

Evaluation of economics of a few green wastes used for income generation in Assam

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■ **ABSTRACT :** There are varied kinds of plant-origin resources, many of which are considered wastes as these materials normally do not find proper economic utilization. Awareness on the utilization of the plant wastes in the household sector is the need of the hour for motivation and impact development among the target group. It can have a great impact on improvement of rural economy in a poor state like Assam. For example - with simple suitable technological intervention the areca palm leaf sheath can be utilized for making biosphere friendly disposable plates and bowls which are biodegradable and have a competitive market edge over paper and other non biodegradable plates made of synthetic materials. Many water bodies like canals, ponds, rivers etc. are choked by the explosive growth of aquatic weed called water hyacinth resulting in enormous direct loss. The prospect of making it an economically blessed weed by properly utilising it as business commodity is getting higher. The opportunity should be trapped by the local or indigenous people by developing adequate entrepreneurship with almost zero raw material cost. A study was under taken with the objectives: To assess the economics of areca palm sheath disposable serving plate making and Assessment of economics of use of water hyacinth for handicraft products. It was revealed that by using 231 numbers of palm leaf sheath per day and an 8 hours of working using two manually operated pressing machines and spending rupees 354 as daily additional cost, a person can earn a profit of rupees one lakh nineteen thousand nine hundred six annually, resulting in a benefit cost ratio of 2.23. On the other hand by making certain utility products using one kg of dried water hyacinth stems @ Rs. 40/- one can earn an average of two thousand nine hundred fifty rupees weekly. The benefit cost ratio was found to be 1.65 which may increase further depending on products of finer quality. Availability of areca plantation and water hyacinth in this part of the country can thus be gainfully utilized as raw material for manufacturing eco- friendly useful biodegradable items with a high potential market face value and thus would help to enhance rural economy.

■ **KEY WORDS:** Economics, Green wastes, Income generation

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Assam is a plant-based resource rich state. The paradox appropriately fits into “Assam is a rich state with poor people”. The truth can well be gauged from the array of reservoirs of natural resources the state has in its bosom. There are varied kinds of plant-origin resources, many of which are considered wastes as these materials normally do not find proper economic utilization. However, some of these wastes can be utilized using appropriate technologies to make biosphere friendly products of market competitiveness. Awareness on the utilization of the plant wastes in the household sector is the need of the hour for motivation and impact development among the target group which are the rural poor. With an appropriate technological intervention these wastes can be rolled out into everyday use materials of household as well as market utility. It can have a great impact on improvement of rural economy in a poor state like Assam. For example - with simple suitable technological intervention the areca palm leaf sheath can be utilized for making biosphere friendly disposable serving plates and bowls which are safe, biodegradable and have a competitive market edge over paper and other non-biodegradable plates made of synthetic materials. Many water bodies like canals, ponds, rivers etc. are choked by the explosive growth of this aquatic weed resulting in enormous direct loss. But, now economic utilisation of this weed for making biodegradable high market value products is gaining momentum. The opportunity should be trapped by the local or indigenous people by developing adequate entrepreneurship with almost zero raw material cost. A study was under taken with the objectives :

- To assess the economics of areca palm sheath disposable serving plate making
- Assessment of economics of use of water hyacinth for handicraft products.

■ RESEARCH METHODS

Areca palm (*Areca catechu*) sheath disposable serving plate making:

Assam possesses a large coverage under this tropical palm as the state has about 70,000 hectares area under areca nut plantation. The entire areca leaf with the leaf sheath is an agricultural waste. There is not much instance of putting the areca palm leaf in any economic utilisation of significant importance. However, it has a minor use as biological cover or barrier material in some

rural homesteads of low income farm households instead of less affordable bamboo fencing. Some marginal farm households use areca palm as roofing material which is of less economic significance without appropriate technological intervention. There are large areca palm plantations in Assam. In general, every household has at least twenty such trees in their homestead apart from some having separate areca plantation garden. The areca nuts have high demand in domestic and international markets and now the sheaths are also no less. It has high economic potential if it is converted into usable products with modern technological advancement.

Areca sheaths can be profitably used for making disposable serving plates and bowls for community feast and such functions. The processing into finished products from areca leaf sheath is less time and money consuming than products from paper and other synthetic materials. Added advantage is they are microwave and refrigerator safe and can hold liquid items for hours without leakage.

The following points are to be considered in using areca sheaths for converting it into serving plates and bowls :

- An average of five to eight numbers of matured sheaths fall annually from each areca plant during monsoon season that starts from June till Sept. in Assam.
- Collection can be done in field only during this period and accumulated to be given to the plate making units within a short time 1-2 weeks.
- After leaf falls it should be sundried kept properly to prevent growth of fungus/ mildew and decay.
- After collection from field sheath should be dehydrated in a mechanical drier which help to keep the sheaths in good condition till it is used for making the serving items.
- For making such plates the dried and stored sheaths should be properly wet in water and cleaned by brushing to remove all kinds of dirt.
- The machines on which plates/bowls are to be made should be adequately heated to press the wet sheaths on them.
- Uninterrupted power supply is to be ascertained during work.
- The plates and bowls that comes out from the machines are to be wiped with dry and clean cloth taking utmost care and properly packed after which they retain its freshness till it is used for serving.
- After its use it can be thrown in ditch which

gets naturally degraded in soil like any plant matter.

Water hyacinth (*Eichhornia crassipes*): Water hyacinth is an abundantly available aquatic plant of this region and is considered a menace. Many water bodies like canals, ponds, rivers etc. are choked by the explosive growth of this aquatic weed resulting in enormous direct loss. “Several products can be made from water hyacinth (WH) residue. This embrace biogas, bioethanol, biohydrogen, biopolymer, biobutanol, composites, biofertilizers, fish feed, high calorific value fuel, fuel briquette, superabsorbent compound and xylitol. Additionally, WH may also be used as substrate for mushroom cultivation and for treatment of assorted industrial effluents for the removal of significant metals.” (Dwivedi and Dwivedi, 2018). “WH can be harvested manually; a person can harvest approximately 200 kg of WH per hour” (Weiping *et al.*, 2018).

Making of value added utility products crafts from WH involves following steps:

- A marshy region with lush growth of WH should be selected for harvesting.
- The stems attain maturity during the winter season from the months of October end till February and are the peak season for harvesting of the WH stems.
- Matured and longer stems of about 15 to 30 inches length and 0.5 to 1.2 inches in diameter should be collected in bulk during sunny days of winter months.
- The leaves and roots should be removed and washed with clean water.
- The stems should be laid on ground over polythene sheaths to dry, intermittent reshuffling is required for even drying.
- Stems should be dried in good sun for 4-5 days and prevent moisture absorption for bringing shiny effect in the products when woven.
- The stems that turn brown on drying and make cracking sound indicates the right stage for storage.
- The dried stems should be tied in bundle and hang in bunches on ropes for making products round the year.
- For adding variation good natural colours can be added to the stems for weaving into products.
- Stems are also flattened in small pressing machines to aid in weaving to add variety in weaving the products.
- Plaits making is done for making ropes by using

the WH stems which is used in weaving the products.

- Thermocol mould of various sizes and designs are made by wrapping the same with wide cello tape to give form to various products by weaving on them.
- While weaving beaded pins are carefully used to affix the stems to the mould which later on are removed.
- Varied kind of utility products can be prepared by weaving the stems with different types of weaves using thermocol moulds of various sizes and designs.
- A treatment is given to the products to give a finish look and prevent growth of mildew on it.

■ RESEARCH FINDINGS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Assessment of the economics of palm leaf plate making:

The economics of palm leaf plate making was calculated on the basis of raw materials (palm leaf sheaths) used, number of man days required for its drying, processing and conversion into disposable serving plates and bowls in the manually operated machines. Apart from this other expenditure heads utilized for the process were also considered and is reported below (Table 1).

The following table details the calculation of economics in making disposable serving plates and bowls by using areca palm leaf sheath using two manually operated plate making pressing machines.

The result reveals that by using 231 numbers of palm leaf sheath per day and 8 hour working using two manually operated pressing machines and spending Rs. 354 as daily additional cost, a person can earn a profit of rupees one lakh nineteen thousand nine hundred six annually. The result shows an encouraging benefit cost ratio of 2.23 indicating strong feasibility of the enterprise.

Assessment of economics of use of water hyacinth for handicraft products? :

The economics of production of handicrafts from water hyacinth was calculated on the basis of man days required for harvesting of matured stems, washing, drying, bundling, procuring, pressing and weaving in thermocol mould. Since the requirement of quantity of dried stems will vary depending on type of products so, a standard

Table 1 : Assessment of the economics of palm leaf plate making		
Sr. No.	Particulars	Time/ Amount/ Quantity
General information		
1.	Working hours in a day (Machine hours)	8 hrs
2.	No. of working days in a month	25
3.	Electricity rate/ unit (Rs./ kwh)	5.50
4.	Electricity consumption/ hour (kwh)	3.00
5.	No. of direct labour (Machine operator)	1
6.	No. of indirect labour (washing, drying etc.)	1
7.	Daily wages of direct labour	250.00
8.	Daily wages of indirect labour	150.00
9.	No. of 4" Katori produced in an hour	40
10.	No. of 5" Katori produced in an hour	33
11.	No. of 6" quarter plate produced in an hour	27
12.	No. of 11" rice plate produced in an hour	20
13.	Selling price of 4" Katori (per piece)	0.75
14.	Selling price of 5" Katori (per piece)	1.00
15.	Selling price of 6" quarter plate (per piece)	1.30
16.	Selling price of 11" rice plate (per piece)	3.25
17.	No. of plates/ bowls produced from 1 sheath	3
18.	Cost price of 1 sheath	1.00
19.	Indirect expenses (Administration/ maintenance/ transportation etc.) as % of sales	5%
Daily production detail		
1.	No. of 4" Katori production/day	320
2.	No. of 5" Katori production/day	264
3.	No. of 6" quarter plate production/day	216
4.	No. of 11" rice plate production/day	160
5.	Total production/day (No.)	960
6.	No. of raw materials (sheath) used in a day	231
7.	No. of labour working	2
8.	Electricity consumption in 1 day (kwh)	16
Daily Revenue from sales (in Rs.)		
1.	4" Katori	240.00
2.	5" Katori	264.00
3.	6" quarter plate	280.00
4.	11" rice plate	520.00
	Total daily Revenue	1304.00
Daily cost of production (in Rs.)		
1.	Raw material cost	231.00
2.	Labour cost	266.00
3.	Electricity cost	88.00
	Total daily cost	585.00
Daily, monthly and annual profit (in Rs.)		
1.	Daily profit	451.55
2.	Monthly profit	11288.88
3.	Less indirect expenses	1296.66
4.	Monthly net profit	9992.22
5.	Annual profit	119906.64
1	Benefit cost ratio	2.23

unit of weight *i.e.* one kg of water hyacinth was considered as a base (Table 2).

The following Table 2 details the calculation of economics in making handicraft products by using one kg of dried water hyacinth stems.

It can be concluded that by using one kg of dried water hyacinth stems costing Rs. 40/- one can earn Rs. 2950.00 weekly by making certain utility products. The amount will vary depending on type of products made. The result shows a benefit cost ratio of 1.65 which indicates encouraging viability of the enterprise.

Conclusion:

Popularisation of suitable rural based eco-friendly technologies of this kind for rural development will be a powerful tool for women and youth empowerment. "The economically backward people in Kerala are living by doing many cottage industries and handicraft making such as products using bamboo which are inevitable for the foreign tourists in Kerala. Major portion of them are buying numerous handicraft products from the outlets" (Unais *et al.*, 2017).

The process and device for raw material collection and its flow should be sound to run an enterprise with the locally available raw materials providing adequate awareness programmes and exposure visits to such pockets.

The products made from areca leaf sheath are being produced in other states and comparatively much less in Assam. Exemplary advancement in this regard the names of state of Kerala, Tamil Nadu, Karnataka, etc. may be cited. The products are stiff, hard and water proof with glossy membrane on the upper side thus making them especially suitable for buffet also. These products have not only gained popularity among the local consumers but also established a niche in the export market. Availability of areca plantation in this part of the country can gainfully be utilized as raw material which is otherwise considered waste for manufacturing eco-friendly useful biodegradable items with a high potential market face value. Thus far, strong opinion is upheld that the making disposable serving plates from areca palm leaf waste will be economically viable indicated by strong benefit cost ratio of 2.23 to bring economic benefit to the target group. Likewise, water hyacinth being abundant can be profitably utilized for making market oriented lifestyle products which would help open self

Table 2: Assessment of economics of use of water hyacinth for handicraft products

Sr. No	Particulars	Time/ Amount/ Quantity		
General information				
1.	Working hours in a day (Machine hours)	8 hrs		
2.	No. of working days in a month	25		
3.	No. of direct labour (weaver)	1		
4.	No. of indirect labour (washing, drying etc.)	1		
5.	Daily wages of direct labour	Rs. 250.00		
6.	Daily wages of indirect labour	Rs. 83.00		
Daily cost of production (in Rs.)				
1.	Raw material cost (per kg dried water hyacinth)	40.00		
2.	Labour cost @ Rs.250 per man days	1750.00		
3.	Total weekly cost	1790.00		
Estimation of price of objects made from 1kg dried water hyacinth				
	Items produced from 1kg water hyacinth	Total numbers	Man days required	Selling price
1.	Big cap	1 no	2	800.00
2.	Medium size cap	1 no	1	450.00
3.	Big bag	1 no	2.5	1050.00
4.	Medium size bag	1 no	1.5	650.00
	Total	4 nos	7	2950.00
Weekly, monthly and annual profit (in Rs.)				
1.	Weekly profit			1160.00
2.	Monthly profit			4640.00
3.	Annual profit			116000.00
4.	Benefit cost ratio			1.65

employment avenues throughout the state as shown by the benefit cost ratio of 1.65. The maintenance of quality of the finished products from plant based wastes is one of the vital key factors for its sustainability in the prevailing competitive market. Skill imparting through trainings to women and youth will go a long way in helping them to be self supporting in improvement of rural economy though such cottage industries.

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