A PRELIMINARY ASSESSMENT OF ISSUES RELATED TO MILL RESIDUE UTILIZATION IN MISSISSIPPI

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ABSTRACT

Mill residues obtained as a byproduct of wood processing industries represent an important feedstock for the wood-based bioenergy industry. Even though mill residues are a high quality feedstock, few published studies have addressed the issues related to their potential use in wood-based bioenergy industry. This study explored issues pertaining to mill residue utilization in Mississippi wood processing facilities by administering a mail survey instrument amongst millowners in the state. Results indicated that 92% of the total volumes of mill residues were obtained from the primary wood processing industry. Unused volumes of mill residues were higher in primary, larger, and year round operational facilities than in other mill types. Study results indicated the need for awareness regarding market opportunities, such as bioenergy, among less formally educated millowners in the state. Since considerable volumes are not internally used in mills, these mill residues can be used to generate wood based bioenergy in Mississippi.

Key words: millowner, bioenergy, regression analysis, survey, residues

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Introduction

Wood-based bioenergy has received increasing policy attention in the United States, given its numerous benefits pertaining to energy security, environment, and economy (Gruchy et al. 2012, Joshi and Mehmood 2011, Guo et al. 2007). Perlack et al. (2005) in their billion ton vision report indicated that 50% of the existing biomass energy consumption in the United States, highest among all sources, is contributed by mill residues and a large part of this volume is currently utilized to generate energy in the nation (Guo et al. 2007). Despite their widespread use, recent studies suggest that significant volumes of mill residues are still available for sale in the United States (GC and Potter-Witter 2011, Indiana Department of Natural Resources 2011). Likewise, some mill residues, in absence of a profitable market, are either disposed of or given away at no cost (Grebner et al. 2009). Given the existence of unused stocks and the relative high quality of mill residues compared to other sources (Foster et al. 2005), generating energy from mill woody residues might be relatively cost-effective form of woody biomass feedstock. Even though mill residues are a high quality feedstock, few published studies in the past (GC and Potter-Witter 2011, Carter 2010) have addressed the issues related to their potential use in wood-based bioenergy industry. Therefore, this paper is expected to fill the existing gap in knowledge pertaining to the issues related to utilization of mill residues as a bioenergy feedstock in Mississippi.

Method

The information related to residues in Mississippi forest product industries was obtained by administering a mail survey instrument. Mississippi Development Authority's online searchable SIC Code 24/25 and 26/27 database was used to obtain the mailing addresses of targeted respondents. After the pilot survey, a total of 582 surveys were mailed to key persons involved in wood processing businesses such as millowners, managers, and/or their representatives in the first week of August, 2011. The survey was administered following recommendations by Dillman (2000). The survey instrument contained three sections: 1) the type of wood processing facilities, and total volumes mill residues produced 2) information regarding methods of mill residue utilization, transportation distance and millowners' opinion on future market of mill residues, and 3) the demographic information of survey respondent.

Descriptive statistical analyses were performed to quantify the availability and use pattern of mill residues in Mississippi. Likewise, an econometric analysis was conducted to understand mill residue utilization behavior of millowners in Mississippi. Ordinary least square (OLS) regression analysis was conducted by establishing a functional relationship of available woody residues with mill characteristics, market opportunities and socio-demographic attributes in Mississippi. The multiple linear regression is functionally expressed as:

Available residue = f (type of facility, technical capacity, size, duration of operation, season of operation, organization structure, market, education, sale)

The preliminary results based on descriptive and inferential statistical analysis are reported in following sections.

Results

The total survey response was 99 returns with an adjusted response rate of 21.6%. Results based on descriptive statistics indicated that the majority of the respondents (54%) had a primary wood processing facility. In terms of volume, 92% of the total mill residue generated in Mississippi was contributed by primary wood processing facilities. Largest volumes of mill residues (69%) were internally used for energy generation. Likewise, a considerable volume (30%) was sold. Only 1% of mill residue, in absence of profitable market, was either disposed of or given away. The results based on regression analysis indicated that millowners having primary wood processing facilities, with higher number of employees, and year-round operations, were significantly more likely to have unused woody residues. Millowners interested in working with others to find better ways to utilize residues and facilities located nearby a mill residue market had a higher possibility of having unused mill residues. Finally, facility owners with postgraduate level of education were less likely to have mill residues. Regression analysis based results of significant variables are reported in Table 1.

Discussion and Conclusion

Significant OLS regression variables (level of processing facility, employee numbers, season(s) of operation, available market, millowner interest in utilization, and millowner education level) help to characterize Mississippi mills that are likely to produce unused mill residues. The sign of the variables are logical and guided by economic rationale. Since 92% of mill residues were produced in primary wood processing facilities, these facilities are of main importance. Mills with higher output production are also likely to have a larger number of employees who are generating more residues. Likewise, total volumes of mill residues generated in a seasonal forest product industry would be less than those that operate year-round. Millowners having residue markets near their firm would have a competitive market environment for their products, providing flexibility in utilizing mill residues to the best of their economic interests. It is also logical that millowners who have available unused mill residues will be more interested in working to find better ways to utilize the residues. And, millowners who may have acquired advanced managerial skills during postgraduate degree education could be better able to recognize and exploit the opportunities in mill residue utilization, thus explaining the negative correlation between graduate education and available mill residues.

Study results generally indicate that refined biomass obtained during wood processing can be utilized to develop wood-based bioenergy in Mississippi. As primary wood processing facilities and availability of unused mill residue were positively related, it can be argued that bioenergy can conceivably be generated at a competitive price, if the industry is located near a primary forest product mill.

Likewise, some information related to wood-based bioenergy and other mill residue markets might help less formally educated millowners to efficiently utilize mill residues. In summary, results indicate that forest product industries can become important contributors in supplying wood-based bioenergy feedstock in the region.

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Table 1. The attributes showing significant functional relationship with unused woody biomass in wood processing facilities, based on multiple linear regression, in Mississippi.

Variables	**Coefficient**	**t-value**
Primary processing facilities	0.98*	1.69
Larger firm in term of employee number	0.84**	2.12
Season of firm operation	2.39*	1.76
Available market	1.22**	2.03
Millowner interest to work	1.33 **	2.09
Millowner education (post graduate degree)	-1.26**	-2.05
Intercept	-0.81	
N	61	
R^2	0.31	

*significant at 10%, ** significant at 5%