

## Banana Fiber Spinning Machine –A Citizen Innovation Model for Waste Utilization and Value Addition in Banana Pseudo Stem

C. Ravindran<sup>1\*</sup>, P.M. Murugesan<sup>2</sup>, G. Srinivasan<sup>3</sup>, K. Prabhakaran<sup>3</sup>, A. Palanisamy<sup>1</sup> and M. Kavitha<sup>1</sup>

**Abstract :** Banana is one of the most important fruit crops grown in India. In India, the area under banana has increased from 1.49 lakh ha during 1956-57 to 8,03,000 ha during 2013-14 with the production of 2,97,25,000 MT with the production share of 33.4% in fruit crops. The Tamil Nadu contribute highest in area (1,18,000) and production (56,50,000 MT). After the harvest of fruits, huge quantity of waste biomass from Pseudo stem, burnt or left *in situ* causing detrimental impact on environment. Though, the technologies for extraction of fibers and paper making from Pseudo stem are available, not being adopted by the industries mainly due to lack of awareness. A low cost rope making banana fiber spinning machine was invented by the farmer Thiru P.M.Murugesan with the support of Krishi Vigyan Kendra, TNAU, Madurai for which he has been recognized for Farmer scientist Award during the year 2012. He registered M/s Rope Production Centre at Madurai under Micro Level Enterprise in the Department of Industries and Commerce, District Industries Centre, Madurai Under the Ministry of industries and Commerce, during 2007 and providing permanent employment for 40 rural women's in the village. Due to the intervention, banana farmers in and around Madurai District got additional income of Rs 5/Pseudo stem as well as protecting their environment through waste utilization of Pseudo stem. Value addition from the pseudo stem viz bags, fruit bags, weaving mat, weaving grill which is alternative to plastics. In this paper, process of hand operated spinning machine, value addition and their market potential will be presented.

**Key word:** krishi vigyan kendra, banana fiber, value added products, spinning machine.

### INTRODUCTION

Banana and plantains are important crops with in the global fruit industry. After the harvest of fruits, huge quantity of waste biomass from Pseudo stem, burnt or left *in situ* causing detrimental impact on environment. Presently, this biomass is discarded as waste. Considerable work has been done in the field of direct use and product development from banana fruits. However, not much attention has been focused on effective utilization of the huge biomass generated in the form of pseudo stem, leaves, suckers *etc.* Though, the technologies for extraction of fibres and paper making from pseudo

stem are available, yet it has not been adopted by the industries mainly due to high transport cost. However, there exist a vast potential of extracting fibres from pseudo stem.

The quantity and quality of fibres show wide variability with cultivars. The fibre extracted from banana pseudo stem could not command proper market owing to its restricted use in cottage industries. There appears to be good scope of profitable use of this fibre in textile and paper industries on commercial scale. Not only this, but number of high value products can also be developed from banana pseudo stem.

<sup>1</sup> Department of Fruit Crops, Horticultural College and Research Institute, Periyakulam, Tamil Nadu.

<sup>2</sup> Farmer scientist and Entrepreneur, M/s Rope Production Centre, 3/43, Melakkal Village, Vadipatti Taluk, Madurai-625234, Tamil Nadu.

<sup>3</sup> Agricultural College and Research Institute, Madurai-625104, TNAU, Tamil Nadu.

\* E-mail : ravi\_hort@yahoo.com

### Work Done so far on this Particular Research Area

Identified local Banana variety (Mupattai and Chakai) suitable for fiber extraction (Evaluating for more commercial variety).

Invention of hand made machine for rope making extracted from Banana Pseudo stem under process of patenting.

Identified potential domestic and export market (Demand 50 Lakhs m/month- supply 4.5 lakhs m).

Established fiber extraction and value added products unit.

### RATIONALE

- Tamil Nadu is largest area in banana cultivation (1.25 lakh ha = 312.5 lakhs plants/year) where the Pseudo stem go after harvest? (100m fiber rope/pseudo stem = .....m).
- Is the all commercial banana cultivars suitable for this purpose?
- employment generation for rural women through skill development training programme.
- Demand for Eco products which is alternate to plastic products (Domestic and International).

### PROGRAM GOAL

With a focus on smallholder farmers, particularly women, the M/s Rope Production Centre under Micro Level Enterprise with partner Krishi Vigyan Kendra in the district and their banana industry sectors to spur economic growth that increases incomes and reduces hunger, poverty, and under nutrition.

Partnering for Innovation's goal is to work with the private sector to identify promising technologies and commercialize them to small holder farmers, there by increasing their ability to improve quality of fiber and value added products through these technologies. The income from banana is unstable, hence this technology help the small holder banana famers for better utilization of waste and make into value added products to sustain the farming activity and increase income.

### TECHNOLOGY INNOVATION

The technology innovation of Hand Operated Banana Rope Spinning Machine is low cost, eco friendly and can be operated by man power with out depending on power supply. This technology is field tested and presently used for production of banana fiber and rope from the banana Pseudo stem. An additional Modification will be done before to market entry. This hand operated will be modified by motor and remote operated one to increase the efficacy of machine and reduce man power.

### Market Potential

The present customers are buyers of fiber and value added products is Rope Enterprises Pvt. Chennai, Tamil Nadu India, Industry Graft Pvt. Ltd, Bengaluru, Karnataka, India and Kouoh Elombo , France. The targeted markets for the produced products (Banana Fiber, Rope, Fruit Basket, bags, weaving mat, weaving girl) by using this technology are European countries in which eco products have more potential but the technology will be implemented in small holder banana farmers (targeted buyers) field for self sustain and become an entrepreneur.

Though similar product available in the domestic and export markets, the products from this technology are differ from other methods in terms of fiber quality and strength. This technology is easy to access by farm family women and other self help group women, rural women and provide permanent employment generation and earn income.

### SMALL HOLDER IMPACT

The hand operated banana fiber spinning machine technology improve small holder farmer income and profitability The quantitative information based on prior field testing or due diligence in the target location, such as decreased labor, increased productivity per unit time, estimated savings in cost of production, increased sales, are described below.

The expenditure for cost of production of banana/Acre	INR- 54000 ( US\$ 888)
Cost of Hand Operated Banana Rope Spinning Machine	INR-100000 (US\$1645)



Banana Plant



Sheath removed from Pseudo stem



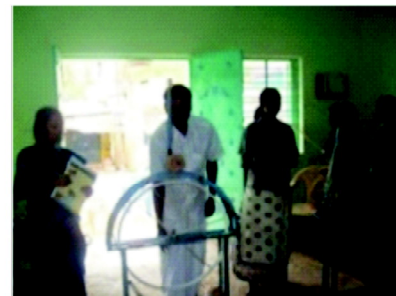
Separation of raw materials from sheath



Storage of raw material



Rope making from raw materials using low cost spinning machine



Rope making process



Rope for value added products



Farmer with value added products from banana Pseudo stem

Figure 1: Flow chart for production of rope from banana pseudo stem

Net income from Banana leaf and fruit/ Acre (1000 plants)	INR-2,60,000 (US\$ 4277)
Net income from fiber by using this technology (100m fiber/plant)	INR- 65,000 (US\$ 1069)
Net income from value added products (2 mat from 100 m rope)	INR -105000 (US\$1727)
Net income from banana farmer having one acre (1000 plts)	INR- 4,30,000 (US\$ 7074)

### PARTNERSHIP

The company collaborator with Krishi Vigyan Kendra, Government organization in seeking scientific production of banana, quality fiber and value added products and marketing through displaying the products in various. The steps have

been initiated to popularizing the technology through various media by the Krishi Vigyan

Table 1  
Statistics on market demand

	Production (m)	Supply	Demand
Domestic	Chennai and Bangalore		
Rope and Bags	14,000 m	14,000 m	50,000 m/day 36,000 m/day
International	Europe Countries		
Banana fibre	Nil	Nil	50t/year 50t/year
Banana rope	Nil	Nil	60,000 km/Yr 60,000 km/Yr

Kendra, exhibition, training but financial constraint this potential technology familiarized with one or few progressive small holding banana farmers.

### **SUSTAINABILITY**

The technology will be available with small holding banana famers and will be marketed through agro service provider/enterprises in future. The fiber and value added products will displayed in all international trade/exhibition/

workshop to increase the market venue besides handlooms shop.

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