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Research Paper

Quantification and utilization of agricultural wastes in farm based rural households of Jorhat district of Assam

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■ **ABSTRACT :** A well structured interview schedule was administered on hundred rural households of eleven villages of Jorhat district of Assam during 2016-17 to conduct a survey specially on accumulation and utilization of agricultural wastes in rural households. Result indicated that majority of the farmers (30%) were of middle age group (30-40 years), mostly having a nuclear family (73%) with 1-5 members with an educational qualification upto 10th standard. Majority of the respondents are marginal farmer with a land holding upto 10 acres and earn their livelihood primarily from farming. Most of the households cultivated paddy as monocrop. However, *Rabi* and *Kharif* vegetables were also grown by many households depending upon the land situation. Data reveals that 10,396 qt rice straw, 18,193 qt of rice husk, 2004.64 kg of water hyacinth and 12000 number of areca sheath are produced as agricultural wastes among the 100 households. The study also reveals that there is a huge gap between the availability of agricultural wastes and awareness for economic utilizing these wastes.

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■ **KEY WORDS:** Agricultural wastes, Water hyacinth, Rice straw, Rice husk

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Biomass is defined as bio residue available by water based vegetation, forest or organic waste, by product of crop production, agro or food industries waste. Various biomass resources such as, woody plants, fruits, vegetables, manures and aquatic plants are available in India. India has huge amount of agriculture land area, so massive residues are produced here. Though these residues promises the potential of biomass feedstock for the use of energy generation, but practically means a great concern for creating problems of environmental pollution, rural sanitation, for recycling and utilization.

Globally, 140 billion metric tons of biomass is generated every year from agriculture (Shehrawat *et al.*, 2015), of which India share an estimated amount of 620 million tons annually (Singh and Sidhu, 2014). Almost 50 per cent of 620 million tons of agricultural wastes finds applications in various agricultural and industrial purposes like animal feedstock, paper industry, roofing material and energy generation (Singh and Prabha, 2017). Ministry of New and Renewable Energy, GOI (2009) estimated that about 500 Mt of crop residue is generated every year. However, major quantities of the on-farm agricultural residues, to which farmers generally treat as wastes, are burnt in the field itself. Although this is a very cheap, non-labour intensive and easy mean of agro

waste disposal, but in turn this has a great negative impact on the agro-ecosystem as it generates a lot of particulate matter in environment to form smog, smoke that cause air pollution, and disturbs soil physical, chemical and biological structure including microbial population and micro flora and micro fauna life forms (Anonymous, 2015-16). These wastes are destroyed by burning or allowed to decay in public places in the open air which creates environmental pollution. The burning of yield build up and biomass in rural fields in north India escalates the issue of air contamination (Agarwal *et al.*, 2016). A judicious and planned use of the agricultural wastes can be promoted as an important renewable energy source, feed source for farm animals, source of fertilizer and other commercial uses. Moreover, it will reduce the methane emission, carbon-di-oxide emission due to its burning, reduce dependency on fossil fuel. Government of India has focused on the deployment and development biomass energy sector with strategic policy and programme and therefore, this study aims to gather the basic information for quantification of available agricultural biomass in Jorhat district of Assam and uses of this biomass by the respondents.

■ RESEARCH METHODS

The study was conducted in randomly selected eleven villages of Jorhat district of Assam. From these eleven villages, 100 households were selected purposively. A well structured questionnaire was administered on the selected rural families to estimate the quantity of biomass accumulation and other relevant information such as land holding, age of the respondents associated with agriculture, educational qualification of the farmers, marital status, number of family members etc. For the study, land holding; qualification and education were considered as independent variable and income and occupation were considered as dependent variable.

Statistical analysis pertaining to this study like, frequency and percentage were calculated for personal profile and socio- economic profile of the respondents, while Chi square test was computed to see the relationship between dependent and independent variables.

The study was restricted to quantification and utilization of agricultural biomass produced by paddy cultivation, arecanut cultivation and by water hyacinth. Paddy is the principal crop of the state while; each and every villager's house hold has at least few arecanut plantations in their *Bari* system. Being a high rainfall area, water hyacinth is commonly available around the swampy areas near the households that seem to constitute a major source of biomass.

■ RESEARCH FINDINGS AND DISCUSSION

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

Personal profile of the respondents:

Personal profile of the respondents indicated that majority (30 %) of the respondents belonged to 30- 40 years of age group followed by 20-30 years of age group (Fig. 1). A few respondents belong to the 50 years and above age group. It indicates that almost young generation is involved in agricultural profession in the selected villages. Marital status indicated that ninety one per cent of the respondents were married. Educational qualification of majority of the respondents was found to be below 10th standard with a few matriculates, graduates, and post graduates, indicating the fact that educated youth's do not prefer the agricultural profession (Fig. 1). This finding agrees with the findings of Narain *et al.* (2015). They observed that participation of rural youth (upto 25 year age group) in farming declined day to day. About 92 per cent farmers practicing farming was due to lack of any other options

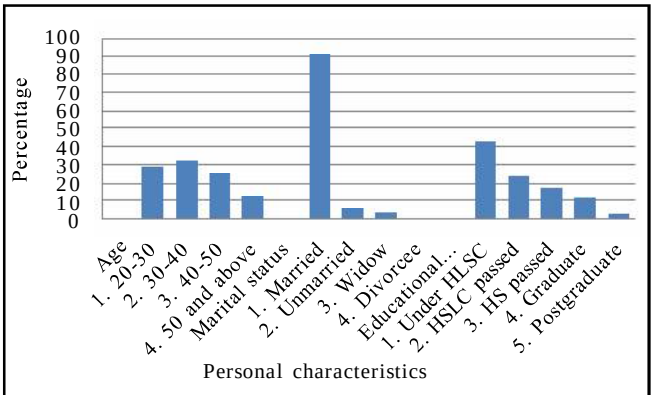

Fig. 1 : Distribution of respondents by personal characteristics (n=100)

Data presented in the Table 1 reveals that majority of the respondents were belonged to nuclear family with

1-5 members. In a study conducted by Shehrawat *et al.* (2015) at two districts of Haryana revealed that majority of the farmer respondents were from joint family with a qualification upto matriculation.

Almost half (56 %) of the respondent family has monthly family income in the range of Rs 10,000/- to 30,000/-, and only eleven per cent had income above Rs. 50,000/- indicating majority of the families being not very affluent. The farm income from the families is below the national average. Chand *et al.* (2015) reported that the average income of the Indian farmer in real price was 44,027.00. According to NSSO report of 2011-12, around 22.5 per cent Indian farmers reel under poverty. In a statement by Ministry of Agriculture and Farmer Welfare, stated, "…the average income per agricultural household from various sources is estimated at Rs. 6,426/- per month during the reference period of the agricultural year July 2012 to June 2013."(Anonymous, 2016). The present data is in conformity with the finding of Chand *et al.* (2015 and NSSO report). The data presented in Table 2 also revealed that 52 per cent of the respondents were in the category of marginal and small farmer with a farm holding of less than 2.0 hectare. According to the Agriculture Census, the total number of operational holdings in India numbered 138.35 million with an average size of 1.15 hectares. Of the total holdings, 85 per cent were in marginal and small farm categories of less than 2 hectares during 2010-11 (Anonymous, 2014).

Statistical analysis to see association between land holding and income level tabulated in Table 3 shows an existence of a very weak positive association between income and land holding. Data tested by Chi-square at 5% level of significance indicates that though the people had adequate land but they could not utilize it properly for better income generation from cultivation in their farm land (Table 3).

Analysis further reveals that there is a very weak positive association between income and qualification (Table 3). Contingency value (0.195) indicates that income of the rural households is not influenced by the educational qualification of the female members of the household.

Result also indicates that there is a very weak positive association between occupation and education *i.e.* occupation of the female members of the rural households has less relation with their educational level

Table 1 : Distribution of respondents in relation to family setting **(n=100)**

Particulars	Frequency	Percentage
Type of family		
Nuclear	73	73
Joint	24	24
extended	3	3
Size of the family		
1-5	74	74
5-10	23	23
10 and above	2	2

Table 2: Distribution of respondents with regard to economic characteristics of the household **(n=100)**

Particulars	Frequency	Percentage
Monthly income (Rs.)		
10,000-30,000	56	56
30,000-50,000	33	33
50,000 and above	11	11
Total	100	100
Types of farming owned by the family		
Landless farmer	38	38
Marginal farmer	41	41
Small farmer	11	11
Large farmer	10	10
Total	100	100

(Table 3). Thus, the data reveals that the educated rural women respondents were not gainfully employed.

This reveals that in spite of having sufficient materials and human resources, their income is just adequate. This shows that there is a scope for supplementing their family income through efficient utilization of the existing resources.

Taking in to account of the educational status of the respondents, family size, land holding and farm family income; efforts have been made to quantify the available agricultural wastes in these villages in order to intervene some programmes for utilizing these waste for income generation.

Quantification of underutilized green waste in respondent households :

Data collected from 100 respondents of eleven villages of Jorhat district of Assam and presented in Table 4 (a) reveals that an amount of 10,396 qt of paddy straw and 18,193 qt of rice husk is produced in each cropping season.

Arecanut being one of the common crop components of *Bari* system of rural house hold, the survey shows that each household has an average of 20 number of arecanut plants in their *Bari*, which produces an average of 6 areca sheaths per tree per year (Table 4b). Thus, estimated production of areca sheath per house hold per year stands 120 numbers, while the figure becomes 12,000 in 100 respondents. This statistics indicates that there is a high potentiality for undertaking profitable small scale cottage industry for farm as well as educated women. With the increase in awareness on advantage of utilizing biodegradable materials for safety of our fragile environment the present day requirement of eco-friendly daily use materials can easily be met from the output of these small scale industries. There is a growing demand of these eco-friendly areca plates and bowls in the metropolis in India as well as abroad which can tap a good economic harvest for the enterprising women.

The study carried out to estimate the availability of water hyacinth in per respondent household indicated that 22 per cent of the respondent households have the access to harvest water hyacinth from their own water bodies. Each respondent house hold has the ability to harvest 97.12 kg of water hyacinth per season from a water body of 0.10 acre size (Table 4c). Thus, an amount of 2,004.64 kg of water hyacinth can be harvested from these villages per season.

Table 3 : Relationship between independent variables and dependent variables of the respondents (Chi-square test)

Independent variables	Dependent variables	X^2 value	Table value	Co-efficient of contingency value
Land holding	Income	1.01	12.592	0.0999
Qualification	Income	3.98	9.488	0.195
Education	Occupation	2.317	12.592	0.1504

Table 4 (a) : Estimation of paddy waste in the respondent households **(n=100)**

Total area of cultivation of paddy (in acre)	Rice production (q)	Straw production (q)	Husk production (q)
324.875	5,198	10,396	18,193

Table 4 (b) : Estimation of areca sheath accumulation amongst the respondent households **(n=100)**

Average areca nut tree among households (number)	Average production of areca sheath from each areca tree/year (number)	Areca sheath production per respondent household (number)	Total areca sheath production (number)
20	6	120	120x100=12,000

Table 4 (c) : Estimation of water hyacinth accumulation near the respondent households **(n=100)**

Total respondents having water hyacinth	Average area covered by water hyacinth among households (acre)	Water hyacinth production per respondent household (kg)	Total water hyacinth production (kg)
22	0.10	97.12	2,004.64

Table 5 : Distribution of respondents according to the waste disposal measures followed

Particulars	Frequency	Percentage
Dumping	25	25
Compost pit	20	20
Vermi compost	3	3
Incinerate	42	42
Animal feed: e.g. straw	80	80

Present trend of uses of agricultural wastes by the respondents:

Form the personal interview, it was learnt that the respondents were not at all aware of the potential utility of these wastes. The primary data presented in Table indicated that most of the respondents (80 %) use the agricultural wastes, particularly rice straw as animal feed. However, they do not follow any scientific procedure to keep them properly. They used to lose a substantial amount of rice straw per year. Only 20 per cent of respondents use agricultural waste for making compost pit.

Awareness among the farmers about the products Made from agricultural wastes:

From the present study it was observed that the awareness among the participatory farmers about the utilization of agricultural waste was noticed to be very poor. Through they were in regular touch with the mass media contact like, TV and radio; they seemed to be little concern with the economical utilization of agricultural wastes available around them. Agricultural wastes were mainly utilized by the farmers as animal feed in traditional way. It was observed that 80 per cent respondents were not aware of economic utilization of agricultural wastes like, to make enriched animal feed, biogas, its use as energy source, making handicrafts, beauty products, cupboards, making briquettes etc. Only 20 per cent of the respondents were aware of making compost, vermicompost and organic manure from the agricultural waste.

Conclusion :

The present study reveals that there is a huge gap between production, availability of agricultural wastes and awareness, uses of these wastes. This difference existed basically due to lack of interest among the framers. Proper awareness programmes motivational drives and demonstrations may be helpful in improving socio-economic conditions of the farmers in such traditional areas.

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