

# BIM Village Immersion Program 2019 – Case Study – Bananas in the Nilgiris

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This case study is written based on the experiences of the author and a team of students during the BIM Village Immersion Program visits on August, 2019. The author thanks all the members involved in the program for this case study.

## BANANA IN THE NILGIRIS:

Banana, aptly called 'Kalpatharu' is a giant herb and a food / fruit crop cultivated all over the world. India is the largest producer of Banana next to Brazil. The Banana fruit is edible and the Banana leaves are used as a natural plate. The stem of a few varieties of Banana is also eaten.

In the Nilgiris District, Banana cultivation has been happening from time immemorial. 'Nendran' variety of Banana is grown here predominantly. The crop takes almost 10 months to grow.

## HOW MUCH BANANA IS PRODUCED IN THE NILGIRIS?

The Tamil Nadu Horticulture Department estimated that during the last year, 18,308.67 tonnes of banana was produced in the Nilgiris district. The area under cultivation was 732.35 hectares. The average productivity was 24.33 tonnes per hectare

### FRUITS

Area:Ha, Prodn: Tonnes P

Sl. No.	BLOCKS	1. BANANA			2. MANGO			3. JACK			4. PI
		Area	Prodn	Ptvy.	Area	Prodn	Ptvy.	Area	Prodn	Ptvy.	Area
1	Udhagamandalam	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Coonoor	0.04	0.96	24.00	0.12	0.72	6.00	13.45	193.41	14.38	0.00
3	Kotagiri	0.04	0.96	24.00	0.00	0.00	0.00	17.13	246.33	14.38	0.00
4	Gudalur	732.27	18308.75	25.00	22.35	139.69	6.25	49.88	718.99	14.38	0.00
	District Total	732.35	18308.67	24.33	22.47	140.41	6.12	80.44	1156.7	14.38	0.00

## CHARACTERISTIC OF NENDRAN BANANA:

There is a considerable diversity in plant stature. Bunch has 5-6 hands weighing about 6-12 kg. Fruits have a distinct neck with thick green skin turning buff yellow on ripening. Fruits remain starchy even on ripening.

## IS THERE ANY SEASONALITY IN BANANA CULTIVATION IN THE NILGIRIS?

Majority of the 'Nendran' produce is planned in Nilgiris for the Onam festival season (June – August) – as the price of the Nendran banana is usually the highest in that season. A small proportion of the farmers grow the crop aiming at other seasons through-out the year; but they are mostly contract growers. Irrespective of the grower type, the banana stems are just being wasted after harvest or from fallen / damaged trees.

DISTRICT:THE NILGIRIS											
S.No	Name	Area, Ha		Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Total
		Jul-17	Aug-17								
<b>A FRUITS</b>											
1	Banana	355.64	13.31	4.00	3.78	16.21	0.00	20.20	5.00	39.00	457.14
2	Mango	22.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.30
3	Jack	68.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	68.14
4	Pineapple	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Guava	18.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.32
6	Grapes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	Pear (Berika)	7.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.96
8	Sapota	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Papaya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	Pomegranate	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.72
11	Apple	1.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.60
12	Plum	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30
13	Peach	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
14	Ujchi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	Amra	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40
16	Other Fresh Fruits	6.25	0.25	0.00	0.00	0.27	0.00	0.60	0.00	0.00	7.92
17	Orange	27.52	0.00	0.00	25.80	1.00	0.00	0.00	0.00	0.00	54.32
18	Lemon	6.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.11
19	Citrus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	Other Citrus Fruits	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total (Fruits) A</b>		<b>516.39</b>	<b>14.01</b>	<b>4.00</b>	<b>29.58</b>	<b>17.48</b>	<b>0.00</b>	<b>20.80</b>	<b>5.00</b>	<b>39.00</b>	<b>646.91</b>

Apr 2018      May 2018      June 2018  
 ward      0      0      15

### HOW MUCH IS A KILO OF BANANA SOLD FOR?

The average price for one kilo of Banana is 40 Rupees (Based on price data from Ooty Uzhavar Sandhai – average price in 2017)

### GUDALUR AND PANDHALUR TALUKS

We visited banana growers in the following villages in the 'Gudalur' and 'Pandhalur' taluks -

1. Thorapalli
2. Puthoorvayal
3. Cheromuli
4. Kunthaladi
5. Kothravayal
6. Uppatti 6th vayal

We had administered 2 surveys to the villagers in the villages that we'd visited. Simple random sampling methodology was employed in administering these surveys and collecting the data. A first survey was to create a baseline data for the villages and a second survey that was focussed on understanding the banana growers and their business in these villages. Kindly find the summary of the data collected from the second survey here -

- **Banana Farmer Survey:**

1. **Location:** There are 5 panchayats under Gudalur. The major villages growing bananas are Thorapalli, Putthurvayal, Cheromuli, Kunthaladi, Kothravayal and Uppatti 6th vayal.
2. **Variety of banana:** Nendram is the variety of banana which is grown by all the farmers. Other variety which can be grown here is 'Yeethavazha', but due to higher margins, 'Nendram' is preferred by all the farmers.
1. **Harvesting season:** The major harvesting is done in the month of July to August. But the banana is being harvested throughout the year by small scale farmers.
2. **Area under cultivation:** The total geographical area of Gudalur Taluk is 72,171 hectares of which 53.0% in forest and uncultivable land and 56.0% is cultivable area. Out of the total cultivated area 65.7% is under perennial and 14.3% is under annuals. Around 730 acres of land is under banana plantation in Gudalur Taluks. A farmer usually takes up a land ranging from 0.5 acres to 11 acres for banana plantation. On an average a farmer has 2 acres of land for banana plantation.
3. **Production:** On an average village around Gudalur are producing around 40 tonnes of banana on an average per year. This leaves equal amount of wastage which is not used. The use of chemical fertilizers is also high despite of the fact there is high availability of organic fertilizers which comes from composting of waste.
4. **Labour:** Mostly labour is used in the fields for at least 2 months, once during the time of sowing and once during the time of harvesting. On average a farmer requires 43 workers according to the survey. At maximum he can employ up to 100 labour or minimum zero and work on the fields by himself depending upon the work force required.
5. **Investment:** People are not able to avail bank loan due to more formalities and patta issues so they are mostly dependent on the money lenders with high interest rate. Some also avail gold loans for farming activities.
6. **Contract/Lease:** Small farmers who cultivates in 2-3 acres majorly involved in contract farming whereas large farmers are able to sustain with their own investment. Contracts are only for the banana fruit and not for any other part of the tree. Most of the farmers are cultivating in leased lands which bounds them to sell the yield at market price to the corresponding land owner.
7. **Marketing conditions:** Farmers majorly harvest the crop in the period of Onam and Vishu, the major Kerala festival. The price of the crop fluctuates as per the yield they produce and they are majorly dependent upon the middlemen from Kerala. The price of the banana may vary from 20-40 rupees per Kg depending upon the demand in markets in Kerala.
8. **Problems:** The major problem faced by banana farmers are the price fluctuations due to demand and supply. Other than that due to natural calamities such as wind, rain, sometimes scarcity of water also affects the production of the crop. Wild animals like elephant, pig are a major threat to the farm. They invade the farm land and destroy the crops.
9. **Spoilage/Waste material:** None of the products other than banana is utilized leaving behind stem, bark, and leaves as waste material. To an extent they are composting the waste but not utilizing it efficiently causing a lot of spoilage after the harvesting is done.

10. **Government scheme/Subsidy:** The farmers are mostly not aware of the government schemes and they are not able to claim the insurance in case of crop failure. Getting loan and other schemes are not promoted to the farmers. Some do not even know the existence of these schemes.
11. **Technological awareness:** The people are highly unaware of the technologies regarding the production and product manufacturing. They are still sticking to the traditional methods of farming and they are complacent with selling of their yields to the market than trying to make products themselves. Although there is big potential in the banana products which is still untapped by these farmers and the farmers also have a highly positive attitude towards adapting newer technologies as well as better production techniques. Most of them are ready to accept the equipment and machinery if they see benefits in it.

Here is an indicative profile of a typical banana grower (based on the interaction we had with banana growers from the above mentioned villagers) –

1. Land holding – 2 to 5 acres (On an average)
2. No. of workers employed – 5 to 20 (across different stages)
3. Yield of Banana per acre – 6,000 Kg (6 tonnes)
4. The total input cost per acre is Rs. 65,472/-
5. The total profit per acre is Rs. 1,74,528/-
6. The total profit per kg of banana is Rs. 29/-
7. At present, many banana growers sell their produce to the Mandi. No value addition of any sort is done.

**Table 1.1 – Average Input Costs for Banana Cultivation**

## Banana - Cost of cultivation (for 1 acre)

Sl. No.	Particulars of Activity	Specifications	Inputs / acre	Unit cost (in Rs.)	Sub total (in Rs.)
1	Suckers		1000 nos	10	10000
2	Manures & Fertilizers	1 acre	FYM - 4 tonnes Urea - 418 kgs Super - 719 kgs Potash - 500 kgs Micro nutrients - 10 kgs	2000 7 4 17 30	8000 2826 2876 8500 300
3	Land ploughing & Levelling		Cultivator ploughing - 8 hrs	450	3600
4	Bed and Channel formation		Men labor - 25	400	10000
5	Corm treatment before planting (Paring and Pralinage)		Agro chemicals (pesticide & Fungicide)	200	200
6	Pit making and planting		Men labor - 10	400	4000
7	Crop protection chemicals		Carbofuran - 8 kgs Bavistin - 500 gm Calyxin - 250 ml Monocrotophos - 500 ml	500 250 200 200	1170
8	Fertilizer application charges	5 times application	Men labor - 4	400	1600
9	Crop protection chemical application charges	4 times	Men labor - 2	400	800
10	Weeding	3 times	Women labor - 10	250	2500
11	Earthing-up	1 time	Men labor - 10	400	4000
12	Cost of supporting twings with casuarina poles or tying with rope	To prevent lodging	Rs. 5 / plant (1000 plants / acre)	5	5000

Total cultivation cost / acre = Rs. 42870

Average yield = 5 to 7 tonnes / acre x Rs.40/Kg  
= Rs.240000/-

## Banana - Cost vs Benefit for cultivation in one acre

Activity	Cost
Suckers	10000
Manures and Fertilizers	22602
Land Ploughing & Levelling	3600
Bed and Channel Formation	10000
Corm treatment before planting (paring and pralinage)	200
Pit making and planting	4000
Crop protection chemicals	1170
Fertilizer application charges	1600
Crop protection Chemical application charges	800
Weeding	2500
Earthing-up	4000
Cost of supporting twings with casuarina poles or tying with rope	5000
<b>Total Cost per acre</b>	<b>65472</b>
<b>Average yeild per acre (kilograms)</b>	<b>6000</b>
<b>Average cost per kilogram</b>	<b>40</b>
Average revenue per acre	240000
<b>Average profit per acre</b>	<b>174528</b>

### WHAT COMMON PROBLEMS DO BANANA FARMERS FACE IN BANANA CULTIVATION ACTIVITY?

From our interactions with the Banana growers and from the official data from Uzhavar Sandhai, we observed that in the last year (2017), the price varied from a minimum of Rs. 20 per Kg to a maximum of Rs. 40 per Kg. These vagaries in price is the major problem for farmers. In addition, the banana pseudo-stem frequently falls down – due to wind / rain – often being wasted. After harvest, the pseudo- stems are again wasted (only a small minority chop it down and use it as a supplement for bio manure).

The harvesting activity stretches for months during the season and any undulated market conditions directly hit the revenue of the banana grower. The climatic vagaries of wind, high day temperature, water shortage affects the yield resulting in forced ripening of banana further reduce the income of the farmer. The perishing nature of the fruit does not permit for storage and high volume of arrivals during season brings down the selling price level eventually.



Picture – A typical banana farm

### PRODUCTS FROM BANANA:

#### Banana Powder:



### **Picture - Banana Powder**

K+ Potassium rich and gluten free, best additive to Chapatti, Paratha, weaning food for babies and kheer preparation adds natural sweetener for healthy taste.

#### **Dehydrated Banana:**

Figs are prepared by peeling, disinfection and dehydration in hot air oven or solar dryer and the product is stable up to 3 months at room temperature. The figs are tasty, highly nutritious and help in nutritional security by providing all the nutrients in banana fruits in the concentrated form. It can be adopted by small and medium scale entrepreneurs/ industries and can create rural employment opportunities. It is ready made energy food suitable for children, sports persons, army personnel and mountaineers. Now-a-days, banana fig is being prepared by using solar driers.

#### **Uses of Dehydrated Banana:**

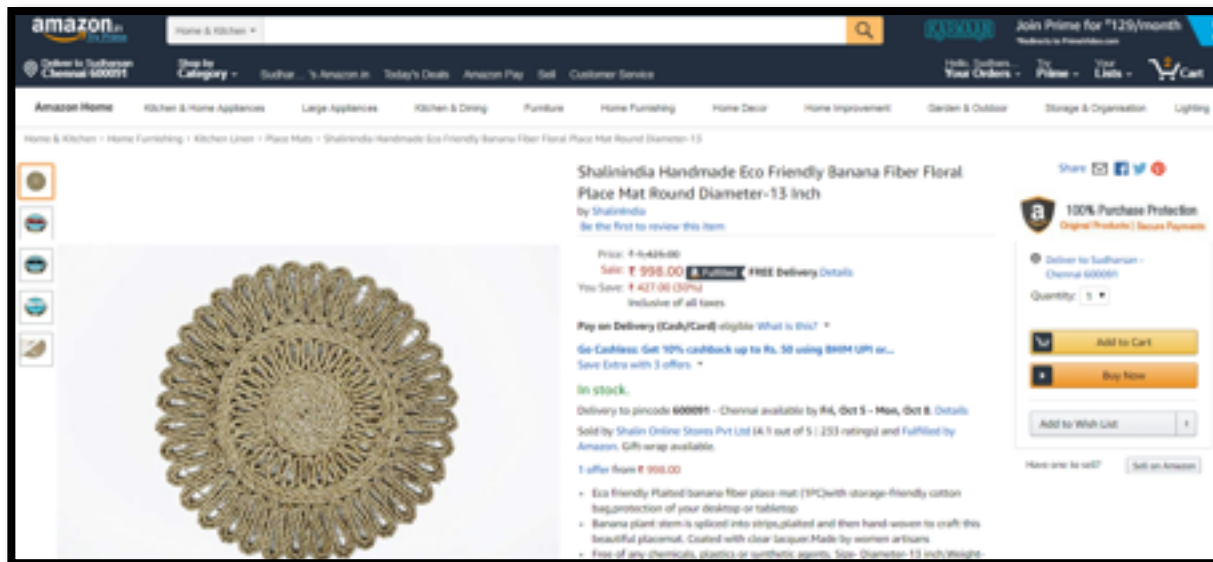
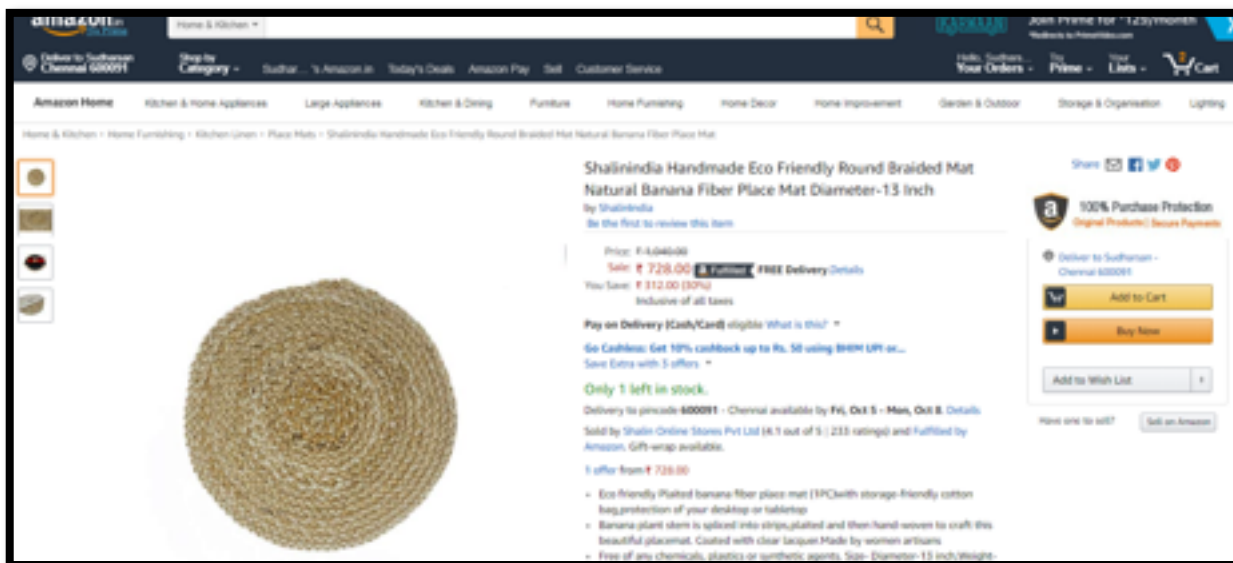
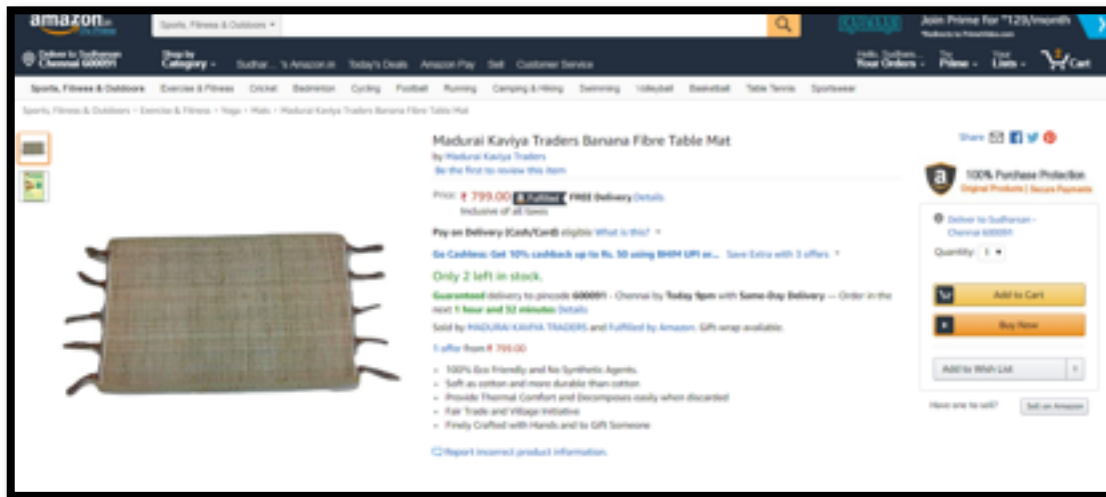
1. Cheaper than existing dry fruits available in the market.
2. Dehydrated product can be stored up to three months.
3. Helps in nutritional security by providing all type of nutrients (such as carbohydrate, vitamins, minerals and dietary fiber)
4. Can be incorporated in many recipes such as cakes, custard, biscuits, payasam, kesari and ice creams as a substitute for raisin.
5. Can be recommended particularly for School and Adolescent Children

#### **Banana Fibre:**

Banana Fibre is extracted from the pseudo stem Sheath of the plant. The extraction can be done mainly in three ways: Manual, chemical and Mechanical. Of these, mechanical extraction is the best way to obtain Fibre of both good quality and quantity in an eco-friendly way. In this process the Fibre is extracted by inserting the pseudo stem sheaths one by one into a raspador machine. The raspador machine removes non-fibrous tissues and the coherent material from the Fibre bundle present in the sheath and gives the fine Fibre as output. After extraction, the Fibre is shade dried for a day and packed in HDPE bags. Then extraction, then it is stored away from moisture and light to keep it in good condition until it is used.

#### **Uses of Banana Fibre:**

1. To make currencies, bond papers, and specialty papers which can last for 100 years
2. As a very good replacement for wood pulp in paper industry, as it has high cellulose content, thus reducing the Environmental impact of deforestation
3. In making composite materials as a replacement for fibreglass
4. For manufacturing mattresses, pillows and cushions in the furniture industry.
5. In handicraft, extensively for making bags, purse, mobile phone cover, door mats, curtains, and yoga mats
6. In the manufacture of textiles



**Handmade products from Sheaths:** Usage of plastic has affected the environment on a large scale. These sheath products are an alternative to them. Various products are made from this sheath such as basket, cups and ropes. This aids to employability of women majorly irrespective of the education.





Picture - Making of Handmade Products Using Banana Sheath





Picture - Banana Fibre Extraction & Products

**QUESTIONS:**

1. Using the data in the case and other relevant secondary data, come up with a sustainable solution to help improve the livelihood of the banana farmers in the Nilgiris.
2. Create an enterprise plan for the solution that you propose. Take necessary assumptions wherever needed.

**ANNEXURE -1**



**FIBER YEILD FROM NENDRAN:**

Commercial cultivar	Biomass after bunch harvest(t/ha)	Whole plant weight (kg)	Pseudostem weight (kg/plant)	Fibre extractable sheath weight (kg/plant)	Fibre yield (%)
Poovan	37.12	20.4	14.0	8.06	0.891
Nendran	36.48	20.1	13.2	7.62	0.758
Rasthali	32.75	18.0	13.1	5.88	0.697
Karpuravalli	38.61	21.1	13.5	8.13	0.548
Robusta	36.01	21.4	14.0	8.40	0.721
C.D ( <i>P</i> =0.05)	1.342	0.992	0.314	0.406	0.001

(Source: Composition and properties of fibre extracted from pseudostem of banana (Musa sp.)-S. Shivashankar, R. P. Nachane and S. Kalpana)

**ANNEXURE- 2**

- Banana Fibre Extractor:** It is manufactured using high quality materials such as ISO Certified Steel Frames, rust free 304 Stainless steel shaft and shields for long life and low maintenance. Higher

percentage of fibre recovery is the hallmark of this machine. In 8 hours, our machine can extract 15 to 19 kg of dry fibre of desired length based on the variety of banana plant used. The machine is user – friendly and safe in handling, with our machine, farmers can extract around 150kg fibre per acre and therefore a farmer with 10 acres can extract around 1.5 tons of fibre earning around rs.1 lakh in two months, excluding expenses. Apart from the fibre, the scutcher waste can be used to produce vermin-compost for use in the farmer’s own field as a manure which is available at free of cost.



2. **Banana Mat Production Machine** – With a capacity of 20 mats per day, this machine is easy to use and requires no power. It uses a variety of twines (nylon / cotton) – per use choice to weave the banana fibre.



3. **Continuous Band Sealer** - Band sealers are suitable for sealing individual pouches/bags automatically. The machine has a variable temperature controller and speed control, to suit different grades of plastic materials Three types of models are available Horizontal type, Vertical type with foot stand type. Other special models include Nitrogen filling attachment, vacuum option, Printing attachment, and for heavy bags sealing



QUOTATION




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- **without band sealer machine cost is Rs. 75,000 plus Tax and Delivery Charges Extra.**

**Please click below the link to view the function:**

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Thanks & Regards

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