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RESEARCH ARTICLE :

Social and economic empowerment of farm women in banana fibre based entrepreneurship for sustainable income

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SUMMARY : Banana is an important crop of world and India with 7.1 lakh ha area is under banana and fruit production of 26.2 million MT contributing 14.7 per cent of world production Apart from fruit, banana crop also generate huge quantity of biomass in the form of pseudostem, leaves, suckers *etc*. and this biomass mostly pseudostem is absolute waste in most of the states of India and Bihar in particular. Banana is cultivated in about 29 thousand ha in the Vaishali district of Bihar with an average yield of 412 q/ha. With the sizable area under banana (0.61 lakh ha) cultivation in Bihar, it is important to develop and popularize different value added products from banana pseudostem. After harvesting of fruits and leaves, pseudostem is cut near to the ground level and its yield ranges from 60 to 80 t/ha. Developing value added products from banana pseudostem is restricted mainly to fibre extraction and handicrafts making at national level. In the process of fibre extraction other components obtained simultaneously. These components are fibre (about 600 kg/ha), scutcher (30 to 35 t/ha), sap (15000 to 20000 l/ha) and central core (10 to 12 t/ha) all of it can be used in developing different value added products. Taking the initiative Krishi Vigyan Kendra, Vaishali, Bihar started giving training to rural farm women on fibre extraction technology on the wasteful harvested pseudostem as this district is an impotant banana cultivating district. The KVK encouraged rural farm men/women to take up simple and remurative income generating enterprises from where they can earn additional income which improves its self confidence and socio- economic status having an overall impact on farm families.

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BACKGROUND AND OBJECTIVES

Banana is one of the earliest crops cultivated in the history of human agriculture. The origin of banana family stretches from India to Papua New Guinea including the Southeast Asian region (Arvanitoyannis and Mavromatis, 2009, De Lange *et al.,* 2009). It is second largest cultivated fruit crop with mass cultivation and consumption and gross production exceeding 139 million tones (FAO, 2010a). Major banana and plantain producers are India, China, Uganda, Ecuador, Philippines, and Nigeria, mainly for their fruits but also

generating tons of underused byproducts and wastes. Improper agricultural waste management practice leads to lost of huge amount of valuable untapped commodity as well as serious ecological damages (Essien *et al.,* 2005; Shah *et al.,* 2005; Yabaya and Ado, 2008).

Banana is an important fruit crop in India with 7.1 lakh ha area is under banana and fruit production of 26.2 million MT contributing 14.7 per cent of world production. Apart from fruit, banana crop also generate huge quantity of biomass in the form of pseudostem, leaves, suckers etc. and this biomass mostly pseudostem is absolute waste in most of the states of India and Bihar in particular. Banana growers find difficult disposing these pseudostems in a routine way of dumping on field bunds or burning or disposing in *nalla*, causing other problems and having no idea in which these biomass can be utilized by preparing other value added products.

In Bihar banana cultivation is carried out in large tract with its production and productivity increasingly steadily over the period because of higher return as compared to other crops. Banana is cultivated in about 29 thousand ha in the Vaishali district with an average yield of 412 q/ha. One of the reason for low yield in banana is due to low replacement rate of banana plantation in the district leading to poor economic returns from the crop after 3rd year of planting leading to poor crop management, fertility management resulting into high pest and disease infestation and being heavy feeder the nutrient status of soil is also exhausted.

Banana and its byproducts :

Developing value added products from banana pseudostem is restricted mainly to fibre extraction and handicrafts making at national level. With the sizable area under banana (0.61 lakh ha) cultivation in Bihar it is important to develop and popularize different value added products from banana pseudostem. After harvesting of fruits and leaves, pseudostem is cut near to the ground level and its yield ranges from 60 to 80 t/ha. Fibre extraction from pseudostem is being done mostly by hand extraction in villages of Tamil Nadu, Kerala, Karnataka Andhra Pradesh and Maharashtra with extremely poor fibre output (0.5 kg/day/man).

Banana fibre :

Banana fibre is a natural fibre produced very cheaply from the waste materials left out in the field after harvest. In pseudostem 9-10 layers of sheath of the plant yield fibre quantity depending upon on the variety yielding 0.29 – 0.9 per cent fibre. The physical and chemical characteristic can be summerised as banana fibre contains cellulose (50-60%), hemicelluloses (25-30%), pectin (3-5%), lignin (12-18%), water soluble materials (2-3%), fat and wax (3- 5%) and ash (1-1.5%) (Mukhopadhay *et al.*, 2008) looks similar to bamboo fibre with better spin ability and fineness. Extraction method and spinning process decides its shiny appearance. (Rao and Mohana, 2007). The fibre is light weight, strong, 3% elongation with average fineness is 2386 Nm, average strength is 3.93 cN/dtex and average length is 50 ~ 60 mm (or 38mm) and can be spun by different methods like ring spinning, open-end spinning, bast fibre spinning, and semi-worsted spinning. This fibre absorbs and realeases moisture very easily is biodegradable and eco-friendly fibre (Mukhopadhay *et al*., 2008).

Banana fibre extraction :

The banana fibre can be extracted manually or by machine. Manual fibre extraction is a cumbersome process involving cutting of pseudostem into 60cm length and 7.5cm width, scrapping by a flat blunt blade. Skilled labour can manually produce only 500- 600g of dry fibre in 8 hours time. Extraction by machine facilitates easy fibre extraction after isolation of pseudostem from banana tree and cut into pieces. These pieces are than passed through the extracting machine, known as mechanical decorticator and fibres are automatically extracted faster. The mechanical decorticator contains of a pair of feed rollers and a beater (Mukhopadhay *et al*., 2008). The fibres are than separated from the sheath and the fibres dipped into bio enzymes to clean and improve quality in terms of length and softness, strength and colour which finally make the fibres shiny (Manandhar, 2010). The bunches of fibres thus extracted are left for sun drying, separated as per group and length. After sun drying the fibres are ready for knotting from one to another manually. The whole bunch in made into long continuous strand which is then made into various by products and handicraft.

Scutcher based products :

Vermicompost :

During fibre extraction from banana pseudostem, huge quantity of scutcher (about 30 to 35 t/ha) is generated. This scutcher is being converted to natural products like vermicompost by adding other essential

components in order to value addition in proper way (Oliveira *et al.*, 2007; Phirke *et al.*, 2001). Process has been standardized for vermicompost preparation using pseudostem scutcher along with dung in ratio of 70:30 (Patil and Kolambe, 2011).

As organic fertilizer :

Vermicompost can be applied to crop fields as organic fertilizer (Phirke *et al.*, 2001). Experiments as well as demonstrations are being conducted at research farm and farmers' fields, respectively on various crops like sugarcane, banana, papaya, ginger etc. using scutcher based vermicompost. Effects of vermicompost has been found comparable with that of biocompost in banana as well as in sugarcane and this can sustain soil health of crop field (Patil and Kolambe, 2011).

Sap based products :

The banana sap contains fair amount of nutrient and can be utilized as liquid fertilizer and nutrient spray with 15,000 to 20,000 litres of sap can be extracted from one hectare of pseudostem.

Enriched sap:

Enriched sap is nothing but fresh sap with essential plant nutrients as well as growth promoting substances *viz*., gibbrelic acid (GA) and cytokinin which can be an alternative for plants vegetative growth (Patil and Kolambe, 2011).

Liquid fertilizer:

Banana sap extracted from pseudostem can be used as liquid fertilizer for banana, papaya, sugarcane, etc. Studies indicate that it may save 20-40% fertilizer. It also improves the yields of banana and sugarcane (Patil and Kolambe, 2011).

Nutrient spray solution (NSS):

Spraying of enriched sap in combination with vermibed wash (1:1) on vegetable seedling is reported to achieve early transplantable stage by 8 to 10 days as compared to no spray. Spraying of both sap and vermibed wash together (1:1) have resulted in higher fruit setting in mango (6.59%) as compared to control (4.62%) (Patil and Kolambe, 2011).

The driving forces of economic growth and social development of any country is skill and knowledge and economy becoming more productive, innovative and competitive through the existence of more skilled human potential. Women play a significant role in performing the day to day farm activities. It is important to strengthen rural women by providing training and awareness programmes for income generation activities.

RESOURCES AND METHODS

If it is possible to implement all the techniques of banana products extraction and production it would be possible to establish many industries only from banana tree waste like: textile industry (yarn, fabric, apparel, saree, baby pampers, hygiene pad), paper mill: writing paper, tissue paper, paper bag, paper made products (cards, notebooks, table calendar, paper box etc.), biofertilizer industry (vermicompost, nutrient spray), fish feed industry, dyeing industry, pharmaceuticals, food processing industry (candy, pickles, soft drinks), handicrafts and bed requirements (Khanum *et al.*, 2000; Phirke *et al.*, 2001; Cordeiro *et al.*, 2004 and Uma *et al.*, 2005).

Taking the initiative Krishi Vigyan Kendra, Vaishali, Bihar started giving training to rural farm women on fibre extraction technology on the wasteful harvested pseudostem as this district is an impotant banana cultivating district. In the initial period training was given to small group of women on banana fibre extraction by hand but after a whole day of labour the amount of fibre extracted was nearly 250g/day which was neither feasible nor economic as the cost was nearly Rs. 400/kg.

To overcome this problem KVK, Vaishali introduced banana extracting machine to the trainees in 2006-07 on which 6-8 trainees can extract fibre simultaneously and cost of fibre came down to Rs. 40/ kg fibre with nearly 2.5kg banana fibre extracted per man day. The second phase of fibre extraction was training on handicraft making which involved steps like cleaning the fibre, combing, making ropes and ultimately turning them into bags, hats, showpiece etc.

OBSERVATIONS AND ANALYSIS

The popularity and demand of handicraft from banana fibre slowly increased among the rural woman and young enterpeureurs with KVK, Vaishali showcasing the products at state and national level Kissan mela, exhibitions and ghosthi. With increased market the

Table 1 : Economics of the unit

Banana unit	No.	Cost of production/unit (Rs.)	Return/unit (Rs.)	Net income/unit (Rs.)
Fibre	2 Fibre extraction machine	2,01,360	3,15,000	1,80,140
Wastage			17,500	
Handicraft			15,000	
Vermicompost			18,000	
Banana SAP			16,000	
Total			3,81,500	

Includes cost of input, labour and others including marketing and transport of the products

demand for fibre increased as it was the base material for the various products. Various SHG of women was formed in the district with the technical support of KVK who made fibre extraction as main subsdiary source of income. Under Rashtriya Sam Vikas Yojna, Vaishali 5 groups of women each of 30 women participants were trained in banana fibre extraction and handicraft making for 15 days.

All this training and popularization of banana fibre made handicraft encouraged formation of micro enterprise on fibre extraction, handicraft making and marketing. Young enterpeurner brought the machine to set up small fibre extraction and handcraft unit with technical support of the KVK. One such enterpeurneur was 23 yrs Sri Nitish Kumar who is graduate with land holding of 1acre. After taking a short duration training from KVK he decided to set up his unit. He brought two banana fibre extracting machine with the financial help of NABARD. Rural farm women of the area were engaged in fibre extraction, rope weaving and handicraft making. Today this unit is produces nearly 2000-3000 kg fibre which is mostly sent to textile and paper industry, rest are made into handicraft which are much in demand but expensive as it is slow time taking process. He is also earning by using fibre wastage as fish feed, sale of banana sap and all wastage used in vermin unit to produce vermicompost with net profit of Rs.1,80,140 per month. Presently five such units are working in the district.

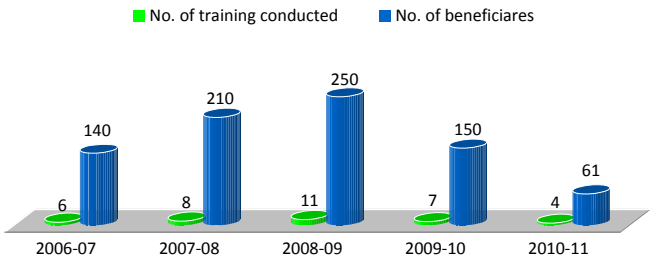
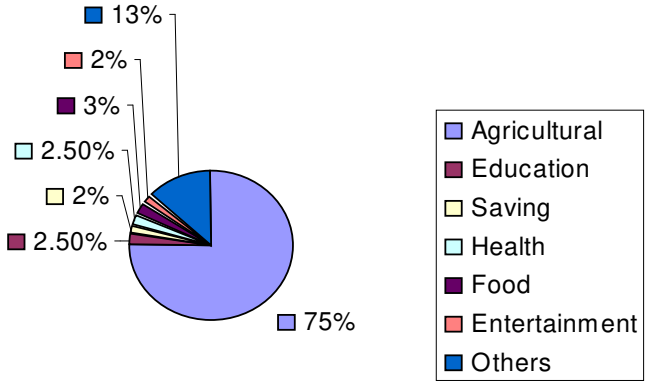
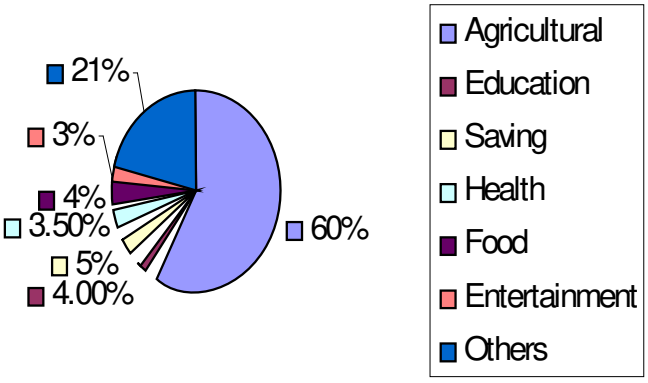


Fig. 1 : Training conducted by KVK, Vaishali on banana fibre extraction and handicraft making

A study was done to analyze change in livelihood pattern of 100 rural farm women engaged in fibre extraction and handicraft making after 30 man days. Most the women were from most backward community both economically and socially earlier doing hard manual work as field laborers (Fig. 2 a and b).



(a) Before



(b) After

Fig. 2 : Change in livilihood pattern of farm women

With more money to spend these household had more money to spend on food, health, entertainment and education. There was improved living condition and with

women working mostly inside with better condition there was marked improvement in health and wellbeing. Improvement in financial condition was reported by most of the farm women, the other benefits they reported was improved self believe, social participation, their psychological status and confidence towards entrepreneurship as well as marketing.

Conclusion :

Training and demonstration are integral part of KVK extension system playing an important role in encouraging rural farm men/women to take up simple and quick income generating enterprises from where they can earn additional income which improves its self confidence and socio- economic status having an overall impact on farm families. There is huge scope of utilizing the banana pseudostem into various uses as is demand for fibre based handicraft but since the products are costly mainly out of reach of admirers. The products manufacture from banana fibre or other parts of banana tree will survive in market with a high competition is addition of values to the banana bio-products to improve its quality enhancing its acceptability. There should be initiative in combination with scientists and technologists to prepare banana bio-products and reach the people in home and abroad, which in turn will contribute in improving the livelihood of rural farm men/women. Banana fruits and its plants as a whole are a good source of bio-chemicals. Only then business persons working in handicrafts or paper production can be attracted to those areas for economic reward to the poor people.

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