps. Extension strategies to address these issues include promoting seed treatment, implementing zero-tillage and selecting suitable varieties for delayed sowing, and advocating for a balanced dose of fertilizers according to package of practices. Encouraging the use of seed-cum-fertilizer drills can help farmers with both sowing and fertilizer application methods. Additionally, promoting the use of recommended doses of weedicides and organic manures, such as PSB, Azotobactor, green manuring, vermicompost, and FYM, can improve overall crop health and yield.

Maize cultivation faces challenges such as imbalanced fertilizer use, pest management issues, low plant population, and weed management problems. To address these gaps, extension strategies include popularizing Integrated Nutrient Management (INM) practices, promoting Integrated Pest Management (IPM), encouraging optimum plant population, and supporting Integrated Weed Management (IWM), including chemical weed control. Additionally, creating awareness of Quality Protein Maize (QPM) and promoting intercropping in maize can contribute to improved yields and crop diversity.

Pulses cultivation suffers from imbalanced fertilizer use, non-adoption of biofertilizers, inadequate pest and disease management, and poor adoption of improved varieties. Extension strategies to address these issues include encouraging the use of recommended doses of fertilizers, promoting the application of Rhizobium and PSB culture, supporting integrated pest and disease management, and popularizing improved varieties. Motivating farmers to grow pulse crops in rice fallow areas and encouraging proper drainage techniques can also contribute to increased productivity and efficient land use.

Oilseed cultivation is impacted by imbalanced fertilizer use, non-adoption of biofertilizers, inadequate pest and disease management, and poor adoption of improved varieties. Extension strategies to address these challenges include promoting the recommended dose of fertilizers, encouraging the application of rhizobium, vermicompost, and PSB culture, supporting integrated pest and disease management, and popularizing improved varieties. Furthermore, raising awareness among farmers about the benefits of utilizing apiary boxes in mustard fields can enhance pollination and crop yields.

Crop	Critical Gap	Proposed Extension Strategies	AESs
Wheat	Use of untreated seeds	Encouraging farmers to use seed treatment to improve seed quality.	I, II, III
	Delayed sowing of Wheat	Recommending the use of zero tillage drilling (ZTD) and suitable varieties for delayed sowing of wheat.	I, II, III
	Sowing by broadcasting	Promoting sowing by seed cum fertilizer drill to enhance the efficiency of nutrient use.	I, II, III
	Imbalanced use of Fertilizers	Encouraging farmers to use a balanced dose of fertilizers as	I, II, III

Crop	Critical Gap	Proposed Extension Strategies	AESs
		per the recommended package of practices.	
	Method of fertilizer (Basal Dose)	Popularizing the use of seed cum fertilizer drill for efficient and effective fertilizer application.	I, II, III
	Using under dose of Weedicides	Encouraging the use of the recommended dose of weedicides as per the package of practice to control weeds effectively.	I, II, III
	Non adoption of organic manure	Encouraging the use of beneficial microorganisms such as PSB and Azotobacter, promoting green manuring, vermicomposting, and the application of farmyard manure.	I, II, III
	Grain with high moisture content during storage	Raising awareness about the importance of storing grains at moisture levels below 10%	I, II, III
	Damage by storage pests	Encouraging the use of fumigation for stored grains in dedicated metallic bins and secure storage structures	I, II, III
	Insufficient knowledge and understanding of Resource Conservation Technology (RCT), such as Zero tillage, FIRBS, and Laser Land leveling.	Encouraging farmers to adopt Resource Conservation Technology (RCT), such as Zero tillage, FIRBS, and Laser Land leveling.	I, II, III
Maize	Promoting balanced use of fertilizers	Encouraging farmers to adopt INM (Integrated Nutrient Management) practices	I, II, III
	Pest Management	Promoting IPM (Integrated Pest Management) among farmers	I, II, III
	Low Plant population	Encouraging farmers to maintain optimum plant population	I, II, III
	Weed Management	Promoting IWM (Integrated Weed Management), including chemical weed control	I, II, III
Maize	Unawareness among farmers regarding QPM (Quality Protein Maize)	Popularization of QPM among farmers	I, II, III
	Low adoption of intercropping in maize cultivation	Popularizing intercropping in maize	I, II, III
Pulses	Imbalanced use of Fertilizers	Encouraging farmers to use the recommended dose of fertilizer	I, II, III
	Non-use of Bio fertilizes	Promoting the application of Rhizobium and PSB culture among farmers	I, II, III
	Inadequate pest and disease management	Encouraging farmers to adopt integrated pest and disease management	I, II, III
	Poor adoption of improved Variety among farmers	Promoting the adoption of improved varieties among farmers	I, II, III
	Underutilization of rice fallow area for pulse crops cultivation	Motivating farmers to cultivate pulse crops in rice fallow areas	I, II, III
	Lack of awareness about proper drainage	Encouraging farmers to adopt proper drainage techniques	I, II, III
Oilseeds	Imbalanced use of Fertilizers	Popularizing the use of recommended doses of fertilizers among farmers	I, II, III
	Non-use of Bio fertilizers	Encouraging farmers to apply rhizobium, vermicompost, and PSB culture	I, II, III
	Inadequate pest and disease management	Promoting integrated pest and disease management practices among farmers	I, II, III
	Poor adoption of improved variety	Encouraging the adoption of improved crop varieties	I, II, III
	Lack of awareness regarding using apiary boxes in mustard fields	Motivating farmers to use apiary boxes in mustard fields	I, II, III

Sl.	Agriculture	Proposed activity	Thrust Area
1.	Promotion of Rajendra Mansuri, Rajendra Sweta, RB-1 varieties of Paddy	-Organizing field demonstrations for recommended seed varieties -Arranging field events in proximity to successful demonstration sites -Assisting in the distribution of recommended seed varieties.	Diversification
2.	Enhancement in paddy transplantation timing	-Awareness campaign for promoting early transplantation of paddy i.e., in June-July rather than July-August	Intensification
3.	Cultivation of aromatic rice for export	-Identifying and characterizing indigenous aromatic rice varieties. -Conducting demonstrations of Basmati and non-Basmati rice varieties alongside local aromatic types to study their economic viability. -Facilitating marketing linkages by organizing farmers' interest groups.	Diversification and value addition
4.	Promoting the adoption of Scientific Crop rotation	-Organizing institutional farmer training on scientific crop planning and crop rotation. -Conducting demonstrations on ideal crop rotation practices. -Arranging exposure visits for farmers to successful demonstration sites, allowing them to interact with the demonstrating farmers.	Diversification & Intensification for optimal use of resources
5.	Bridging the technological gap in major agricultural crops such as paddy, maize, pulses, mustard, tissi, etc..	-Educating farmers through mass media on technological gaps. -Organizing training programs on technological gaps. -Conducting demonstrations on seed testing, seed treatment, fertilizer application, and pest management. -Organizing farmers' field days on successful demonstration sites. -Facilitating linkage of farmers with credit, inputs, and markets. -Conducting demonstrations on processing and value addition techniques. -Conducting demonstrations on the use of bio-fertilizers and micronutrients.	Intensification with appropriate technology
6	The implementation of seed villages scheme to produce seeds of preferred varieties in a decentralized manner.	-Identifying and analyzing success stories of farmers producing and selling their own seeds. -Organizing field trips for farmers to visit successful seed production sites. -Identifying villages and farmers interested in producing and selling seeds. -Providing training to seed producers on seed production and certification techniques. -Acquiring foundation seeds of preferred varieties from reliable sources for a fee. -Hosting field days for farmers and local dealers interested in purchasing seeds. -Facilitating connections with credit, input suppliers, and seed certification agencies, including processing.	Intensification with production of quality seeds
7	Value addition and agro processing in paddy, maize, pulses & oilseeds	-Identification of FIG/ CIG -Organizing demonstration & training on agro processing and value addition. -Facilitate linkage with supply of machinery credit & marketing.	Intensification with value addition
8	Farm mechanization for timely & effective agricultural operations.	-Conducting awareness campaigns to promote farm mechanization among farmers. -Organizing training sessions and demonstrations on the use of farm machinery. -Identifying agro service centers that provide farm machinery services. -Linking farmers with schemes that offer subsidized sales of agriculture implements and machinery. -Forming groups to provide finance for purchasing machinery. -Providing training on repairing / maintaining existing machinery.	Diversification with improved farm implements

Strategies for Horticulture

The field study revealed several critical gaps in the cultivation of peas, beans, bulb crops, spices, mangoes, vegetables, and post-harvest management. To address these challenges, various extension strategies have been proposed.

For peas and beans, the lack of seed treatment adoption, inadequate pest and disease management, and low adoption of improved varieties and recommended practices are critical gaps. Extension strategies include encouraging farmers to use recommended seed treatment methods, advocating for the use of Integrated Pest Management (IPM) and Integrated Disease Management (IDM), raising awareness for using quality seeds to increase production and income, and promoting the adoption of Package of Practices (POP) for higher yields and income.

In bulb crops like onions and spices such as turmeric, zinger, and coriander, gaps include the absence of recommended package of practices, unavailability of recommended varieties, and inadequate pest and disease management. Proposed strategies involve promoting the adoption of POP, encouraging quality seed production, and popularizing the adoption of IPM and IDM. For onion cultivation, promoting Integrated Weed Management (IWM), including chemical weed control, is also essential.

Mango cultivation faces challenges such as alternate bearing, low application of basal dose of manure and fertilizers, inadequate plant protection measures, mango malformation/sterility, gummosis, and the presence of very high aged trees. Extension strategies include promoting regular bearing cultivars/hybrids, encouraging basal dose of manure and fertilizers, supporting recommended plant protection measures, advocating resistant varieties and cultural practices, promoting balanced fertilizers and micronutrients, and encouraging rejuvenation/replacement of aged trees. Motivating farmers to adopt post-harvest technology is also crucial for adding value to their produce.

For vegetable cultivation, low area coverage under organic cultivation, lack of interest in rejuvenating orchards, inadequate availability of good quality planting material, and insufficient availability of quality vegetable seeds are significant gaps. Encouraging organic cultivation of vegetables, motivating farmers to rejuvenate their orchards, and supporting the production of quality planting material and vegetable seeds at farmers' fields can help address these challenges.

Improving soil health requires raising awareness about soil fertility, soil property deterioration, and hazardous element accumulation. Promoting fertilizer application based on soil analysis and organizing farmer trainings on soil analysis can help address these issues.

Lastly, post-harvest management faces significant losses due to the lack of facilities. Extension strategies to address these losses include encouraging farmers to construct packhouses, building capacity on post-harvest management, forming farmer groups, and promoting cold storage facilities. These initiatives can help reduce post-harvest losses and increase overall income for farmers in Rohtas district.

Crop	Critical Gap	Proposed Extension Strategies	AESs
Peas & Beans	Non-adoption of seed Treatment	Encouraging farmers to follow recommended seed treatment practices	I, II, III
	Pest & Disease Management	Promoting the adoption of Integrated Pest Management (IPM) and Integrated Disease Management (IDM)	I, II, III
	Low adoption of improved Varieties	Raising awareness about the importance of using high-quality seeds to increase production and income	I, II, III
	Low adoption of recommended package of practices	Popularizing the use of recommended package of practices (POP) for higher yield and income	I, II, III
Bulb crop- Onion	No recommended Package of Practices	Promoting the adoption of recommended Package of Practices (POP) for higher yields and income	I, II, III
	Unavailability of recommended varieties	Facilitating availability and adoption of recommended varieties	I, II, III
	Pest & Disease Management	Promoting effective Pest and Disease Management practices	I, II, III,
	Weed Management	Promoting effective Weed Management practices, including Integrated Weed Management (IWM) and chemical control.	I, II, III
Spices- Turmeric, zinger, Coriander,	Unavailability of recommended varieties	Promoting quality seed production	I, II, III
	No recommended Package of Practices	Popularizing adoption of POP for obtaining higher yield as well as income	I, II, III
Mango	Alternate bearing	Popularizing regular bearing cultivars/ Hybrid	I, II, III
	Low Application of basal dose of manure and fertilizers	Promoting basal dose of manure and Fertilizers	I, II, III
	Inadequate plant protection measures	Promoting recommended plant protection measures	I, II, III
	Mango malformation / Sterility (Jhumka)	Popularizing resistant varieties and adoption of cultural practices	I, II, III
	Gummosis	Popularizing balanced fertilizers, micronutrients, and timely plant protection measures	I, II, III
	Very high aged trees	Rejuvenation /replacement of Aged Trees	I, II, III
	Lack of awareness about value addition	Motivating farmers for use of post-harvest technology	I, II, III
Veg.	Low adoption of organic cultivation in vegetable farming	Promoting organic cultivation of vegetable	I, II, III
	Low interest in rejuvenating orchards	Motivating farmers to Rejuvenate their orchards	I, II, III
	Inadequate availability of good quality planting material	Motivating farmers / Entrepreneur to take up production of quality planting material	I, II, III
	Inadequate availability of quality vegetable seeds	Promoting seeds production of vegetable at farmers' fields	I, II, III
Soil health	Low awareness about soil fertility index Degradation of soil physical properties caused by flooding Accumulation of hazardous elements in soil due to flooding	Promoting fertilizers Application based on soil analysis. Organizing farmers' trainings regarding soil analysis	I, II, III
Post-Harvest Management	Significant post-harvest losses due to lack of Post-Harvest Facilities	Encouraging farmers to build packhouses and providing capacity building on post-harvest management technology, forming farmer groups, and promoting construction of cold storage facilities.	I, II, III

Sl.	Horticulture	Proposed activity	Thrust Area
1.	Expanding the cultivation area for off-season vegetables through crop substitution.	-Identifying and analyzing successful cases of innovative farmers who have started cultivating off-season vegetables. - -Organizing exposure visits for other farmers to successful examples. -Facilitating the supply of seeds and other inputs for off-season vegetable cultivation. -Training farmer groups in off-season vegetable cultivation and seed production. -Providing training on post-harvest processing and value addition for off-season vegetables.	Diversification
2.	Promoting horticulture as an alternative land use and encouraging crop diversification	-Conducting awareness campaigns to promote horticulture as an alternative land use and crop diversification. -Organizing exposure visits for farmers to successful horticulture sites. -Providing training to farmers on horticulture practices. -Facilitating the supply of quality grafts for horticulture plantations such as Mango, Guava, and Litchi. -Encouraging decentralized production of saplings and grafts in collaboration with NGOs and private sector. -Facilitating the linkage with marketing channels to ensure farmers can sell their produce.	Diversification
3.	Promoting the cultivation of organic spices such as ginger, turmeric, and tuber crops.	-Promote the cultivation of organic spices such as ginger, turmeric, and tuber crops, -Conduct awareness campaigns to encourage farmers to switch to organic spice and tuber cultivation. -Provide training to farmer groups on organic spice cultivation techniques. -Facilitate the supply of high-yielding varieties of ginger and turmeric. -Organize demonstrations on organic spice cultivation and conduct field days at successful demonstration sites. -Promote agro-processing and value addition of organic spices.	Diversification
5.	Introduction of paddy & mushroom in around town area	-Identification of villages and farmer groups, where substrate is available. -Organizing demonstration on mushroom production. -Facilitate supply of critical inputs like spawn. -Linkage with marketing of produced mushroom.	Diversification organizing farm women for mushroom cultivation
6.	Commercial cultivation of honeybee	-Identification of areas with nectar bearing trees and field crops like mustard, fruit plants etc. -Identification of farmer interest groups and organizing training for them (village level). -Facilitate supply of high yielding bees' box, smoker etc. for apiary. -Demonstration on extraction of honey and preservation. -Linkage with marketing.	Diversification & encouraging farmers for bee-keeping processing & marketing.
7.	Promotion of intensive vegetable cultivation on irrigated areas, including protected and open cultivation.	-Identifying locations with successful intensive vegetable cultivation. -Conducting exposure visits to these sites to motivate farmers. -Providing training to farmers on innovative vegetable cultivation methods, with successful farmers acting as resource persons. -Facilitating the supply of necessary inputs for vegetable production.	Intensification of vegetable cultivation in areas with assured irrigation

Sl.	Horticulture	Proposed activity	Thrust Area
		-Forming Farmer Interest Groups (FIGs) for seed production and marketing of vegetables.	
8.	Overcoming technological gaps in major vegetable crops and spices.	-Educations of farmer through mass media on technological gaps. -Organizing need-based training on technological requirement. -Demonstration on seed treatment planting techniques, INM & IPM etc. -Linkage of farmers or groups with credit, supply of inputs & marketing. -Organizing special training on hybrid vegetable production technology.	Intensification of vegetable cultivation by promoting appropriate technology
9.	Promoting decentralized production of vegetable seeds and fruit crop planting materials.	-Identifying and analyzing successful cases of decentralized production and sale of vegetable seeds and fruit planting materials by farmers. -Organizing visits for interested farmers to successful farms. -Selecting and training farmers willing to produce and sell seeds and planting materials. -Conducting training on seed production technology for participating farmers. -Organizing field days for interested buyers and seed dealers. -Establishing links with suppliers of foundation seeds, as well as credit and marketing support. -Collaborating with ongoing initiatives related to seed and planting material production.	Intensification of vegetable seed production in rural areas
10.	Post-harvest technology, value addition & agro processing for fruits, vegetable & spices	-Conduct a diagnostic study to identify issues related to the market for various commodities. -Evaluate the marketed surplus of each commodity produced by different types of farming families. -Identify potential alternative market opportunities for each commodity. -Research consumer preferences for each commodity in alternative markets. -Assess new post-harvest handling technologies for on-farm use. -Organize training and demonstrations for farmer groups on post-harvest handling, value addition, and agro-processing techniques (including preservation techniques) that meet specific consumer preferences. -Facilitate linkage with input suppliers and marketing channels.	Intensification and promoting value-addition in vegetable crops
11.	Addressing technological gaps in fruit crops such as mango, papaya, and Litchi by implementing drip and sprinkler irrigation.	-Organizing awareness campaigns to promote fruit -Plantation and address technological gaps. -Facilitating exposure visits for farmers to successful fruit plantation sites. -Conducting need-based training sessions for farmers on critical technological gaps related to fruit cultivation. -Demonstrating best practices for raising saplings, grafting, pruning, and aftercare of fruit plants. -Establishing linkages between farmers or groups and resources for credit, input supply, and marketing support.	Intensification and value addition in fruit crops

Strategies for Animal Husbandry

The field study conducted in Rohtas district for the animal husbandry and dairy sector identified critical gaps in various aspects of livestock management for cows, buffaloes, and goats. To address these challenges, several extension strategies have been proposed.

For cows, the partial adoption of artificial insemination (AI) is a significant gap. Proposed extension strategies include providing awareness about AI with audio-visual aids, intensifying the availability of technical staff, offering refresher training to technical personnel, improving the availability of semen, storage and transportation facilities, conducting fertility improvement camps, and imparting training to para-vets. Furthermore, gaps in adoption of quality feed and fodder, feeding of minerals and vitamins, and intercalving periods can be addressed through awareness programs about animal production capacity, dairy economics, and the importance of feeding minerals, vitamins, and having "a calf a year" as a target.

In terms of healthcare management for cows, intensifying awareness programs about animal health, hygiene, and vaccination, as well as increasing the conduction of animal health camps and mass deworming programs, will be helpful. Capacity building of technical staff at disease diagnostic labs at the block level can also improve healthcare outcomes. Additionally, addressing the partial gap in average milk yield can be achieved through awareness about improved dairy management and economics.

For buffaloes, breed upgradation through artificial insemination, feed management, and intercalving periods can be improved with awareness programs, training, and field visits. Fertility improvement camps and buffalo calf rallies can also be organized. In terms of healthcare, promoting the adoption of a deworming schedule can be achieved through awareness programs and conducting deworming camps.

In the case of goats, a large gap in adoption of improved breeds can be addressed through awareness programs, training, field visits, and providing improved varieties of male goats suitable for the area. Feed management can be improved by providing awareness programs about the feed and fodder requirements for goats and intensifying the supply of fodder and multipurpose tree seeds. Lastly, for goat healthcare, imparting awareness about the importance of deworming and ectoparasitic control and conducting health care camps can help improve overall goat health and productivity.

By implementing these extension strategies, Rohtas district can improve the productivity and profitability of its animal husbandry and dairy sector, benefiting both livestock and farmers in the area.

Animal	Critical gap	Proposed Extension Strategies	AES's
Cow	**Artificial insemination:** Partial adoption of AI	-Raising awareness about artificial insemination (AI) using audio-visual aids -Increasing the availability of technical personnel -Providing refresher training for technical staff -Ensuring the availability of semen, semen storage facilities, and transportation -Organizing fertility improvement camps -Providing training to para-veterinarians	I, II, III

Animal	Critical gap	Proposed Extension Strategies	AES's
	Fodder: Gap in adoption of quality (feed & fodder) feeding	-Increasing awareness about animal production capacity, feed requirements, and economics of dairy farming. -Enhancing the supply of high-quality fodder seeds and root slips. -Ensuring year-round availability of green fodder crops. -Promoting the use of urea molasses mineral blocks to meet fodder requirements during emergencies such as droughts and floods.	I, II, III
	There is a significant gap in the adoption of feeding **minerals and vitamins.**	-Intensify the awareness' programs about the importance of feeding minerals & vitamins -Holding infertility management camps	I, II, III
	Intercalving period	-Intensify the awareness program about "a calf a year"	I, II, III
Cow	**Health care:** Gap in health care Management	-Organize awareness programs on animal health, hygiene, and vaccination through training sessions and field visits. -Strengthen the implementation of animal health camps to improve animal health status. -Enhance mass deworming and external parasites control programs to control the spread of diseases. -Build the capacity of technical staff at disease diagnostic laboratories located in block level hospitals.	I, II, III
	General/Farm management A Partial gap in Adoption of general/ Farm management	-Intensify the awareness programs about animal management through training and field visits -Showing of AV Aids of good managed animal farms	I, II, III
	Average milk yield: Partial gap in average milk yield	-Awareness about Improved dairy management and economics	I, II, III
Buffaloes	**Breed Upgradation:** Partial adoption of artificial insemination	-Organizing awareness programs through training sessions and field visits -Increasing the availability of technical personnel -Providing regular training and refreshment courses for technical personnel -Conducting fertility improvement camps for better breeding outcomes -Organizing rallies and campaigns specifically for buffalo calf management and improvement	I, II, III
	Feed management: Partial adoption of feed Management	-Providing awareness programs about animal nutrition -Intensify the supply of fodder seeds	I, II, III
	Intercalving period	-Intensify the awareness program about "a calf a year"	I, II, III
	Health care: Non adoption of deworming schedule	-Imparting awareness of deworming/ ectoparasitic control -Conducting deworming camps	I, II, III
Goat	**Breed Improvement:** A large gap in adoption of improved Breeds	-Awareness programs through training and field visits -Intensify the availability of technical persons -Providing refreshment training from technical persons -Provide improve variety of male goat suitable for the area	I, II, III
	Feed management: A large gap in adoption of feed management	-Providing awareness programs about the feed and fodder requirement for the goat -Intensify the supply of fodder / multipurpose trees seeds	I, II, III
	Health care: Non adoption of deworming schedule	-Imparting awareness about importance of deworming/ ectoparasitic control -Conducting health care camps	I, II, III

Sl.	Livestock	Proposed activity	Thrust Area
1.	Breed up gradation in cattle	-Restricting A.I. service to only those villages where crossbreed animals are being currently raised. -A.I. services in buffaloes to be intensified at doorsteps through local Para vets. -Training of Para vet for providing A.I. at doorstep. -Supply of inputs on cost basis. -Training to FIGs on breed up-gradation and presentation of animals (village level).	Intensification
2.	Expanding goat farming units and improving breeds	-Providing improved breeding bucks for natural breeding. -Training farmers on care and management of goats for meat production. -Providing vaccination, de-worming, and treatment against parasites for goats. -Establishing marketing linkages for goat growers involved in meat production.	Intensification
3.	Promoting backyard poultry	-Popularization of local breeds of poultry birds for backyard poultry. -Organization of training for disease management & feeding of poultry birds. -Facilitate vaccination do-worming & treatment against parasites in poultry birds.	Intensification
4.	Improved feeding, housing & health care for dairy & drought animal (cow & buffaloes)	-Awareness campaign on breed upgradation, care & maintenance of dairy & drought animals & schematic provisions. -Organising training for the farmer's groups to abridge the technological gaps. -Exposure visits to successful villages. -Arrangement of required inputs on cost basis. -Facilitate linkage with credit, input & marketing.	Intensification
5.	Vaccination, de-worming, and treatment against parasites for poultry & goat	-Identify para vets and NGOs interested in the work. -Conduct training for para vets, NGOs, and farmers on vaccination, de-worming, and treatment techniques. -Provide critical inputs at cost basis. -Organize mobile treatment camps at the village level.	Intensification
6.	Cultivation of fodder for enhancing the nutrition of dairy animals.	-Identification of success stories where fodder cultivation has been taken successfully. -Exposure visit of identified farmers or farmer groups to successful sites. -Identification of sites and varieties for green fodder cultivation. -Organisation of trainings on improved fodder cultivation techniques. -Facilitate supply of critical inputs.	Intensification

Strategies for Fish Production System

The field study conducted in Rohtas district for the fisheries sector identified several critical gaps that hinder the growth and development of this industry. To address these challenges, various extension strategies have been proposed.

Firstly, there is a lack of awareness about the physicochemical parameters of soil and water in fishponds. Creating awareness about these parameters is essential for maintaining a healthy environment for fish growth. Educational programs and training sessions can be organized to educate farmers about these parameters and how they can monitor and manage them.

Secondly, improper stocking measures are prevalent in the district. Promoting proper stocking measures is crucial to ensure optimal fish growth and prevent overcrowding. Extension services can provide guidelines on appropriate stocking densities and offer training on best practices for various fish species.

Additionally, there is a lack of awareness about composite fish farming. Creating awareness about this farming method can help farmers diversify their fish production, optimize the use of available resources, and increase overall productivity. Training programs and field demonstrations can be organized to teach farmers about the benefits and techniques of composite fish farming.
Unscientific feeding is another issue that negatively affects fish growth and productivity. Promotion of scientific feeding methods through training and educational programs can help farmers understand the nutritional requirements of their fish, ensure proper feeding schedules, and ultimately increase productivity and profitability.

Furthermore, the potential of fish farming in water storage village ponds remains unexploited. Efforts should be made to exploit this potential by providing technical support, training, and financial assistance to farmers interested in utilizing these water sources for fish farming.

The marketing of fish through unorganized sectors limits the growth of the fisheries sector. Promoting marketing through organized sectors can help streamline the supply chain, ensure better quality control, and provide better returns for fish farmers. Support for the establishment of fish marketing cooperatives, cold storage facilities, and market linkages can help achieve this goal.

The lack of availability of quality fish seed at the right time and place is another challenge. Encouraging private entrepreneurs to set up fish seed hatcheries can help address this issue, ensuring a reliable supply of quality seed for fish farmers.

The common practice of monoculture in the district can be diversified by promoting the adoption of polyculture or composite culture practices. This can increase productivity, reduce risks, and contribute to better resource utilization.

Lastly, the low adoption of freshwater prawn culture presents an opportunity for growth. Introduction and intensification of freshwater prawn farming can provide farmers with an additional source of income while also diversifying their production systems.

Fisheries	Critical gap	Proposed Extension Strategies	AES's
Fishery	Insufficient awareness about physicochemical parameters of soil and water in fishponds	Increasing awareness about physicochemical parameters of soil and water in fishponds	I, II, III
	Inadequate knowledge about proper stocking measures	Promoting proper stocking measures in fishponds	I, II, III
	Lack of awareness about composite farming practices	Creating awareness about composite fish farming techniques	I, II, III
	Unscientific feeding practices	Promoting scientific feeding practices in fishponds	I, II, III
	Underutilization of the potential for fish farming in village ponds used for water storage	Exploring the potential of fish farming in water storage village ponds	I, II, III
	Fish marketing through unorganized sectors	Encouraging marketing of fish through organized sectors, CIGs and FPOs	I, II, III
	Limited availability of quality seed at the right time and place	Encouraging private entrepreneurs to set up fish seed hatcheries	I, II, III
	Prevalent monoculture practices	Diversifying from monoculture to poly culture or composite culture in fish farming	I, II, III
	Low adoption rate of freshwater prawn culture	Introducing and intensifying freshwater prawn culture in fishponds	I, II, III

Sl.	Fish Production System	Proposed activity	Thrust Area
1.	Promotion of composite pisciculture in water bodies	-Conducting awareness campaigns on pond preparation and composite pisciculture -Organizing farmer training programs on composite pisciculture -Providing demonstration of critical practices involved in composite pisciculture -Facilitating the supply of critical inputs such as fingerlings and prawn juveniles.	Intensification
2.	Promotion of polyculture in village tanks	-Exposure visit to successful sites and institutions. -Training of motivated persons on technology aspects by using successful farmers as trainees. -Linkage of above farmers with credit & input organizations. -Demonstration of critical practices on poly culture.	Intensification
3.	Pond preparation & adoption of technology for high fish production	-Exposure visit of willing fish farmers to training institutes or successful pond sites. -Training on improved production technology. -Facilitate linkage with supply of critical inputs, credit & marketing.	Intensification
4.	Decentralized production of fingerlings	-Identify ponds and other water bodies suitable for fish production using composite techniques or poly-culture techniques. -Locate farmers who can engage in fish seed production. -Arrange visits to training institutes and local fingerling production units to gain exposure and learn best practices. -Conduct training programs to educate farmers on fingerling production. -Facilitate connections with input suppliers, credit providers, and marketing channels for setting up hatchery units and selling fish.	Intensification

Strategies for Sustainability of Production/ Income

Strategies for Agriculture Sector

One of the key issues is the inadequate and low use of organic manure. To address this, extension services can focus on popularizing improved methods of composting and vermicomposting. By providing training and support to farmers in these techniques, the use of organic manure can be increased, leading to healthier soil and improved crop yields.

Another challenge is the less use and inadequate availability of biofertilizers. Creating awareness about the importance of biofertilizers and promoting their increased production can help address this issue. Educational programs and field demonstrations can be organized to teach farmers about the benefits of biofertilizers and how to produce and apply them effectively.

Depletion of soil fertility due to injudicious use of fertilizers is another major concern. Extension services can promote the application of fertilizers based on soil testing results, which can help maintain soil health and prevent nutrient imbalances. Regular soil testing and the provision of soil health cards can encourage farmers to adopt this practice.

Deficiency of micronutrients is also a critical gap that needs to be addressed. Extension strategies should include promoting the application of micronutrients on the basis of soil test results. By providing farmers with accurate information about their soil's micronutrient levels, they can apply the appropriate nutrients to improve crop productivity and maintain soil health.

Finally, the prevalence of mono cropping systems presents a challenge to the sustainability of agricultural production in the district. Extension services can encourage the adoption of crop rotation and mixed cropping systems, which can improve soil health, reduce pest and disease pressure, and increase overall productivity. Training programs, field demonstrations, and incentives for farmers to adopt these practices can help promote a shift toward more sustainable cropping systems.

Strategies for Horticulture Sector

Depletion of soil fertility is a significant issue in Rohtas, which can adversely impact crop productivity and farmers' income. To address this, extension services can focus on popularizing Integrated Nutrient Management (INM) programs. These programs can help farmers understand the importance of balancing the use of organic and inorganic fertilizers, maintaining soil health, and ensuring optimal nutrient availability for their crops. By providing training, support, and resources, farmers can adopt INM practices that result in healthier soils and improved crop yields.

Another critical gap is the lack of proper cropping systems, which can lead to unsustainable farming practices and reduced crop productivity. Extension services can encourage the adoption of appropriate cropping systems that promote crop diversification and the efficient use of resources. For example, intercropping, crop rotation, and agroforestry can be introduced as viable options for farmers in Rohtas. Educational programs and field demonstrations can be organized to showcase the benefits of these cropping systems and provide guidance on their successful implementation.

Inadequate pest and disease control is another challenge faced by horticulture farmers in Rohtas. Extension strategies can focus on popularizing Integrated Pest Management (IPM) and Integrated Disease Management (IDM) to address this issue. IPM and IDM approaches emphasize the use of a combination of biological, cultural, and chemical methods to control pests and diseases while minimizing the impact on the environment and human health. By organizing training programs, workshops, and field visits, extension services can help farmers learn about and adopt these sustainable pest and disease management practices.

Strategies for Animal Husbandry & Dairy Sector

One significant challenge is the inadequate adoption of artificial insemination (AI) in buffaloes. To increase AI adoption, extension services can focus on raising awareness about the benefits of AI, such as improved genetics, higher milk production, and better disease control. Training programs, workshops, and demonstrations can be organized to help farmers understand the AI process and its advantages. Additionally, efforts should be made to increase the availability of technical staff, provide refresher training, and ensure the accessibility of quality semen and storage facilities.

Infertility problems, including anoestrus and repeat breeding, are common among livestock in Rohtas. To address this issue, extension services can organize fertility improvement camps and provide training on the diagnosis and treatment of infertility issues. Farmers can be educated about proper nutrition, management practices, and the importance of regular veterinary check-ups to prevent and address these problems.

The deworming problem is another critical gap that leads to poor growth and reduced milk production in dairy animals. Extension strategies can focus on imparting knowledge about the importance of regular deworming and its impact on animal health and productivity. Organizing deworming camps, providing training on deworming schedules, and offering guidance on the proper use of deworming medications can help farmers improve their animals' health, milk production, and overall wellbeing.

Inadequate pest and disease control measures can have a significant impact on livestock productivity and income. To address this challenge, extension services can popularize Integrated Pest Management (IPM) and Integrated Disease Management (IDM) for animal husbandry and dairy farming. By organizing training programs and field visits, farmers can learn about the effective combination of biological, cultural, and chemical methods to control pests and diseases while minimizing environmental and health impacts.

Strategies for Fisheries Sector

Renovating ponds can help enhance water retention and ensure an adequate supply of water for fish farming throughout the year. This can be achieved by conducting a thorough assessment of existing ponds, identifying areas for improvement, and undertaking necessary repair and renovation work. Desilting, strengthening pond embankments, and repairing leakages are some of the critical tasks involved in pond renovation. Additionally, proper maintenance of pond structures can also help prevent water loss and ensure the sustainability of fish farming.

Extension services can provide technical assistance and guidance to fish farmers for pond renovation, covering aspects such as structural design, material selection, and construction techniques. This support can be delivered through workshops, training programs, and on-site consultations. Encouraging farmers to access government schemes and financial assistance for pond renovation can further facilitate the process.

Moreover, promoting sustainable water management practices is essential for the long-term conservation of water resources. Extension services can educate fish farmers about efficient water use, recycling, and rainwater harvesting techniques to minimize water wastage and optimize resource utilization. Training programs on effective water management can help farmers understand the importance of water conservation and equip them with the necessary skills to implement sustainable practices in their fish farming operations.

By focusing on pond renovation and sustainable water management practices, extension strategies can significantly contribute to the conservation of water resources and enhance the sustainability of production and income for fish farmers in Rohtas district. This will ultimately lead to improved livelihoods, food security, and economic development for the region.

Sl.	Critical gap	Proposed Extension Strategies	AESs
Agriculture			
01	Insufficient and infrequent application of organic manure	Popularizing improved method of composting and Vermi composting	I, II, III
02	Limited availability and utilization of bio-fertilizers	Creating awareness about importance of Bio fertilizers & increased production of Bio-fertilizers	I, II, III
03	Soil fertility depletion caused by inappropriate and excessive fertilizer use	Application of fertilizers based on soil testing results	I, II, III
04	Inadequate supply of essential micronutrients	Application of Micronutrients based on soil test results	I, II, III
05	Over-reliance on monoculture cropping systems	Crop rotation and mixed cropping System	I, II, III
Horticulture			
01	Depletion of soil fertility	Popularizing Integrated Nutrient Management Program	I, II, III
02	Absence of proper crop rotation systems	Adoption of proper cropping system	I, II, III
03	Insufficient measures for pest and disease control	Popularizing IPM & IDM	I, II, III
Animal Husbandry			
01	Artificial insemination in Buffaloes	Adoption of AI by farmers to improve the genetic potential of improved breeds	I, II, III
02	Infertility problem i.e., Anoestrus, Repeat breeding	Infertility problem i.e., Anoestrus, Repeat breeding	I, II, III
03	The deworming problem leading to poor growth & less milk production	To impart knowledge about deworming, improve milk production & general health	I, II, III
04	Inadequate pest and disease control measure	Popularizing IPM & IDM	I, II, III
Fisheries			
01	Conservation of water resources	Rejuvenation of ponds	I, II, III

Sl.	Sustainability factors	Proposed activity	Thrust Area
1.	Amendment of acid soils	-Conduct soil tests to determine soil pH levels. -Identify upland areas with a pH level of 5.5 or lower that require amendment. -Provide farmers with training on how to amend acidic soils using locally available materials such as dolomite and lime.	Intensification with acid soils management
2.	Conservation of biodiversity (Agril.)	-Involve farmers in identifying valuable indigenous crop varieties and forest species. -Multiply these varieties and species among farmers. -Categorize these varieties and species using participatory research with farmers. -Encourage and promote in situ conservation of these varieties and species on small farms through diversification. -Integrate the reintroduced and indigenous varieties and species with improved and ecologically sound soil, water, and nutrient management practices to enhance productivity.	Intensification
3.	Integrated Plant Nutrient supply system	-Organize awareness campaigns for IPNS. -Prepare a detailed action plan to manage the IPNS at farm level. -Organize trainings for farmers on production and use of bio-fertilizers compost, vermin compost and use of balanced fertilizer based on soil tests. -Identify the feasible wastelands for production of green manure seeds & bio fertilizers like Azolla & BGA by SHGs etc. -Supply bio-fertilizer at subsidy & organize crop demonstrations. -Conduct field days at the site of successful demonstrations. -Follow up support for use of non-traditional nutrients sources like bio fertilizer, vermicompost etc. -Organize plantation of leaf manure crops on wastelands or on common lands. -Refinement of technological package on INM for different AES recycling organic wastes & crop residues etc.	Intensification with combined use of organics, inorganics, & biofertilizers
4.	Integrated Pest Management	-Conduct awareness campaigns to promote Integrated Pest Management (IPM) technology. -Identify key crop pests and diagnose pest problems in one endemic village in each Agro-Ecological Zone (AES). -Analyze various technological options emerging through different sources of innovation, including bio-pesticides. -Organize demonstrations and action research on crop pest management. -Facilitate concurrent evaluation of technological options by involving participating farmers. -Conduct Farmer Field School (FFS) programs to train farmers to become IPM experts. -Facilitate the supply of bio-pesticides, pheromone traps, etc., at cost to farmers.	Intensification
5.	Integrated Watershed management	-Conduct training programs for watershed committees and associations to address technological gaps and promote watershed plus activities. -Conduct demonstrations on improved cropping systems in watershed areas. -Involve user groups in participatory problem-solving to identify root causes of problems in watershed areas. -Organize training for user groups on equitable distribution of benefits and conflict management.	Intensification with land use plans in micro-watersheds using a farming system approach.

Sl.	Sustainability factors	Proposed activity	Thrust Area
		-Assess the extent of soil erosion problems in specific areas and develop a detailed action plan to manage erosion, involving farmers. -Identify appropriate technological actions and assess farmers' preferences for the proposed options. -Evaluate farmers' willingness to contribute a proportion of the cost required for mechanical measures. -Organize training for user groups on the implementation and maintenance of various soil conservation measures, including record-keeping. -Release funds for the implementation of mechanical or biological measures in installments.	

Strategies for Community Organizations

In Rohtas district, community organization plays a crucial role in ensuring sustainable agricultural development and resource management. Several proposed strategies can help strengthen and empower these community organizations to achieve their objectives in various thrust areas, including diversification, intensification, and natural resource management (NRM).

Diversification: To promote diversification of the farming system, it is essential to organize farmer groups focused on new commodities. Identifying these commodities and assessing their potential can help in forming groups. Partnering with NGOs can facilitate the organization of farmer groups and provide necessary training for capacity building. This approach will enable farmers to explore new opportunities in agriculture, leading to increased income and sustainable livelihoods.

Intensification: Commodity-oriented groups can improve access to inputs, marketing, and technological support, resulting in agricultural intensification. Identifying success stories and arranging exposure visits for feasible farmer groups can offer valuable insights. Collaborating with NGOs can help organize these groups and provide skill upgradation and empowerment training. This strategy can enhance productivity and income generation for the farmers involved.

Natural Resource Management (NRM) - Women Self-Help Groups (SHGs): Organizing women SHGs focused on NRM can empower women and promote sustainable resource management. Identifying successful SHGs and arranging exposure visits can offer inspiration and motivation. Local NGOs can be involved in organizing SHGs and providing training on record management and capacity building. Facilitating linkages with other institutions can help with credit, input supply, and economic development of the members. Regular meetings can ensure effective decision-making and smooth functioning of the group.

Natural Resource Management (NRM) - Water User Associations (WUAs): The organization of WUAs is essential for efficient canal water distribution and maintenance of the system. Partnering with NGOs can help establish WUAs and provide exposure visits to successful canal areas. Training on water management, canal maintenance, rational water distribution, crop planning, and water rate collection can empower WUAs. Demonstrations on water management and multiple cropping can

further enhance their understanding. System improvement and farmer turnover in canal areas can lead to better water resource management and utilization.

Sl.	Community Organisation	Proposed activity	Thrust Area
1.	Organize farmer groups to promote the production of new commodities through the diversification of the farming system.	-Identify new commodities and assess the potential for forming groups to produce them. -Subcontract the organization of farmer groups to NGOs. -Conduct training programs to build the capacity of these groups.	Diversification
2.	Organize commodity-oriented groups to improve farmers' access to inputs, marketing, and technological support.	-Identify the success stories -Exposure visit of feasible farmer groups to successful areas where CIGs have been formed. -Organise groups with the help of NGOs. -Organise training for skill upgradation & group empowerment.	Intensification
3.	Organisation of woman SHGs for NRM.	-Identify successful Self-Help Groups (SHGs). -Organize exposure visits to successful villages for SHG members. -Promote the formation of SHGs through regular interactions with local NGOs. -Motivate group members to work collaboratively, share responsibilities, and make collective decisions. -Organize training programs to build the capacity of SHG members, including record-keeping and management skills. -Facilitate linkages with other institutions for economic development, such as access to credit and inputs. -Conduct regular meetings of the SHGs to plan and decide on the group's further course of action.	NRM
4.	Organisation of Water User Association for distribution of canal water & maintenance of system.	-Organize farmers to form Water User Associations (WUAs) through the assistance of NGOs. -Conduct exposure visits for WUA members to successful canal areas under the Agricultural Intensification Program (AIP). -Provide training to WUAs on water management, canal maintenance, equitable water distribution, crop planning, and water fee collection. -Conduct demonstrations in canal areas to showcase water management practices and multiple cropping techniques. -Improve the canal system and encourage farmer participation in canal management activities.	NRM

Strategies for Sustainability of interventions

In Rohtas district, the following interventions proposed under the SREP document aim to ensure the sustainability of agricultural practices and natural resource management:

Encouraging cost-sharing for sustainable initiatives: Conducting awareness campaigns can help farmers understand the importance of natural resource management (NRM). Motivating them to contribute 25-50% for community work and 50% for individual work can help support these

initiatives. Encouraging user groups to contribute to community work and building a revolving fund can also support these efforts.

Establishing a revolving fund: Organizing awareness campaigns about the necessity of revolving funds and motivating Commodity Interest Groups (CIGs) or Farmer Interest Groups (FIGs) to pay for services like artificial insemination, soil testing, consultancy, grafts, and biofertilizers can help establish a revolving fund. This fund can then be utilized to multiply the impact by providing more inputs to the farmers.

Setting up agro-clinics: Creating awareness campaigns about the concept of agro-clinics at block and panchayat levels and collecting service charges for additional field and advisory services can help establish agro-clinics. These clinics will offer consultancy services for a fee, providing farmers with valuable support and guidance.

Publishing newsletters and periodicals: ATMA can identify successful enterprises, important commodities, and farmers' needs to publish newsletters and periodicals covering technical and managerial aspects. Charging a fee for these publications can create a revolving fund for ATMA while also providing valuable information to farmers and extension workers.

Establishing a farmer's forum at the ATMA level: Conducting awareness campaigns at the panchayat level about the farmers' forum at ATMA can help collect annual or lifetime membership fees from interested farmers. Providing training to members on participatory monitoring and evaluation can further enhance the effectiveness of the forum. The establishment of a monitoring and evaluation unit at ATMA and a committee involving NGOs/farmers representatives can ensure the proper evaluation of ATMA activities.

Linking district-level farmers' federations with sectorial groups: Organizing the formation of sectorial associations at the block level and district-level federations with the assistance of NGOs can help establish links between these groups. Affiliating them with ATMA under agreed terms and conditions can enhance cooperation. Providing training to farmers' federations to enhance their skills and capabilities and distributing ATMA's technical literature at a nominal cost can strengthen their knowledge base.

By implementing these activities, Rohtas district can promote sustainable agricultural practices and natural resource management, leading to improved livelihoods for farmers and overall growth in the region.

7. Schedule of activities for Research & Extension Strategies

Revised ATMA Cafeteria:

The Revised ATMA Cafeteria provides support for State, District and Block level activities. Support for innovative activities is also provided at all levels. District / Block level activities are further categorized into three groups namely:

(i) Farmer Oriented Activities.
(ii) Farm Information Dissemination.
(iii) Research-Extension-Farmer (R-E-F) linkages

Farmer Oriented Activities include development of SREP, mobilization of farmer groups, training/exposure visit of farmers, arranging demonstrations, all aimed at empowering farmers and improving their participation in technology dissemination process. Under the category Farm Information Dissemination, local level agricultural exhibitions, information dissemination through printed materials and development of technology packages in electronic form are covered. Research-Extension-Farmer (R-E-F) linkages-based activities include organization of Farmer-Scientist Interaction at local level, organization of Field-days and Kisan Goshties and support for local level researchable issues which emanate from SREP.

Research & Extension Activities

The strategies can be helpful in achieving the goal / objectives of the project only when translated into action. Therefore, it is necessary to spell out different activities under each category of the respective program component. Based upon the analysis of issues, problem and opportunities, relevant and feasible strategies have been worked out for carrying out extension activities in the district. The strategies have been categorized under five major groups as indicated below:

1) Improvement in productivity and income of farmers in the existing enterprises and farming system.
2) Sustainability in productivity / income
3) Natural Resource Management
4) Financial Sustainability
5) Marketing System

The information collated in this chapter describes mostly the overall requirement of the activities in general terms, excluding the quantification of activities and the financial requirements as the same has to be placed under Annual Action Plans of participating department prepared annually.
Ayarkotha, Sikariyan, Rehal

Table 36: Identification of different farming situation in each EFS

Name of Village : Ayarkotha, Sikariyan, Rehal **AES-I, II, III**		Name of Crop : Onion		Area in Hec. :	
Sl	Time of Sowing	Source of Irrigation			
		Well	Tank	Canal	Rainfed
1	Early	No	No	No	No
2	Normal	Yes	No	Yes	Yes
3	Late	Yes	No	Yes	Yes

1 . Type of Soil :- Loamy Soil
2 . Time of sowing :- October – November
3. Source of irrigation :- Well, Canal, Rainfed
4. Previous crop :- Flood affected
5. Problematic soil etc… :- No.

Name of Village : Ayarkotha, Sikariyan, Rehal **AES-I, II, III**		Name of Crop : Paddy		Area in Hec. :	
Sl	Time of Sowing	Source of Irrigation			
		Well	Tank	Canal	Rainfed
1	Early	Yes	No	No	Yes
2	Normal	No	No	No	Yes
3	Late	No	No	No	No

1 . Type of Soil :-Loamy Soil
2 . Time of sowing :-October – November
3. Source of irrigation :-Rainfed
4. Previous crop :-Flood affected
5. Problematic soil etc… :-No.

Name of Village : Ayarkotha, Sikariyan, Rehal **AES-I, II, III**		Name of Crop : Wheat		Area in Hec. :	
Sl	Time of Sowing	Source of Irrigation			
		Well	Tank	Canal	Rainfed
1	Early	Yes	Yes	No	No
2	Normal	No	No	No	Yes
3	Late	No	No	No	No

1 . Type of Soil :-Loamy Soil
2 . Time of sowing :-October – November
3. Source of irrigation :-Well, Rainfed
4. Previous crop :-Flood affected
5. Problematic soil etc… :-No.

Name of Village : Ayarkotha, Sikariyan, Rehal **AES-I, II, III**		Name of Crop : Lentil		Area in Hec. :	
Sl	Time of Sowing	Source of Irrigation			
		Well	Tank	Canal	Rainfed
1	Early	Yes	No	No	Yes
2	Normal	Yes	No	Yes	Yes
3	Late	Yes	No	Yes	Yes

1 . Type of Soil :-Loamy sand - Loam Soil
2 . Time of sowing :-October – November
3. Source of irrigation :-Well, Canal, Rainfed
4. Previous crop :-Flood affected
5. Problematic soil etc… :-No.

Name of Village : Ayarkotha, Sikariyan, Rehal **AES-I, II, III**		Name of Crop : Mustard Area in Hec. :			
Sl	Time of Sowing	Source of Irrigation			
		Well	Tank	Canal	Rainfed
1	Early	No	No	No	No
2	Normal	No	No	No	Yes
3	Late	No	No	No	Yes

1 . Type of Soil :-Loamy Soil
2 . Time of sowing :-October – November
3. Source of irrigation :-Rainfed
4. Previous crop :-Flood affected
5. Problematic soil etc… :-No.

Name of Village : Ayarkotha, Sikariyan, Rehal **AES-I, II, III**		Name of Crop : Potato Area in Hec. :			
Sl	Time of Sowing	Source of Irrigation			
		Well	Tank	Canal	Rainfed
1	Early	No	No	No	No
2	Normal	Yes	No	No	Yes
3	Late	Yes	No	No	Yes

1 . Type of Soil :-Loamy Soil
2 . Time of sowing :-October – November
3. Source of irrigation :-Well, Rainfed
4. Previous crop :-Flood affected
5. Problematic soil etc… :-No.

Table 37: Gap in adoption and proposed extension strategy for improving the productivity / income from crop

District -Rohtas, AES: All, Crop: Paddy Villages: Ayarkotha, Sikariyan, Rehal						
Sl.	Items of package	Recommended practice	Existing practice	Gap in adoption (F/P/N)	Specific reasons for the gap (**)	Farmer proposed extension strategy (***)
1	Sowing:			P	1,3,4	1,3,4
	Time	June-July	July-August			
	Method	Transplantation	Transplanting			
2	Varieties	Rajendra Mansuri, Rajendra Sweta, RB-1	Local Varieties	P	1,4	1,4
3	Seed rate (per ha.)	40-50	70-85	P	1	1
4	Seed treatment	Carbendazim, Azotobacter	-	P	1	1
5	Organic manure (tons /ha)	20-25	-	P	1	1
6	Fertilizer / nutrient(kg/ha)					
	Basal (N+P+K)	60-60-40	30-10-0	P	1	1
	Top dress (N)	50-40-20	4.5	P	1	1
	Total					
7	Method of fertilizeruse:					
	Basal	Placement	-	P	1	1
	Top dress	Broadcast	-	P	1	1
8	Micro nutrient (specify) :					
	Dose (kg/ha)	25kg Zn	-	P	1	1
	Method of application	Broadcast, Basal				
9	Pest management	IPM, Biochemical agents	Only Chemical	P	1	1
10	Disease management	IPM, Chemical	Only Chemical	P	1,2	1,2
11	Post-harvest management	Cleaning &Drying	Cleaning &Drying	N	-	-
12	Weed management					
	Mechanical	Hand weeding	Hand weeding	P	1,2	1,2
	Herbicide	Butachlor, Nominee Gold	-	P	1	1
13	Water management:					
	Number of irrigations	6				
	Method of irrigation	Check & basin	Flooding	P	1	1
14	Land management:					
	Salinity/ acidity	Leaching of slat				
	Water logging	Amendment in soil by pyrite				
15	Method of harvesting	Machine	Manual/ Machine	N		
16	Any other					
17	Average Yield (Q / ha.)					
	Grain	G-55, HY-60	G 22-25	P		
	Fodder	G-50, HY-65				

** Code for specific reasons for gap in adoption

1 Lack of awareness
2 Lack of fund and facilities
3 No availability of quality Seed
4 Lack of upgraded varieties
5 Lack of market facilities

*** Code for farmer proposed extension strategy

1 Training, demonstration, and exposure visit
2 Linking with financial institutions
3 To arrange quality control
4 To insure varieties upgradation
5 Arrangement of market facilities

District -Rohtas, AES-All, Crop: Wheat		Villages: Ayarkotha, Sikariyan, Rehal				
Sl.	Items of package	Recommended practice	Existing practice	Gap in adoption (F/P/N) (*)	Specific reasons for the gap (**)	Farmer proposed extension strategy (***)
1	Sowing:			P	1,3,4	1,3,4
	Time	Oct-Nov	Nov-Jan			
	Method	Zero-Tillage	Broadcasting			
2	Varieties	HD- 2967, HD- 3086, HI- 1563, DBW-186	Sri Ram, Lokman 43, Lokman 300	P	1,4	1,4
3	Seed rate (per ha.)	125, 250	100	P	1	1
4	Seed treatment	Carbendazim	-	P	1	1
5	Organic manure (tons /ha)	15 ton/ha.	4 ton/ha	P	1	1
6	Fertilizer / nutrient(kg/ha)					
	Basal (N+P+K)	150 : 60 : 40	200 : 80 : 50	P	1	1
	Top dress (N)			P	1	1
	Total					
7	Method of fertilizeruse:					
	Basal	Placement, Broadcast	Broadcast	P	1	1
	Top dress			P	1	1
8	Micronutrient(specify):					
	Dose (kg/ha)	25 kg zinc	-	P	1	1
	Method of application					
9	Pest management	Malathion 05% @ 3.2 kg Per Hec.	As recommended by local dealer	P	1	1
10	Disease management	IPM/Chemical	_	P	1,2	1,2
11	Post-harvest management	Drying/ Cleaning	Drying/ Cleaning	N	-	-
12	Weed management					
	Mechanical			P	1,2	1,2
	Herbicide			P	1	1
13	Water management:					
	Number of irrigations	3-4	3			
	Method of irrigation	Sprinkler	Flooding	P	1	1
14	Land management:					
	Salinity/ acidity					
	Water logging					
15	Method of harvesting	Reaper -Cum- Binder, Straw Baler, Combine Harvester	Thresher or Manual			
16	Any other					
17	Average Yield (Q / ha.)					
	Grain	50 - 60 q. Per Hec.	30 - 40 q. Per Hec.	P	1	1
	Fodder					

** Code for specific reasons for gap in adoption

1 Lack of awareness
2 Lack of fund and facilities
3 No availability of quality Seed
4 Lack of upgraded varieties
5 Lack of market facilities

*** Code for farmer proposed extension strategy

1 Training, demonstration and exposure visit
2 Linking with financial institutions
3 To arrange quality control
4 To insure varieties upgradation
5 Arrangement of market facilities

District -Rohtas, AES-All, Crop: Maize		Villages: Ayarkotha, Sikariyan, Rehal				
Sl.	Items of package	Recommended practice	Existing practice	Gap in adoption (F/P/N) (*)	Specific reasons for the gap (**)	Farmer proposed extension strategy (***)
1	Sowing:			P	1,3,4	1,3,4
	Time	Oct-Nov	Sept.-Nov.			
	Method	Line Sowing	Broadcasting			
2	Varieties	Shaktiman I, II, III, IV, Ganga	Local	P	1,4	1,4
3	Seed rate (per ha.)	20Kg	30Kg	P	1	1
4	Seed treatment	Carbendazim		P	1	1
5	Organic manure (tons /ha)	20	10	P	1	1
6	Fertilizer / nutrient(kg/ha)					
	Basal (N+P+K)	40+60+40	75+0+0	P	1	1
	Top dress (N)	70Kg N		P	1	1
	Total					
7	Method of fertilizer use:					
	Basal	Placement	Broadcasting	P	1	1
	Top dress			P	1	1
8	Micro nutrient (specify) :					
	Dose (kg/ha)	25Kg		F	1	1
	Method of application	Basal		F	1	1
9	Pest management	IPM, Chemical	Chemical	P	1	1
10	Disease management	IPM, Chemical	Chemical	P	1,2	1,2
11	Post-harvest management	Cleaning & Drying	Cleaning & Drying	N	-	-
12	Weed management					
	Mechanical	Manual	Manual	P	1,2	1,2
	Herbicide	Atrazine / simazine 1.5 kg	-	F	1	1
13	Water management:					
	Number of irrigations	No in Kharif	-	N		
	Method of irrigation			P	1	1
14	Land management:					
	Salinity/ acidity	Leaching/ Chemical/ Drainage/	Leaching/ Drainage			
	Water logging					
15	Method of harvesting	Manual	Manual			
16	Any other					
17	Average Yield (Q / ha.)					
	Grain	80-90	60-65	P	1	1
	Fodder					

** Code for specific reasons for gap in adoption

1 Lack of awareness
2 Lack of fund and facilities
3 No availability of quality Seed
4 Lack of upgraded varieties
5 Lack of market facilities

*** Code for farmer proposed extension strategy

1 Training, demonstration and exposure visit
2 Linking with financial institutions
3 To arrange quality control
4 To insure varieties upgradation
5 Arrangement of market facilities

District -Rohtas, AES-All, Crop: Lentil/Masoor			Villages: Ayarkotha, Sikariyan, Rehal			
Sl.	Items of package	Recommended practice	Existing practice	Gap in adoption (F/P/N) (*)	Specific reasons for the gap (**)	Farmer proposed extension strategy (***)
1	Sowing:			P	1,3,4	1,3,4
	Time	Nov-Dec	Nov end to Dec end			
	Method	Line Sowing	Broadcasting			
2	Varieties	PL08, PL06, PL 639, Narendra Masoor RL 25	Balwan (Local)	P	1,4	1,4
3	Seed rate (kg per ha.)	35	42	P	1	1
4	Seed treatment	Carbendazim 2g/kg	Carbendazim 2g/kg	P	1	1
5	Organic manure (tons /ha)	2 ton/ha.	2-3Ton/Ha	P	1	1
6	Fertilizer / nutrient(kg/ha)					
	Basal (N+P+K)	20+40+0	20-40-0	P	1	1
	Top dress (N)			P	1	1
	Total					
7	Method of fertilizer use:					
	Basal	Placement	Broadcast	P	1	1
	Top dress			P	1	1
8	Micronutrient(specify):					
	Dose (kg/ha)	25 kg ZnSO4	-	P	1	1
	Method of application					
9	Pest management	IPM/Chemical	_	P	1	1
10	Disease management	IDM/Chemical	_	P	1,2	1,2
11	Post-harvest management	Drying/ Cleaning	Drying/ Cleaning	N	-	-
12	Weed management					
	Mechanical	2 hand weeding, Pandamethalin, Isoproturon	Hand Weeding	P	1,2	1,2
	Herbicide			P	1	1
13	Water management:					
	Number of irrigations	-	-			
	Method of irrigation	-	-	P	1	1
14	Land management:					
	Salinity/ acidity	Leaching of salt, Amendment in soil by application of pyrite	-	N	1	1
	Water logging					
15	Method of harvesting	Manual	Manual	N		
16	Any other					
17	Average Yield (Q / ha.)					
	Grain	15 Q/Ha	11 Q/Ha	P		
	Fodder	25 Q/Ha	20 Q/Ha			

** Code for specific reasons for gap in adoption

1 Lack of awareness
2 Lack of fund and facilities
3 No availability of quality Seed
4 Lack of upgraded varieties
5 Lack of market facilities

*** Code for farmer proposed extension strategy

1 Training, demonstration and exposure visit
2 Linking with financial institutions
3 To arrange quality control
4 To insure varieties upgradation
5 Arrangement of market facilities

District -Rohtas, AES-All, Crop: Mustard			Villages: Ayarkotha, Sikariyan, Rehal			
Sl.	Items of package	Recommended practice	Existing practice	Gap in adoption (F/P/N) (*)	Specific reasons for the gap (**)	Farmer proposed extension strategy (***)
1	Sowing:			P	1,3,4	1,3,4
	Time	Nov	Nov			
	Method	Line Sowing	Broadcasting			
2	Varieties	Rajendra Sarso-1, Varuna, Taarameera	Local Variety, Swarna	P	1,4	1,4
3	Seed rate (per ha.)	5-6	6-8	P	1	1
4	Seed treatment	Carbendazim 2g/kg	-	P	1	1
5	Organic manure (tons /ha)	10 ton/ha.	0-2	P	1	1
6	Fertilizer / nutrient(kg/ha)					
	Basal (N+P+K)	80 : 40 : 40	DAP 200 Kg Urea 200 Kg	P	1	1
	Top dress (N)			P	1	1
	Total					
7	Method of fertilizer use:					
	Basal	Placement	Broadcasting	P	1	1
	Top dress	Broadcasting		P	1	1
8	Micronutrient(specify):					
	Dose (kg/ha)	05% Zinc spray 25 kg Zn. Sulphate	10	P	1	1
	Method of application					
9	Pest management	IPM/Chemical	_	P	1	1
10	Disease management	IPM/Chemical	_	P	1,2	1,2
11	Post-harvest management	Drying/ Cleaning	Drying/ Cleaning	N	-	-
12	Weed management					
	Mechanical	1 hand Weeding at 25-30 days	hand weeding	P	1,2	1,2
	Herbicide			P	1	1
13	Water management:					
	Number of irrigations	-	-			
	Method of irrigation	-	-	P	1	1
14	Land management:					
	Salinity/ acidity	Leaching of salt, Amendment in soil by application of pyrite	-			
	Water logging					
15	Method of harvesting	Manual	Manual	N		
16	Any other					
17	Average Yield (Q / ha.)					
	Grain	10 - 12 qt/ha	08 - 10 qt/ha	P		
	Fodder	32 Q/Ha	22-24 Q/Ha			

** Code for specific reasons for gap in adoption

1 Lack of awareness
2 Lack of fund and facilities
3 No availability of quality Seed
4 Lack of upgraded varieties
5 Lack of market facilities

*** Code for farmer proposed extension strategy

1 Training, demonstration and exposure visit
2 Linking with financial institutions
3 To arrange quality control
4 To insure varieties upgradation
5 Arrangement of market facilities

District -Rohtas, AES-All, Crop: Onion		Villages: Ayarkotha, Sikariyan, Rehal				
Sl.	Items of package	Recommended practice	Existing practice	Gap in adoption (F/P/N) (*)	Specific reasons for the gap (**)	Farmer proposed extension strategy (***)
1	Sowing:			P	1,3,4	1,3,4
	Time	Oct-Nov	Nov-Dec			
	Method	Line Sowing	Line Sowing			
2	Varieties	Pusa Red, Patna Red, Arka Pragati	Pusa Red, Jirrath	P	1,4	1,4
3	Seed rate (per ha.)	15kg	15kg	P	1	1
4	Seed treatment	Mancozeb 2.5g/kg	-	P	1	1
5	Organic manure (tons /ha)	25	-	P	1	1
6	Fertilizer / nutrient(kg/ha)					
	Basal (N+P+K)	150 : 60 : 100	200:00:50	P	1	1
	Top dress (N)			P	1	1
	Total					
7	Method of fertilizer use:					
	Basal	Broadcasting	Broadcasting	P	1	1
	Top dress			P	1	1
8	Micronutrient(specify):					
	Dose (kg/ha)	Sulphur 10kg/ha	Sulphur 10kg/ha	P	1	1
	Method of application	Spray				
9	Pest management	IPM/Chemical	_	P	1	1
10	Disease management	IDM/Chemical	_	P	1,2	1,2
11	Post-harvest management	Drying/ Cleaning	Drying/ Cleaning	N	-	-
12	Weed management					
	Mechanical	2 hand Weeding	No hand weeding	P	1,2	1,2
	Herbicide	Isoproturon		P	1	1
13	Water management:					
	Number of irrigations	5-6	7			
	Method of irrigation	Ridge & Furrow	Flooding	P	1	1
14	Land management:					
	Salinity/ acidity		-			
	Water logging					
15	Method of harvesting	Manual	Manual	N		
16	Any other					
17	Average Yield (Q / ha.)	250-300 Qt/Ha	200Qt/Ha			

** Code for specific reasons for gap in adoption

1 Lack of awareness
2 Lack of fund and facilities
3 No availability of quality Seed
4 Lack of upgraded varieties
5 Lack of market facilities

*** Code for farmer proposed extension strategy

1 Training, demonstration and exposure visit
2 Linking with financial institutions
3 To arrange quality control
4 To insure varieties upgradation
5 Arrangement of market facilities

District -Rohtas, AES-All, Crop: Chickpea			Villages: Ayarkotha, Sikariyan, Rehal			
Sl.	Items of package	Recommended practice	Existing practice	Gap in adoption (F/P/N) (*)	Specific reasons for the gap (**)	Farmer proposed extension strategy (***)
1	Sowing:			P	1,3,4	1,3,4
	Time	Oct-Nov	Nov-Dec			
	Method	Line Sowing	Broadcasting			
2	Varieties	PUSA 256, PUSA 362, PUSA 1003, IPC-9- 15, IPC-10-59	PUSA 256, PUSA 372, RAU 52, Rajendra Chana	P	1,4	1,4
3	Seed Rate (per ha.)	60Kg/Ha	85Kg/Ha	P	1	1
4	Seed treatment	FIR	Carbendazim 2g/kg	P	1	1
5	Organic manure (tons /ha)	25	-	P	1	1
6	Fertilizer / nutrient(kg/ha)					
	Basal (N+P+K)	20 Kg N + 100 Kg DAP	50 Kg Urea + 100 Kg DAP + 50 Kg Urea	P	1	1
	Top dress (N)			P	1	1
	Total					
7	Method of fertilizer use:					
	Basal	50%		P	1	1
	Top dress	50%		P	1	1
8	Micronutrient(specify):					
	Dose (kg/ha)	25 kg Zn. Sulphate	-	P	1	1
	Method of application	Spray				
9	Pest management	Quinolfos- 25EC @ 01 ml per Lit.	Novaluron 10EC 1.5 ml per lit.	P	1	1
10	Disease management	Carbendazim 2g/kg	_	P	1,2	1,2
11	Post-harvest management	Drying/ Cleaning	Drying/ Cleaning	N	-	-
12	Weed management					
	Mechanical	2 hand Weeding	No hand weeding	P	1,2	1,2
	Herbicide	Isoproturon		P	1	1
13	Water management:					
	Number of irrigations	2	0			
	Method of irrigation	Ridge & Furrow	Flooding	P	1	1
14	Land management:					
	Salinity/ acidity	Leaching of salt, Amendment in soil by application of pyrite	-			
	Water logging					
15	Method of harvesting	Manual	Manual	N		
16	Any other					
17	Average Yield (Q / ha.)	20-22Qt/Ha	15-18Qt/Ha			

** Code for specific reasons for gap in adoption

1 Lack of awareness
2 Lack of fund and facilities
3 No availability of quality Seed
4 Lack of upgraded varieties
5 Lack of market facilities

*** Code for farmer proposed extension strategy

1 Training, demonstration and exposure visit
2 Linking with financial institutions
3 To arrange quality control
4 To insure varieties upgradation
5 Arrangement of market facilities

Table 38: Type of farming situations under which important horticultural crops are cultivated

AES	Farming Situation		Area and % under different farming situations				Total	
			EFS-1		EFS-2			
			Area (Ha.)	(%)	Area (Ha.)	(%)	Area (Ha.)	(%)
AES-I	Irrigated	RR	-	-	-	-	-	-
		RP	-	-	-	-	-	-
	Rainfed	RR	-	-	-	-	-	-
		RP	-	-	-	-	-	-
AES-II	Irrigated	RR	-	-	-	-	-	-
		RP	-	-	-	-	-	-
	Rainfed	RR	-	-	-	-	-	-
		RP	-	-	-	-	-	-

Table 39: Gap in adoption and proposed extension strategy for improving the productivity/ income from horticultural crop

District: -Rohtas, AES-All, Crop: Mango			Villages: Ayarkotha, Sikariyan, Rehal			
Sl.	Items of package	Recommend practice	Existing practice	Gap in adoption (F/P/N)	Specific reasons for the gap (**)	Fanner proposed Extension Strategy (•••)
1	Variety	Dashahari, Langda, Chousa, Amrapali, Bombay green, Malda	Biju, Local, Malda	P	1	1
2	Spacing (mts)	5x5 mts/ 2.5x2.5 mts for high density	4x4	P	1	1
3	Manure (kg/plant)	Compost 40kg, Oil Cake 2Kg per year, 60-80Kg	Nil	F	1,4	1,4
4	Major nutrients: (N+P+K)					
	a. Dose (Kg/plant)	SSP-1Kg, Mop-0.25Kg, 10gm Forate per year NPK-1+.3+.7	Nil	F	1,4	1,4
	b. Method of application	Placement				
5	Micronutrient ( )					
	• Dose (kg/plant)	Borax 50-100g Basal, Multiplex b1.5ml / lt of water	Nil	F	1,4	1,4
	• Method of application	Foliar Spray				
6	Weed management					
	Around the plants	Manual	Manual	Nil	1	1
	In between the rows	Manual	Manual	Nil	1	1
7	Pest management	IPM/ Chemical	Nil	F	1	1
8	Disease management	IPM/ Chemical	Nil	F	1	1
9	Water management					
	Nos. of irrigation	According to the need	Random	N	-	-
	Method of irrigation	Basin	Basin			
10	Special Practices					
	Training	1,2	Not practicing	F	1	1
	Prunning	1,2	Not practicing	F	1	1
	Girdling					
	Bahar treatment					
11	Harvesting					
	Method	Manual	Manual	N	-	-
	Time (hour)					
12	Farm level Processing					
	Grading	Grading according to size and fruit quality	according to size and fruit quality	N	-	-
13	Marketing					
	Location of market	Wholesale Market	Local Market	F	3	5
	Distance from farm			N		
	Mode of transport			N		
	Marketing by individual/ group			F		

** Reasons for gaps :

1. Lack of awareness
2. Lack of fund & facilities
3. Market problem in local area
4. Non-availability of good quality FYM
5. Non-adoption of Package of Practices.

*** Farmer proposed extension strategies :

1. Demonstration & trainings.
2. Link with credit Institutions.
3. To arrange program for quality control.
4. Ensuring variety upgradation
5. Arrangement of marketing facilities

Table 40: Gap in adoption and proposed extension strategy for improving the productivity…

District: -Rohtas, AES-All, Crop: Cucurbitaceous			Villages: Ayarkotha, Sikariyan, Rehal			
Sl.	Items of package	Recommend practice	Existing practice	Gap in adoption (F/P/N) (*)	Specific reasons for the gap (**)	Fanner proposed Extension Strategy (•••)
1	Sowing time and method	Summer Jan-Feb, Kharif June-July, Line sowing 2x1.5m	Summer Jan-Feb, Kharif June-July, Line sowing 1x1m	P	1	1
2	Variety	**Bottle gourd** -Rajendra Chamatakar, Pusa Manjari, Dholi Safed, PusaMeghduth, Arka Bahar. **Sponge gourd -** Ranendra Nenua 1, Pusa Chikani, **Bitter gourd -** Pusa Vishesh, Pusa Do Mausami, Arka Harit, Priya, Coimbatore log	Local	Local	1	1
3	Seed Rate	**Bottle gourd** -4-5kg **Sponge gourd**-3-4kg **Bitter gourd**-5-6kg				
4	Spacing (mts)	1x1 mt	Not proper	F	1	1,2
5	Manure (Ton/Plant)	18	2-3	P	1,2	1,2
6	Major nutrients: (N+P+K)					
	a. Dose (Kg/plant)	30+40+40, 30	35+0+0, 25	F	1,2	1,2
	b. Method of application					
7	Micronutrient ( )					
	• Dose (kg/plant)	Multiplex 1.5/hect.	Not practiced	F	1,2	1,2
	• Method of application					
8	Weed management	Manual	Manual	P	-	-
	Around the plants					
	In between the rows					
9	Pest management	IPM/Chemical	Chemical	F	1	1,2
10	Disease management	IPM/Chemical	Chemical	F	1	1,2
11	Water management					
	Nos. of irrigation	-	-	P	-	-
	Method of irrigation					
12	Special Practices	-	-	F	1	1,2
	Training					
	Prunning					
	Girdling					
	Bahar treatment					
13	Harvesting					
	Method	Manual	Manual	N	1	1,3
	Time (hour)					

** Reasons for gaps :

1. Lack of awareness
2. Lack of fund & facilities
3. Market problem in local area
4. Non-availability of good quality FYM
5. Non-adoption of Package of Practices.

*** Farmer proposed extension strategies :

1. Demonstration & trainings.
2. Link with credit Institutions.
3. To arrange program for quality control.
4. Ensuring variety upgradation
5. Arrangement of marketing facilities

Table 41: Gap in adoption and proposed extension strategy for improving the productivity…

District: -Rohtas, AES-All, Crop: Guava			Villages: Ayarkotha, Sikariyan, Rehal			
Sl.	Items of package	Recommend practice	Existing practice	Gap in adoption (F/P/N)	Specific reasons for the gap (**)	Fanner proposed Extension Strategy (•••)
1	Variety	Allahabad Safeda sardar, Chittidar, Lalit, Safed jam, Habsi	Allahabad Safeda Local	P	1	1
2	Spacing (mts)	6x6	No proper spacing	F	1	1
3	Manure (kg/plant)	Compost 30kg	Nil	F	1,4	1,4
4	Major nutrients: (N+P+K)					
	a. Dose (Kg/plant)	SSP-1Kg, Mop-0.25Kg, 10gm Forat per year NPK-0.5+.3+0.5	Nil	F	1	1
	b. Method of application	Placement				
5	Micronutrient ( )					
	Dose (kg/plant)	Multiplex 1.5ml/It of water	Nil	F	1,2	1
	Method of application	Foliar Spray				
6	Weed management					
	Around the plants	Manual	Manual	Nil		
	In between the rows					
7	Pest management	IPM/ Chemical	Nil	F	1	1,2
8	Disease management	IPM/ Chemical	Nil	F	1	1,2
9	Water management					
	Nos. of irrigation	According to the need	Random	N	-	-
	Method of irrigation	Basin	Basin			
10	Special Practices					
	Training	1,2	Not practicing	F	1	1,2
	Pruning	1,2	Not practicing	F	1	1
	Girdling					
	Bahar treatment					
11	Harvesting					
	Method	Manual	Manual	N	-	-
	Time (hour)					
12	Farm level Processing					
	Grading	Grading according to size and fruit quality	according to size and fruit quality	N	-	-
13	Marketing					
	Location of market			F	1,3	1,2,3
	Distance from farm			N		
	Mode of transport			N		
	Marketing by individual/ group			F		
	Any other					
	Average yield (T/ ha.)	14	08-Oct	P	1	1

** Reasons for gaps :

1. Lack of awareness
2. Lack of fund & facilities
3. Market problem in local area
4. Non-availability of good quality FYM
5. Non-adoption of Package of Practices.

*** Farmer proposed extension strategies :

1. Demonstration & trainings.
2. Link with credit Institutions.
3. To arrange program for quality control.
4. Ensuring variety upgradation
5. Arrangement of marketing facilities

Table 42: Gap in adoption and proposed extension strategy for improving the productivity…

District: -Rohtas, AES-All, Crop: Potato			Villages: Ayarkotha, Sikariyan, Rehal			
Sl.	Items of package	Recommend practice	Existing practice	Gap in adoption (F/P/N) (*)	Specific reasons for the gap (**)	Fanner proposed Extension Strategy (•••)
1	Variety	KufriChandramukhi, Kufrikuved, KufariBahar	Local	P	1	1,2
2	Spacing (mts)	50x50 Cm Line to line, Seed to Seed 20x20Cm	Not proper	F	1	1,2
3	Manure (Ton/Plant)	18	2-3	F	1	1,2
4	Major nutrients: (N+P+K)					
	a. Dose (Kg/plant)	180 Kg N, 80 Kg P, 120 Kg K	-	F	1,2	1,2
	b. Method of application	1/3 NPK Use in Soil Before Sowing				
5	Micronutrient ( )					
	• Dose (kg/plant)	25kg Zn	Not practiced	F	1,2	1,2
	• Method of application					
6	Weed management	Manual	Manual	P	-	-
	Around the plants					
	In between the rows					
7	Pest management	IPM/Chemical	Chemical	F	1	1,2
8	Disease management	IPM/Chemical	Chemical	F	1	1,2
9	Water management					
	Nos. of irrigation	As per need	As per need	P	-	-
	Method of irrigation	Basin	Basin			
10	Special Practices	-	-	F	1,3	1,2,3
	Training	1-2`	No	F	1,3	1,2,3
	Prunning	1-2`	No	F	1,3	1,2,3
	Girdling	1-2`	No	F	1,3	1,2,3
	Bahar treatment					
11	Harvesting					
	Method	Manual	Manual	N	1	1,3
	Time (hour)					
12	Average yield (T/ ha.)	G: 300-350Q, HY: 300-600Q	8-12	P	1	1,3

** Reasons for gaps :

1. Lack of awareness
2. Lack of fund & facilities
3. Market problem in local area
4. Non-availability of good quality FYM
5. Non-adoption of Package of Practices.

*** Farmer proposed extension strategies :

1. Demonstration & trainings.
2. Link with credit Institutions.
3. To arrange program for quality control.
4. Ensuring variety upgradation
5. Arrangement of marketing facilities

Table 43: Type of farming situations under which cattle are managed

AES	Ownership of land resource	No. of families (%) under different farming situations				Total	
		Local breed		Improved breed			
		No	%	No	%	No	%
AES-I	**A. Land Owners**	-	-			-	-
	Irrigated + Rainfed	-	-	-	-	-	-
	Only Irrigated	-	-	-	-	-	-
	Rainfed only	-	-	-	-	-	-
	B. Landless	-	-	-	-	-	-
	TOTAL-I	-	-	-	-	-	-
AES-II	**A. Land Owners**	-	-	-	-	-	-
	Irrigated + Rainfed	-	-	-	-	-	-
	Only Irrigated	-	-	-	-	-	-
	Rainfed only	-	-	-	-	-	-
	B. Landless	-	-	-	-	-	-
	TOTAL-II	-	-	-	-	-	-

Table 44: Gap in adoption and proposed extension strategy for improving the productivity / income from cattle **AES-I,II & III**

Sl.	Items of the package	Recommended practice	Existing practice	Gap in adoption (F/P/N) *	Reasons for gap in adoption (**)	Farmer proposed extension strategy (***)
1	**Breed up gradation:**				1,2,3	1,2,3,4,5
	*Artificial insemination:					
	Breed	HF/ JR / PVC/ MPCS	Local Breed	F		
	Location					
	* Natural insemination:					
	Breed	Nil	Local Breed	N		
	Location					
2	**Feed management (per animal)**				1,2,3	1,2,3,4
	Green fodder (kg/day)	35-45	10	P		
	Dry fodder (kg/day)	6-9	4	P		
	Concentrates (gms/day)	2000-5000	3000	P		
	Minerals (gms/day)	30-35	-	F		
	Vitamins (ml/day)	6-12	-	F		
3	**Inter calving period (months)**	11	16	p	1,3	1,2,3,4,5
4	**Health care (per year)**					
	HSBQ (No. of vaccinations)	Twice/Year	Once	P	-	1,2,3,4,5
	FMD	-	Once	P	-	-
	Rinder pest	1/Life time	-	-	1,3	1,2,3,4,5
	Mastitis test	Daily	-	-	1,3	1,2,3,4,5
	Thilaris	On demand	-	-	1,3	1,2,3,4,5
	Deworming	1-2/year	-	-	1,3	1,2,3,4,5
5	**General management:**					
	Washing (times/day)	1-2	1-2	N	1,3	1,3,4
	Cleaning 9times/day)	2	0	F	1,2,3	1,3,4
	Housing (Pacca/Katcha)	Pacca	Pacca/Kutcha	P	1,2,3	1,3,4,5
6	Drinking water (lts./day)	50-100		P	1,3	-
7	Average milk yield (lt/day)	15-20	5-6	P	1,2,3	1,2,3,5

** Reasons for gaps:
1. Lack of awareness
2. Lack of fund and facilities
3. Lack of Management practices
4. Shortage of Bull

*** Farmer proposed extension strategies:
1. Awareness Camp
2. Financial availability
3. Management Practices
4. Improvement in A.I facilities
5. Exposure visits & demonstration

Table 45: Type of farming situations under which goats are managed

AES	Ownership of land resource	No. of families (%) under different farming situations				Total	
		Local breed		Improved breed			
		No	%	No	%	No	%
AES-I	**A. Land Owners**						
	Irrigated + Rainfed						
	Only Irrigated						
	Rainfed only						
	B. Landless						
	TOTAL-I						
AES-II	**A. Land Owners**						
	Irrigated + Rainfed						
	Only Irrigated						
	Rainfed only						
	B. Landless						
	TOTAL-II						

Table 46: Gap in adoption and proposed extension strategy for improving the productivity / income from goat

AES-I,II & III

Sl.	Items of the package	Recommended practice	Existing practice	Gap in adoption (F/P/N) *	Reasons for gap in adoption (**)	Farmer proposed extension strategy (***)
	Breed up gradation:					
	*Artificial insemination:					
	Breed	Black Bengal, Barbari	Local	F	1,2,3	1,2,3
1	Location	Mathura				
	* Natural insemination:					
	Breed					
	Location					
	Feed management (per animal)					
	Green fodder (kg/day)	4-6	-	F		
	Dry fodder (kg/day)	0.5	2-3	P		
	Concentrates (gms/day)	60-300	-	F	1,2,3	1,2,3
	Minerals (gms/day)	10-15	-	F		
2	Vitamins (ml/day)	2-5	-	F		
3	**Inter calving period**	6-7	6	N		
	Health care (per year)					
	HSBQ (No. of vaccinations)	1/YR	-	F		
	FMD	1/LIFE TIME	-	F		
	Rinder pest	-	-	F	1,2,6	1,2,3
	Mastitis test	-	-	F		
	Thilaris	-	-	F		
4	Deworming	-	-	F		
	General management:					
	Washing (times/day)	-	-	P		
	Cleaning (times/day)	2	-	P	1,2	1,2
	Housing (Pacca/Katcha)	Pucca	Kutcha	F		
5	Drinking water (lts./day)	Ad. Liq.	1 ltr	N		
6	Average milk yield (lt/day)	0.25-0.3	0.12	P	1,5	1,5

** Reasons for gaps:

1. Lack of awareness
2. Lack of fund and facilities
3. Lack of Management practices
4. Shortage of Bull

*** Farmer proposed extension strategies:

1. Awareness Camp
2. Financial availability
3. Management Practices
4. Improvement in A.I facilities
5. Exposure visits & demonstration

Table 47: Type of farming situations under which the particular milch and meat animal is managed

Sl.	Ownership of land resource	No. of families (%) under different farming situations				Total	
		Local breed		Improved breed			
		No	%	No	%	No	%
AES-I	Land Owners		70%	-	30%		100%
	Irrigated + Rainfed						
	Only Irrigated						
	Rainfed only						
	Landless						
AES-II	Land Owners		70%		30%		100%
	Irrigated + Rainfed						
	Only Irrigated						
	Rainfed only						
	Landless						
AES III	Land Owners		70%		30%		100%
	Irrigated + Rainfed						
	Only Irrigated						
	Rainfed only						
	Landless						

Table 48: Gap in adoption and proposed extension strategy for improving the productivity / income of milch and meat animals in all AES

Sl.	Items of the package	Recommended practice	Existing practice	Gap in adoption (F/P/N)	Reasons for gap in adoption	Farmer Proposed extension strategy
1	**Breed upgradation:**				1,2,4	1,2,3,4
	Artificial insemination:					
	Breed	Surti/Murrah	-	F		
	Location					
	* Natural insemination:					
	Breed	Nil	Local Village	N		
	Location					
2	**Feed management (per animal)**				1,2	1,2,3
	Green fodder (Kg/day)	35-45	6	P		
	Dry fodder (Kg/day)	6-8	4	P		
	Concentrates (gms/day)	5000-6000	1	P		
	Minerals (gms / day)	30-35	-	F		
	Vitamins (ml. / day)	6-12	-	F		
3	**Inter calving period (months)**	11-18	18	P	1	1
4	**Health care (per year) (+)**				1,2	1,2
	HSBQ (No. of vaccinations)	2/year	1/year	P		
	FMD	1/year	1/year	F		
	Rinder pest	1/life time	1/life time	F		
	Mastitis	-	-	N		
	Thilaris	1/life time	1/life time	F		
	Any other	-	-	-		
5	**General management :**				1,6	1,6
	- Washing (times / day)	2	1	N		
	- Cleaning (times / day)	1	1	N		
	- Housing (Paccca / Kutcha)	Pacca	Kutcha	F		
	- Drinking water (lts. / day)	40-50	30	N		
6	**Average milk yield (lit/day)**	11	6	P	1,3,6,7	1,3,6,7

** Reasons for gaps:

1 Lack of awareness

2 Lack of fund and facilities

3 No availability of quality feed & fodder

4 Lack of upgrated breed

5 Lack of market facilities

6 Improper healthcare

7 Round the year gap in fodder production

*** Farmer proposed extension stratcpies

1 Training, demonstration and exposure visit

2 Linking with financial instutions

3 To arrange quality feed & fodder

4 To insure breed upgration

5 Arrengement of market facilities

6 To insure timely and proper healthcare facilities

7 Round the year fodder production

Table 49: Gap in adoption and proposed extension strategy for improving the fish seed production / income (Part-1) **AES-I, II, III**

Sl.	Item of package	Recommended practice	Existing practice	Gap in adoption (F/P/N)	Reason for gap	Proposed extension strategy
1	**A. Induced breeding (Happa)**					
	(i) Carp (IMC)	PG/synthetic hormone	None	-	2	1,2
	(ii) Catfish	-	-	-	-	-
	(iii) Prawn	-	-	-	-	-
	B. Spontaneous breeding (common carp)	Hormonal Injection	-	F	1,2,3	1,2,3
2	**Nursery preparation**	Nursery pond	Stocking pond	P	1,2	1,2
	a Routine manuring					
	(i) Raw cow dung/Year	8000 Kg/Ha	600Kg/Ha	N	-	-
	(ii) Lime/Year	250-300 kg	150-200 kg	F	1,2,3	1,2,3
	(iii) Urea	None	-			
	(iv) SSP	10-20 kg/ha	None	P	1,2,3	1,2,3
	b Instant manuring					
	(i) Inorganic fertilizer	Yes	Yes	N	-	-
	(ii) Oil cake	5000 kg/ha/yr	3000 kg/ha/yr	N	-	-
	(iii) Raw cow dung					
3	**Insect control**					
	(a) Manual					
	(b) Oil soap	Yes	Yes	N	-	-
4	**Spawn stocking**					
	(a) Single species					
	(b) Multi species	10 million/ha	20 million/ha			
5	Feeding schedule	Semi-intensive	Semi-intensive			
	(a) Oil cake			N	-	-
	(b) Rice bran	1-3%BDW daily	1-3%BDW	N	N	-
	(c) Green leaf (Grass Carp)	1-3%BDW	1-3%BDW	N	P	-
6	Disease	Sanitizer@2lt/ha	Sanitizer@2lt/ha	N	-	-
7	Rearing period	8-12 months	6-10 months	N	-	-
8	Method of harvesting	1 Yr Netting	6-10 months	P	1,2	1,2,3
	(i) Yield within 15 days (Recovery %) Spawn, Fry	40	25	P	1,2,3	1,2,3
	(ii) Yield within 30 days (Recovery %) Finger lings	25	15	P	1,2,3	1,3
	(iii) Yield within 45 days (Recovery % Finger lings)	15	10	P	-	-
9	Marketing	Pond Site	Pond Site	P	2	1,2,3
10	Production of fish (ton/ha)	4-5 carp	3.2 carp	-	-	-

**** Reasons for gaps:**

1. 1ack of awareness
2. Lack of funds & facilities
3. Lack of tendency to adopt recommend practices.
4. Cumbersome leasing policy of the government
5. Lack of enough community water bodies
6. Inadequate availability of good quality of seed and fingerlings
7. Lack of fish feed production unit

***** Farmer proposed extension strategies:**

1. Awareness camps
2. Exposure visits.
3. Print & electronic media.
4. Entrepreneurship development for fish net production
5. Promotion of fish feed production
6. Hatchery Establishment

Table 50: Gap in adoption and proposed extension strategy for improving the fish seed production / income (Part-2) **AES-I, II, III**

Sl.	Item of package	Recommended practice	Existing practice	Gap in adoption (F/P/N)	Reason for gap in adoption	Proposed extension strategy
1	**A. Induced breeding (Happa)**	Hormonal Injection				
	(i) Carp (IMC)		-	F	1,2,6,7	1,2,3
	(ii) Catfish		-	F		
	(iii) Prawn		-	F		
	B. Spontaneous breeding (common carp)		-	F		
2	**Nursery preparation**			P	1,2,6,7	1,2,6
	a Routine manuring					
	(i) Raw cow dung/Year	6 qt./ha	6 qt./ha	P	1,2,3,7	1,2,5
	(ii) Lime/Year	250-300Kg		P		
	(iii) Urea					
	(iv) SSP	10-20Kg		P		
	b Instant manuring				1,2,3,7	1,2
	(i) Inorganic fertilizer	Yes	Yes	P		
	(ii) Oil cake	Yes	Yes	P		
	(iii) Raw cow dung					
3	**Insect control**					
	(a) Manual					
	(b) Oil soap	Yes	Yes	N	-	-
4	**Spawn stocking**					
	(a) Single species					
	(b) Multi species					
5	Feeding schedule					
	(a) Oil cake	Intensive	Intensive	N	-	-
	(b) Rice bran	3-5%BDW	3-5%BDW	N	N	-
	(c) Green leaf (Grass Carp)	1-3%BDW	1-3%BDW	N	P	-
6	Disease	50%BDW	50%BDW	N	-	-
7	Rearing period	6-8 months	8-9 months	N	-	-
8	Method of harvesting	1 Yr Netting	6-10 months	P	1,2	1,2,3
	(i) Yield within 15 days (Recovery %) Spawn, Fry	40	25	P	1,2,3	1,2,3
	(ii) Yield within 30 days (Recovery %) Finger lings	25	15	P	1,2,3	1,3
	(iii) Yield within 45 days (Recovery % Finger lings)	15	10	P	-	-
9	Marketing	Pond Site	Pond Site	P	2	1,2,3
10	Production of fish (ton/ha)	15-18 t cat fish	12-15 ton cat fish	-	-	-

**** Reasons for gaps:**

1. 1ack of awareness
2. Lack of funds & facilities
3. Lack of tendency to adopt recommend practices.
4. Cumbersome leasing policy of the government
5. Lack of enough community water bodies
6. Inadequate availability of good quality of seed and fingerlings
7. Lack of fish feed production unit

***** Farmer proposed extension strategies:**

1. Awareness camps
2. Exposure visits.
3. Print & electronic media.
4. Entrepreneurship development for fish net production
5. Promotion of fish feed production
6. Hatchery Establishment

Table 51: Gap in adoption and proposed extension strategy for improving the productivity / income

Sl.	Item of package	Recommended practice	Existing practice	Gap in adoption (F/P/N)	Reason for gap in adoption	Proposed extension strategy
1	**Culture components**					
	(a) Indian Major carp	Catla, Rohu, Amur, Naini	Catla, Rohu, Naini,	N	-	-
	(b) Exotic carp	Grass, Common Carp	Comman carp	P	1,2,4	1,2,4
	(c) Prawn	-	-	-	-	-
	(d) Cat fish	-	-	-	-	-
2	**Pond preparation**					
	(a) Organic manure (kg/ha)	1250	600	P	1,2	1,2
	(b) In organic manure (kg/ha)	SSP 240	SSP 160	P	1,2	1,2
	(c) Bio-fertiliser (kg/ha)					
	(d) Lime (kg /ha)	300	60	P	1,2	1,2
	(e) Water depth (Mtrs)	1-1.5	1	P	1,2	1,2
3	**Weed control**					
	(a) Mannual	Manual	Manual	N	-	-
	(b) Mechanical	Mechanical	Mechanical	N	-	-
	(c) Chemical	Simazine / 2,4-D	-	F	1,2	1,2
4	**Stocking size / No./ha**					
	(a) Spawn	10,000-20,000	10,000-20,000	P	1,2	1,2
	(b) fry	10,000	6,000	P	1,2	1,2
	(c) Fingerlings	5,000	7,000	P	1,2,3	1,2,3
5	Feeding schedule					
	(a) Rice bran	3-5% BW	1-2% BW	P	1,2	1,2
	(b) Oil cake	3-5% BW	1-2% BW	P	1,2	1,2
	(c) Green leaf (Grass carp)	50% BW	10% BW	P	1,2	1,2
6	Sample netting					
	Monthly	Quarterly to assess growth	-	F	1	1
	Quarterly	During morning hours churning of mechanical	Not Practice	F	1	1
	Half yearly					
7	Aeration	-	-	-	-	-
8	Disease	Cifax Acrafalavin	KMnO4, CaCO3	N	-	-
9	Harvesting method	Netting	Netting	-	-	-
10	Culture method	Intensive and Poly	Intensive and Poly			
11	Average yield (ton / ha)			P	1,2,3,4	1,2,34

** Reasons for gaps :

1 Lack of awareness

2 Lack of fund and facilities

3 Team of anti social element and loss

4 Non-availability of exotic seed.

5 Due to mortality & sale fingerlings.

*** Farmer proposed extension strategies

1 Training, Demonstration and exposure visit

2 Linkage with financial institutions

3 Need of social awareness and insurance.

4 To ensure quality seeds (Fingerlings)

Table 52: Proposed strategy for promoting integrated nutrient management

Cropping system/sequence- Present crop: Paddy, Previous crop: -, **Next** crop:						
Name of crop under study: **Paddy**, District: -Rohtas, Name of agro-ecological situation: All						
Moisture condition: Irrigated/Rainfed						
Sl.	**Particulars**	**Existing practice**	**Recommended practice**	**Gap in adoption**	**Reasons for gap**	**Proposed strategy**
1	**Soil Testing / Soil Health Cards**	Nil	Soil Testing	F	A, E	A-D
2	**Use of manure (T/ha)**					
	FYM	0.5	15	P		
	Compost/ Vermi-compost	-	1	F		
3	**Basal dose (kg/ha) of major fertilizers**					
	N	35	50	P		
	P	35	40	P		
	K	-	20	F		
4	**Top dress (kg/ha)**					
	N	55	50	P		
5	**Use of micro-nutrients (Kg/ha)**					
	ZnSo4	-	25	F		
6	**Cultivation of legume**					
	- As rotational crop	-	1:1	F		
	- As inter crop	-	Recommended	F		
	- As green manure	-	Recommended	F		

**** Code for reasons for gap in adoption**
A. Lack of awareness
B. Other farmers follow it
C. High residual effect of fertilizer from previous crop
D. Fear of loss of yield.
E. Lack of finance

***** Code for proposed strategy**
A. Mass media
B. On farm trial.
C. Training demonstrations
D. On farm trial / demonstration
E. Linkage with credit institutions
F. Any other (specify)

Table 53: Proposed strategy for promoting integrated nutrient management

Cropping system/sequence- Present crop: ---, Previous crop: --, Nextcrop:						
Name of crop under study: **Wheat**, District: -Rohtas, Name of agro-ecological situation: All						
Moisture condition: Irrigated/Rainfed						
Sl.	**Particulars**	**Existing practice**	**Recommended practice**	**Gap in adoption**	**Reasons for gap**	**Proposed strategy**
1	**Soil Testing / Soil Health Cards**				A, E	A-D
2	**Use of manure (T/ha)**					
	FYM	3 Tons/ Ha	15-20 Ton/Ha	P		
	Compost/ Vermi-compost	30 Tons/ Ha	40 Tons/ Ha	P		
3	**Basal dose (kg/ha) of major fertilizers**					
	N					
	P					
	K					
4	**Top dress (kg/ha)**					
	N	25	40	P		
5	**Use of micro-nutrients (Kg/ha)**					
	ZnSo4	Nil	-	N		
	-					
6	**Cultivation of legume**					
	- As rotational crop					
	- As inter crop					
	- As green manure					

**** Code for reasons for gap in adoption**
A. Lack of awareness
B. Other farmers follow it
C. High residual effect of fertilizer from previous crop
D. Fear of loss of yield.
E. Lack of finance

***** Code for proposed strategy**
A. Mass media
B. On farm trial.
C. Training demonstrations
D. On farm trial / demonstration
E. Linkage with credit institutions
F. Any other (specify)

Table 54: Proposed strategy for promoting supply of seed and its multiplication

Sl.	Source of seed of preferred variety/ hybrid	Quantity of seed used (of preferred variety) (Q)	Area sown (ha)		Quality of seed of preferred variety (G/A/P)*
			Preferred variety	Other varieties	
AES-I, II, III	**Purchase from outside:**	-	-	-	-
	From Private dealer	-	-	-	-
	From public sector	-	-	-	-
	Use of self-produced seed:	-	-	-	-
	From own field	-	-	-	-
	From others field	-	-	-	-
	Any other	-	-	-	-
	Total	-	-	-	-

Table 55: Proposed strategy for promoting preferred horticultural planting material

Sl.	Source of preferred planting material	Quantity of Planting Material used (Nos.)	Area sown (ha) under the crop		Quality of seed of planting material required
			Variety 1	Variety 2	
AES-I, II, III	**Purchase from outside:**	-	-	-	-
	From Private Nursery	-	-	-	Good
	From public sector	-	-	-	Good
	Self-produced seed:	-	-	-	-
	From own field	-	-	-	-
	From others field	-	-	-	-
	Any other	-	-	-	-
	Total	-	-	-	-
* G=Good A= Average P = Poor			-	-	-

Table 56: Proposed strategy for promoting success stories and its replication

Title of success story	Whether it shall spread on its own (Y/N)	Reasons behind non-adoption of successful technology *	Type of recommendation domain	Proposed strategy **
Mixed Farming (Fisheries + Horticulture) Animal Husbandry	Yes	Awareness & Training	Awareness, Training given by ATMA & Fisheries Dept. Exposure Visit	Replication Regular Training

Table 57: Proposed strategy for management of land and water resources

Sl.	Problems	Severity of problems (H/M/L)	Units affected	Root cause of the problem	Proposed technological / management solutions
AES-I, II, III	**Degradation of private land resource**	L			1. Upgradation of soil health 2. Popularization of organic farming technologies 3. Recognize the link between farm forestry and farm viability 4. Develop appropriate link with government and or industry 5. Group facilitation and Improvement 6. To apply in field gypsum pyrite, lime etc. 7. Use green manure bio fertilizer etc. 8. Use horticulture plant like hedge. Planting of tree etc.
	Fallow land	-			
	Gully courses				
	Rill erosion	L			
	Salinity/alkalinity/acidity	L			
	Perennial weed	L			
	water logging	L			
	Cultivated land	L			
	Degradation of common land resource	H			
	Gully erosion	L			
	Destruction of tree component	L			
	Loss of surplus run off from the village	L		-	

Table 58: Issues for policy consideration in agriculture

Sl.	Issue / problem	Proposed policy intervention	Modality for implementation	Concerned AES
1	Small and fragmented land holdings	Legislative measures for prevention of further fragmentation and conversion toward non- agriculture purposes. Market oriented integrated farming system approach to make hest use of resources at farm level.		All
2	Depleting soil fertility	Propagation of INM green manuring & IPM to avoid excessive dependency on chemicals.		
3	Non-Judicious Use of fertilizer & chemicals	Soil testing labs at block level. Timely and balanced dosages		
4	Increased incidence of developing resistance in weeds, insects, pest.	INM, IPM, adoption of suitable of practices and crop/varieties selection		
5	Non – availability of quality planting materials.			
6	Functioning of state govt. poultry farms	Functional and training programme should be developed further farmers' technical financial capability		
7	Post harvesting handling	Facilities at farm/local level		
8	Marketing of agricultural product.	Promotion of FPOs		

Recommendations

The Rohtas district's Agricultural Technology Management Agency (ATMA) serves as an independent entity dedicated to facilitating extension services to the farming community. The ATMA operates under the guidance of a Governing Board, which determines the overarching policy framework, with operational support from the District ATMA Cell comprising the Project Director, Deputy Project Directors, and other personnel. The ATMA Management Committee executes the plan, while the District Farmers Advisory Committee offers essential farmer feedback for district-level planning and execution. As the district-level nodal agency, ATMA is entrusted with managing the agricultural extension system, which includes the creation of a Strategic Research and Extension Plan (SREP).

At the block level, ATMA's efforts are supervised by a Block Technical Manager and an Assistant Technology Manager, whose roles include the provision of extension services in agriculture and related sectors, tailored to each block's specific needs. The SREP for the Rohtas district is devised in collaboration with numerous stakeholders, including line departments, the Krishi Vigyan Kendra (KVK), the Minor Irrigation Department, NABARD, the Animal Husbandry Department, the Fisheries Department, Panchayati Raj Institutions (PRIs), the private sector, farmers, and others.

The SREP is a multi-purpose tool providing a comprehensive overview of the district's agricultural sector, highlighting potential challenges and opportunities, aiding in strategic long-term planning, and ensuring stakeholder participation in the development process. It also helps amalgamate and restructure ongoing developmental programs to maximize farmers' benefits, underpins each block's annual action plans, and fosters the advancement of farmer-centric, market-oriented extension research management systems.

The SREP, which is updated every five years, forms the groundwork for Block Action Plans, which are then consolidated at the district level to formulate District Agriculture Action Plans. These, in turn, are integrated into the Comprehensive District Agriculture Plans under the Rashtriya Krishi Vikas Yojana and are further consolidated into State Extension Work Plans and State Agriculture Plans.

Strategizing for extension and research in each Agro-Ecological Situation is vital for agricultural planning. These strategies are crafted with inputs from line departments, KVK scientists, agricultural extension workers, and TRUAGRICO consultants, and they aim to address strategic issues related to extension and research. In formulating these strategies, a range of factors is considered, including:

- Diversification and intensification of existing farming systems to maximize productivity and income.
- Improvement of productivity/income from various enterprises/commodities in existing farming systems while ensuring the sustainability of natural resources.
- Sustainability of the production system to balance productivity with environmental conservation.
- Capacity building of all stakeholders in the agricultural sector.
- Integration and alignment of ongoing schemes of agriculture and other departments and research institutions.
- Promotion of market-led extension for enhancing profits and promoting innovative post-harvest technologies.
- Adoption of digital technologies to improve communication and decision-making processes.
- Promotion of Public-Private Partnerships for improved service delivery, innovation, and resource mobilization.
- Strategies to address gender inequalities and promote active participation and empowerment of women in the agricultural sector.
- Additional strategies to address unique challenges or opportunities in specific agro-ecological situations or areas.

Recommendations for Agricultural

The Participatory Rural Appraisal (PRA) conducted across three Agro-Ecological Situations (AES) in Rohtas district highlighted several issues in the cultivation of wheat, maize, pulses, and oilseeds. These challenges affect the quality, yield, and sustainability of the crops. Insights from the PRA suggest potential extension strategies to improve agricultural productivity.

In the case of wheat farming, problems like untreated seeds, delayed sowing, and imbalanced fertilizer application were noted. Extension strategies such as endorsing seed treatment, advocating for zero-tillage and suitable varieties for late sowing, and balanced fertilization according to established practices can help mitigate these issues. Also, advocating for seed-cum-fertilizer drills can assist farmers with both sowing and fertilizer application methods. Further, promoting the use of recommended weedicides and organic manures, like PSB, Azotobactor, green manuring, vermicompost, and FYM, can enhance overall crop health and yield.

Maize farming faces hurdles such as imbalanced fertilizer use, pest management, low plant population, and weed control problems. Extension strategies to mitigate these include promoting Integrated Nutrient Management (INM) and Integrated Pest Management (IPM), endorsing optimal plant population, and supporting Integrated Weed Management (IWM), including chemical weed control. Additionally, raising awareness about Quality Protein Maize (QPM) and encouraging intercropping in maize can enhance yields and crop diversity.

Pulse farming suffers from imbalanced fertilizer use, non-use of biofertilizers, inadequate pest and disease management, and poor uptake of improved varieties. Extension strategies to address these include endorsing the use of recommended fertilizers, promoting the application of Rhizobium and PSB culture, supporting integrated pest and disease management, and popularizing improved varieties. Encouraging farmers to grow pulses in rice fallow areas and promoting proper drainage techniques can also contribute to increased productivity and efficient land use.

Oilseed farming is impacted by imbalanced fertilizer use, non-use of biofertilizers, poor pest and disease management, and low adoption of improved varieties. Extension strategies include promoting the recommended fertilizer dosage, encouraging the use of rhizobium, vermicompost, and PSB culture, supporting integrated pest and disease management, and popularizing improved varieties. Additionally, educating farmers about the benefits of using apiary boxes in mustard fields can enhance pollination and crop yields.

Recommendations for Horticultural

The field study identified several gaps in the cultivation of peas, beans, bulb crops, spices, mangoes, vegetables, and post-harvest management. Extension strategies have been proposed to address these challenges.

Pea and bean farming lack seed treatment adoption, adequate pest and disease management, and low adoption of improved varieties and recommended practices. Extension strategies could include promoting the use of recommended seed treatment methods, endorsing Integrated Pest Management (IPM) and Integrated Disease Management (IDM), advocating for the use of quality seeds for higher yields and income, and encouraging the adoption of the Package of Practices (POP).

For bulb crops like onions and spices such as turmeric, ginger, and coriander, the gaps include non-adherence to recommended practices, non-availability of recommended varieties, and inadequate pest and disease management. Proposed strategies include promoting the adoption of POP, encouraging quality seed production, and popularizing the adoption of IPM and IDM. For onion cultivation, endorsing Integrated Weed Management (IWM), including chemical weed control, is also essential.

Recommendations for Animal Husbandry

The field survey undertaken in the Rohtas district for the livestock and dairy sector pinpointed key shortcomings in several facets of animal management for cows, buffaloes, and goats. A variety of extension strategies have been suggested to tackle these issues.

Regarding cows, the incomplete adoption of artificial insemination (AI) is a significant issue. Suggested measures include enhancing awareness about AI using multimedia tools, bolstering the presence of technical staff, providing refresher courses for technical staff, improving the accessibility of semen, storage and transportation amenities, conducting fertility enhancement camps, and offering training to para-vets. Moreover, the gaps in the adoption of high-quality feed and fodder, supplying minerals and vitamins, and managing intercalving periods can be addressed through educational programs emphasizing animal production capacity, dairy economy, and the significance of supplying minerals, vitamins, and maintaining "a calf a year" as an objective.

Regarding cows' healthcare management, enhancing awareness programs about animal health, cleanliness, and vaccination, as well as ramping up the conduction of animal health camps and mass deworming programs, will be beneficial. Enhancing the capabilities of technical staff at disease diagnostic labs at the block level can also contribute to better healthcare results. Moreover, addressing the partial gap in average milk yield can be accomplished through spreading awareness about improved dairy management and economics.

For buffaloes, improving the breed through artificial insemination, managing feed, and intercalving periods can be improved with awareness initiatives, training, and field visits. Organizing fertility improvement camps and buffalo calf rallies can also be beneficial. Regarding healthcare, encouraging the adoption of a deworming schedule can be accomplished through awareness initiatives and holding deworming camps.

For goats, a considerable gap in adopting improved breeds can be addressed through awareness initiatives, training, field visits, and providing improved varieties of male goats appropriate for the area. Feed management can be enhanced by providing educational programs about the feed and fodder requirements for goats and intensifying the supply of fodder and multipurpose tree seeds. Finally, for goat healthcare, imparting knowledge about the importance of deworming and ectoparasitic control and organizing healthcare camps can help improve overall goat health and productivity.

By implementing these extension strategies, the Rohtas district can improve the productivity and profitability of its animal husbandry and dairy sector, benefiting both livestock and farmers in the area.

Recommendations for Fish Production System

The field survey undertaken in the Rohtas district for the fisheries sector pinpointed several crucial gaps that impede the growth and development of this industry. Various extension strategies have been proposed to tackle these challenges.

Firstly, there is a knowledge gap about the physicochemical parameters of soil and water in fishponds. Building awareness about these parameters is crucial for maintaining a healthy environment for fish growth. Educational initiatives and training sessions can be organized to educate farmers about these parameters and how to monitor and manage them.

Secondly, incorrect stocking measures are common in the district. Encouraging proper stocking measures is crucial to ensure optimal fish growth and prevent overcrowding. Extension services can provide guidelines on appropriate stocking densities and offer training on best practices for various fish species.

Moreover, there is a lack of awareness about composite fish farming. Building knowledge about this farming method can help farmers diversify their fish production, optimize the use of available resources, and enhance overall productivity. Training initiatives and field demonstrations can be organized to teach farmers about the benefits and techniques of composite fish farming.

Non-scientific feeding is another problem that negatively impacts fish growth and productivity. The promotion of scientific feeding methods through training and educational initiatives can help farmers understand the nutritional requirements of their fish, ensure proper feeding schedules, and ultimately increase productivity and profitability.

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