Research Repository of ICAR-ATARI Zone-IV Patna

EXTENSION MODELS			
S.No	**Title**	**Category**	**Brief description**
1.	**Rohtas Straw Baling Model (RSBM) for Crop Residue Management**	Extension Model	KVK Rohtas developed Enterprise-Based Extension Model to utilize the paddy straw into bales using baler machine provided by KVK on CHB to farmers and these bales are locally procured by milk cooperatives and private companies for animal feed block and bioenergy production. The model proven cost-effective for farmers, with additional income generated from selling straw, and for agri-preneurs engaged in straw collection. Results indicates that an average of 14 quintals of paddy straw is collected from one acre, incurring a total cost of Rs. 2600/acre, while the average profit from selling paddy straw amounts to Rs. 1720 per acre. The total value of collected straw on-site is Rs. 2/kg, while the total cost involved is Rs. 1.6/kg. The State Agriculture Department tool policy initiative and stated the scheme for Special Custom Hiring Centre (SCHS) including Baler Machine to motivate more farmers to adopt and use this technology and leave the malpractice of parali burning.
2.	**Waste to Wealth based Agripreurship Model for Banana fibre**	Extension Model	The technology is outcome of ARYA project, perceived self-employment generation among rural youth & women in the prospective of livelihood promotion through bio-eco-friendly Agricultural Waste Management i.e., Banana waste. KVK Vaishali started work in the year 2019 through ARYA project. KVK registered five self-help group through ATMA, Vaishali. In each SHG KVK provided banana fibre extraction machine. Rural youth started fibre extraction and women starting craft making. They are getting Rs. 40-45 lakh annually and women are earning Rs. 6000-8000 monthly at village level. This module utilized waste banana in rural areas. At present farmers are producing banana fibre, banana extract as a foliar spray of potassic fertilizer, banana vermicompost and

			their crafts.
3.	**Community Based Animal Health Care Model**	Extension Model	The CAHC Model was conceived by KVK Banka under TSP project for the tribals of Bihar who are mainly depends on livestock for their livelihood and have inadequate access to veterinary health services. The CAHC were established in three tribal dominated villages of Banka district (Bihar) which were operated by trained and certified local youths. Under this model community members, usually livestock keepers, selected by their own community with the collaboration of private veterinary doctors, the public veterinary service and supporting bodies (KVK) were trained as Community Animal Health Workers (CAHCWs) to perform basic animal health and animal husbandry-related tasks in their localities. The success and popularity of the Model shown by a remarkable 79.71 percent reduction in the average cost paid per visit to veterinary service providers, 44.92 percent decrease in average transportation charges incurred by livestock owners seeking animal health services, 4.7 percent increase in the average number of free animal health services received in the last year. Lastly the local community members are empowered to diagnose and treat minor health concerns in animals without the need for extensive travel or expensive veterinary visits.
4.	**Low-Cost Local Resource based Organic Farming technology for Chotonagpur Plateau area**	Extension Model	This technological model is designed to address the agrarian challenges of small and marginal farmers in Jharkhand's Chota-Nagpur Plateau by enabling a low-cost, self-sustaining organic farming system. It leverages locally available natural resources, especially cow dung, cow urine, and biomass, minimizing dependency on commercial inputs. The model consists of different organic liquid manures and pesticides like, Shashyagavya, Sanjivani, Dashparni, Kunapajala etc. Products like Beejamrit & Jeevamrit were also included. Construction of animal shed floor (150 sq. feet) in every beneficiary's house for efficient collection of urine, dung and waste fodder to be used as main ingredient for preparation of liquid manure and bio pesticides. 10 plastic drums (720 litre) for preparation of organic liquid manure and bio-pesticide to every farmer which is sufficient for cultivation of

			crops in about in the 10-acre area. After validation over 5 years at Divyayan KVK, Ranchi and Field-tested under NABARD project in Dhurleta village. 13 clusters (750 acres, 510 farmers) have now adopted this model. Soil sample report also tested for ICAR-Research Institute for verifying the nutrient content of the soil after the intervention. Dhurleta recognized as Jharkhand's First Organic Village. This model approach enhances soil health, crop yield, and farmer profitability over time, while promoting agro-ecological sustainability.

FARMER'S INNOVATIONS

S.No	Name of Innovation	Farmer's Name	Brief Description
1.	Need-based Modifications in Zero Tillage Machine for Sowing in Ploughed Field	Md. Qamar Tauhid KVK Banka	The modifications allow the Zero Tillage Machine to function effectively in both ploughed and unploughed fields, significantly broadening its scope of use. This simple, low-cost, and farmer-friendly innovation ensures easy adoption at the local level and represents a practical, need-driven solution to real-world agricultural challenges. Highly economical, cost Rs. 4,500/ha for sowing, compared to Rs. 11,000/ha with traditional methods. Saves approximately Rs. 6,500/ ha in sowing cost. It is also fuel and time saving in comparison to traditional method. The cost of machine is Rs. 40,000 which is much lower than the commercial models which have price above Rs. 75,000. Increases the versatility and utility of existing Zero Tillage Machines, allowing farmers to use one implement for more field conditions; Saves the cost of purchasing additional sowing machinery. Reduces time and labour requirements for sowing, since equipment need not be switched between tools suited specifically to ploughed or unploughed fields. Enhances efficiency in crop establishment, potentially leading to more timely sowing and improved yields.
2.	Modified Low-Cost Betel Vine Shade House	Shri Shyam Sundar Kumar KVK Gaya	The structure is designed to maintain ideal microclimatic conditions such as adequate humidity, filtered light, and proper soil moisture—crucial for the delicate Magahi betel vine. The shade house is 2-2.5 m high and provide slope for run-off and provide 30-35% shade. It also plays a crucial role in protecting

			the crop from leaf burn, black spot disease, and environmental stress, thereby enhancing the quality and yield of betel leaves. Moreover, high density planting at 30cm apart which also suppress weed growth. In modified shade farmers harvest 100 leaves whereas in normal 20-25 leaves each wine. Use of locally available, eco-friendly materials bamboo and dry grass (Jhalasi) able to provides protection from heatwaves, excessive rain, and frost; Maintains humidity and shade, critical for betel vine growth of shoot and new leaves; Sustainable and low-cost solution for small and medium betel vine growers/farmers; and Improves resilience and supports continuous harvesting. Higher leaf productivity inside the modified structure with reduced disease incidence only 5-10%.
3.	Grading of Makhana pop through an indigenous grader	Shri Amit Kumar KVK Supaul	Grading of Makhana pop using indigenous grader, a unique specialized equipment. It sorted and grade makhana (fox nuts or Euryale ferox) into different grades or sizes as per APEDA norms. Grading is important step in makhana processing because it saves labour cost. The machine operates using a series of vibrating or rotating sieves with varying mesh sizes; raw makhana is fed from the top and, as it moves over the sieves, it is separated by size, with clean, graded makhana collected in separate bins. The capacity of the machine ranges from 50 kg/hour for small units to 500–1000 kg/hour for commercial units.
4.	helf-life Enhancement of Litchi Frui	Shri Bhola Nath Jha Muzaffarpur	Litchi, a delicate and highly perishable non-climacteric fruit, tends to lose its attractive appearance soon after harvest, primarily due to browning of the peel and the onset of microbial growth, both of which significantly reduce its market value and consumer appeal. Applying a glucose solution coating forms a protective layer over the fruit's surface, which helps slow down discoloration, inhibits microbial incidence, and thereby extends the shelf life, allowing for longer storage, better transportation, and improved marketability. Glucose treatment plays a vital role in supporting the fruit's natural metabolism, maintaining cell turgor pressure, reducing the accumulation of reactive oxygen species (ROS), and preserving anthocyanin pigments that contribute to the bright red colour of the litchi peel. This treatment also helps extend the shelf life by preventing common postharvest problems such as shrivelling, micro-cracking, and premature senescence. In practice, freshly harvested litchi bunches are

			dipped in a 5% glucose solution to form a protective coating, and then covered with a layer of cotton to minimize moisture loss, protect against physical damage, and further slowdown the deterioration process during storage and transportation.
5.	o-friendly bait for Fruit Fly	Shri Amarjeet Kumar Sinha	Low-cost fruit fly management technique for mango, guava, and other soft fruits involves preparing a bait using overripe bananas with a few drops of Nuvacron, placed inside half-cut waste plastic bottles. These bait stations are then hung on trees. The bait attracts and traps fruit flies within hours. It remains effective for 6–7 days, significantly reducing fruit fly populations and preventing crop damage. Easy preparation method, no sophisticated skill is required, very cheap and highly effective and reducing fruit fly infestation to a larger extent thereby farmers getting higher marketable yield. This bait is easy to prepare and easy to install no sophisticated skill is required. Only 2-3 rupees par bait cost is involved. Cost involved per ha is only Rs. 400- 450. But the cost involved in readymade trap is about Rs. 2000 per ha. If chemical method is taken into account the total cost incurred will be more than Rs. 2000.0 and that will not be safe for environment and human being. About 90% reduction in fruit fly infestation in orchard was observed which reflects the significance of innovation.

EXTENSION APPROACHES

S.No	Name	Category	Brief description
1.	**Revitalization and integration of indigenous scented rice Bhutku and Tulsi Mukul to low land areas of Ranchi**	Agricultural Extension Approach	A baseline survey conducted by KVK, Ranchi (2013–2016) under the PPVFRA programme identified 159 indigenous rice varieties with unique traits. From these, 10 scented varieties were evaluated through multi-location on-farm trials for commercial potential. Based on yield, aroma, lodging resistance, and farmer preference, Bhutku and Tulsi Mukul rice varieties were identified as the most promising. KVK developed an improved organic cultivation package and provided quality inputs like organic seed, liquid manure, and bio-agents. Farmer trainings, awareness programmes, and field days promoted indigenous scented

			rice cultivation. A producer's group was formed for seed production and participatory area expansion. KVK ensured seed storage and marketing linkages, resulting in an increased B:C ratio from 1.46 to 2.01. Product promotion activities further enhanced consumer demand and farmer income while conserving traditional rice biodiversity.
2.	**Sand Bag Check Dam (Bora Bandh): A Community-Led Approach for Sustainable Water Conservation in Rainfed Agro-Ecosystems**	Agricultural Extension Approach	KVK Gumla promoted the Bora Bandh technology as a community-led approach for sustainable water conservation under the NICRA initiative. This intervention involves constructing low-cost check dams using sand-filled cement bags strategically placed across seasonal streams to harvest runoff water. Implemented through participatory approaches, the technology significantly enhances groundwater recharge, reduces soil erosion, and improves irrigation potential in rainfed areas. The initiative effectively addresses the challenges of water management in plateau ecosystems, while also demonstrating how low-cost, climate-resilient technologies can offer sustainable environmental benefits and enhance agricultural productivity. Recognizing the success and scalability of this intervention, state policymakers have supported its replication across distress-prone blocks of Jharkhand, allocating ₹25,000 per block for the procurement of cement bags to facilitate widespread adoption and long-term sustainability.
3.	**Mitigating greenhouse gas emissions through sustainable crop rotation and tillage interventions: a research perspective**	Agricultural Extension Approach	This extension approach integrates conservation tillage, alternative crop establishment methods, and efficient resource management practices. Field research was conducted over three years to evaluate five scenarios of tillage and crop establishment. The study demonstrated significant outcomes under conservation agriculture-based practices, including a 15–18% increase in rice yield, 20–25% improvement in wheat yield, and enhanced green gram productivity. Irrigation requirements were reduced by 24.76%, while global warming potential decreased by 23.46%. Soil health indicators, such as organic matter content and earthworm populations, also showed improvement contributing to long-term sustainability. The adoption of techniques like zero

			tillage, direct seeding, and residue retention enhanced energy efficiency by 32.16% and significantly reduced production costs. These practices not only increased profitability but also promoted environmental conservation by reducing greenhouse gas emissions and improving soil carbon sequestration.
4.	**Green Gold: A Bamboo-Based Entrepreneurship Model for Sustainable Rural Development**	Agricultural Extension Approach	The Bamboo-Based Entrepreneurship Model was conceptualized and implemented to promote sustainable rural livelihoods through resource-based enterprise development. Under the National Bamboo Mission, a Hi-tech Bamboo Nursery, Treatment Unit, and Common Facility Centre (CFC) were established at KVK, Piprakothi. Technical guidance from the Cane and Bamboo Technology Centre (CBTC), Assam, ensured the adoption of scientific bamboo treatment and processing methods, significantly improving the durability and market value of bamboo products. This model facilitated capacity building and enterprise development in areas such as furniture, handicrafts, utensils, and textiles, particularly engaging rural youth and women. A total of 65,000 bamboo seedlings were raised and distributed through the Hi-tech Bamboo Nursery, generating ₹2.95 lakh in revenue. Around 1500–2000 bamboo culms/ha are harvested annually after the sixth year. Economic returns from bamboo cultivation begin in the fourth year at approximately ₹1.4 lakhs/ha, rising to ₹1.67 lakhs/ha by the sixth year. Over a 10-year cycle, the cumulative net income is estimated at ₹ 10 – 15 lakhs/ha, demonstrating long-term profitability and sustainability.
5.	**Millet Based Entrepreneurial Model: Linking Farmers to Markets through Value Chain Innovation**	Agricultural Extension Approach	KVK Piprakothi took significant steps toward the production and promotion of millet-based value-added products. The Food Processing Unit developed a series of gluten-free, nutrient-rich products like Biscuit, Namkeen and Ladoo. These healthy alternatives to market-available biscuits and snacks were developed to utilize local millet varieties and promote better dietary practices. The unit secured FSSAI License No. 104230700000279, ensuring regulatory compliance and enhancing consumer trust. To disseminate this technology at the grassroots level, KVK Piprakothi adopted a decentralized model focusing on the mobilization and skill development of farm women and SHGs. Through 48 training programs, a total of 1177 beneficiaries were trained in millet value addition techniques. This initiative not only improved the livelihood

			opportunities of rural women but also created awareness about the commercial potential of millets.

DIGITAL TOOLS

1.	**ATARI AMS (Access Management System)**	Digital Tool	This digital was developed by ATARI Patna to facilitate huge data access and identity management for KVKs. It ensures effective implementation and monitoring of various activities and programs. It assesses the long-term impact of different programs through Perform data analysis and interpretation. In this way it is a scalable and secure software to operate more efficiently by decreasing the effort, time and money that would be required to manually manage access to their networks.
2.	**Unique E-Certificate Generation and Centralized Digital Training Database Management for KVKs**	Digital Tool	The digital tool was developed by ATARI Patna as The Unique E-Certificate Generation and Centralized Digital Training Database Management for KVKs is a digital solution designed to streamline the planning, execution, and management of training programs organised by KVKs. It offers an integrated platform to automate participant registration, monitor performance, and generate e-certificates, ensuring a seamless training process from start to finish. The system provides a centralized database for storing and managing training-related data, including participant demographics, course materials, feedback, and progress tracking.

PROCESSED PRODUCTS

S.No	Name of the Institute	Name of Technology	Berif Description	Photographs

1.	KVK Ranchi ICAR-ATARI Patna	**Nutrient-dense Ragi Ladoo**	Nutrition dense food is the current interest of the society due to the increase in disease condition and changes in life style in present generations. Development of nutrient dense Ragi laddoo was done by processing ragi (finger millet) with other ingredients such as sugar, ghee, and nuts (optional) into various combining. Three trails were undertaken to standardize Nutrient dense ragi laddoo. The product was evaluated by the sensory evaluation technique with the selected panel members. The five-point hedonic scale was used for the development of score card for various sensory characteristic like appearance, taste, color, texture, flavor and overall acceptability. KVK Ranchi provided training technical support for marketing of ragi to how to facilitate the production in the market.	 
2.	KVK, Piprakothi, East Champaran ICAR-ATARI Patna	**Millet based Products**	KVK Piprakothi took significant steps toward the production and promotion of millet-based value-added products. The Food Processing Unit developed a series of gluten-free, nutrient-rich products like Biscuit, Namkeen and Ladoo. These healthy alternatives to market-available biscuits and snacks were developed to utilize local millet varieties and promote better dietary practices. The unit secured FSSAI License No. 104230700000279, ensuring regulatory compliance and enhancing consumer trust. To disseminate this technology at the grassroots level, KVK Piprakothi adopted a decentralized model focusing on the mobilization and skill development of farm women. Three SHGs are preparing and marketing their millet-based products like Finger millet flour, Finger millet laddu, multi-grain flour	

3.	KVK, Piprakothi, East Champaran ICAR-ATARI Patna	**Jaggery Products**	There comes the quintessential need for production and processing of jaggery in scientific manner so that it gives maximum returns. This technology derived from IISR-Lucknow was needed to be disseminated to the farmers, which was achieved through training of the Farmers Producers Company and production of processed and packaged jaggery. The FPOs formed by KVK Piprakothi were trained for production, processing and packaging of Barfi shaped Jaggery. Moreover, flavoured jaggery is also produced and marketed by the FPOs as 1.Ginger Flavoured Jaggery 2.Fennel Flavoured Jaggery 3.Giloy Flavoured Jaggery 4.Dry Fruits Flavoured Jaggery 5.Barfi shaped Plain Jaggery The FPOs associated with sustainable production of processed Jaggery were trained and mobilized through continuous technological trainings. Piprakothi Agro Producer Company is now a leading FPO in production of Processed jaggery	
4.	KVK Dhanbad ICAR-ATARI Patna	**Maize based Food Enriched Snacks for Adolescents**	The snacks are made up of Madua flour, roasted green gram flour, Jaggery, groundnut roasted, with cup of milk and usual diet. It was tested by organoleptic test of different three panels of Scientists, farmwomen/mothers & adolescents before starting in their daily diet. Technology transferred to ICDS, Dhanbad as supplementary snacks for adolescents to prevent anaemia. Provided livelihood to more than 400 women and girls of Tejaswini of ICDS through low-cost nutritious millet based enriched food production and popularised at district level mela etc	

				
5.	KVK Gumla ICAR-ATARI Patna	***Asparagus racemosus* (Satawar) Jam**	Satawar has good medicinal properties like anti-oxidant, anti-aging, promotes reproductive health, rich on folic acid and Vitamin K. In Gumla District, Satawar is locally available in large amount but there was no work on value addition of Satawar was taken place. The technology of jam includes Satawar Pulp: 1 kg Sugar : 750 g Water : 500 ml Pectin: 12 gm Citric Acid: 5 gm The Satawar jam is good for health and it is considered as a good enterprise for the SHGs. Registration of Food Processing Unit of Vikas Bharti Bishunpur has been done with the name of Vikas Mahila Swalamban Nyas under FSSAI. About 10 to 15 quintals of Satawar Jam are manufactured every year by the organization. The jam is packed in 200 and 500g glass bottles and labelling are done properly and price of Rs.200 per Kg. The packed products are sold across the state with the help of grocery shops, SHGs and outlets of Vikas Bharti.	  

6.	KVK Vaishali ICAR-ATARI Patna	**Multigrain weaning mix**	Processing and formulation of germinated weaning food from locally available grains like Wheat, Maize, Ragi and Moong were washed separately soaked in potable water for overnight. The remaining water was drained out and soaked grains were tied in wet muslin cloth separately and allowed for 24 hours for germination at room temperature. After 24 hours, the germinated Wheat, Maize, Ragi and Moong were rinsed with potable water and then dried at 55-60o C. Then, sprouted grains were roasted separately under low flame (70-80o C) to give a pleasant flavour and the roasted samples of Wheat, Maize, Ragi and Moong were into fine powder in an electric grinder and sieved by 80-100 mesh and then stored in plastic containers for further use. The developed multigrain weaning mix is low-cost product (price Rs.5 per 100 gm) as compared to commercial food Cerelac. Technology transferred to Director ICDS, govt. of Bihar under ICDS Project-Supplementary programs for malnourished children of district.	 

WASTE TO WEALTH TECHNIQUES

S.No	Name of products	Name of organisation	Brief Description
1.	Handicraft from Paddy Waste	KVK Jehanabad	Making useful marketable Handicrafts from Crop wastes (Paddy Straw) at KVK Jehanabad Enterprises initiated: Started since 2002 (Natural fibres art) Innovations adopted in enterprise, if any: Scenery & handicraft of paddy straw Technologies modified if any: Hot iron pressed on cut straw for spreading

2.	Herbal Gulal	KVK Smastipur, KVK Dhanbad	Eco- Friendly Herbal Gulal were prepared from flowers waste like marigold, parijat, tesu etc, waste beetroots collected from evening hats, small turmeric peels and leaves like mehndi, neem sadabahar etc. In earlier times when festival celebrations were not so much commercialized, holi colours were prepared from the flowers of trees that blossomed during spring, such as Indian corol tree Parijat also known as "Night Flowering Jasmine" and the flame of the forest – kesu also known as "Palash" both of which have bright red flowers.
3.	Organic waste based Vermicompost Technology	KVK Rohtas	The KVK Rohtas has two vermicompost units' of 1200 square feet dimension producing 12-14 ton vermicompost in one year by the use of 15–19-ton crop residue, dung & other biomass. The KVK earns an annual income of Rs. 72000 – 84000 by selling compost @ Rs.6/Kg. and also earns upto Rs. 60000 – 80000 by selling of worms @Rs.500/Kg.