

# Wood Materials Engineering Laboratory

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## V(A). Planned Program (Summary)

### 1. Name of the Planned Program

Wood Materials Engineering Laboratory

## V(B). Program Knowledge Area(s)

### 1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
511	New and Improved Non-Food Products and Processes			100%	
	<b>Total</b>			100%	

## V(C). Planned Program (Inputs)

### 1. Actual amount of professional FTE/SYs expended this Program

Year: 2008	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	4.9	0.0
<b>Actual</b>	0.0	0.0	4.0	0.0

### 2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	8306	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	234781	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	166170	0

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

For the past year, the investigation was focused on the manufacturing and properties of several natural fiber/biobased polyester composites in their solid forms. This phase of research is necessary to evaluate the mechanical, thermal mechanical, and rheological properties of various natural fiber composite materials. This study provides important guidelines and references for the foaming of these composites. The natural fibers used in this study included wood flour, nano cellulose whiskers, sugar beet pulp, and bamboo fibers. The biobased polyesters used were poly(lactic acid), poly(3-hydroxybutyrate) and poly(3-hydroxybutyrate-co-3-hydroxyvalerate). All three are cornstarch based polymers. The effects of fiber length, size, L/D ratio and compatibilization on the morphology and properties of the composites were studied. Mechanisms of reinforcing and toughening were investigated.

### 2. Brief description of the target audience

The target audience for this program will be the forest products, composites, packaging materials, transportation, and construction industries.

**V(E). Planned Program (Outputs)****1. Standard output measures****Target for the number of persons (contacts) reached through direct and indirect contact methods**

	<b>Direct Contacts Adults</b>	<b>Indirect Contacts Adults</b>	<b>Direct Contacts Youth</b>	<b>Indirect Contacts Youth</b>
<b>Year</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>	<b>Target</b>
<b>Plan</b>	150	3000	2	0
2008	150	3000	0	0

**2. Number of Patent Applications Submitted (Standard Research Output)****Patent Applications Submitted**

<b>Year</b>	<b>Target</b>
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<b>Plan:</b>	1
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2008:	2
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**Patents listed**

1. E. Brown and M.-P. Laborie. (08/2008). Method of in situ bioproduction and composition of bacterial cellulose nanocomposites, US patent No 60/957,279. 2. M.-P. Laborie. (11/2008). Surface activations of wood plastic composites, US Provisional patent No Provisional app #: 60/985,440

**3. Publications (Standard General Output Measure)****Number of Peer Reviewed Publications**

	<b>Extension</b>	<b>Research</b>	<b>Total</b>
<b>Plan</b>	2	3	
2008	0	5	0

**V(F). State Defined Outputs****Output Target****Output #1****Output Measure**

Peer Reviewed journal Articles

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2008	3	5

**V(G). State Defined Outcomes**

<b>O No.</b>	<b>Outcome Name</b>
1	Methods to improve the compatibility of natural fiber and biopolyesters and melt strength of biocomposites, knowledge of composition-morphology-property relationships of composites
2	Microcellular foaming extrusion process design and processing optimization of biocomposites; characterization of composition-morphology-property relationships of microcellular foam
3	Product application development of microcellular foaming technology of biocomposites
4	Develop and characterize hybrid lignocellulosic composites with novel biopolyester resin systems.
5	Develop novel lignocellulosic nanomaterials.

**Outcome #1**

**1. Outcome Measures**

*Not reporting on this Outcome for this Annual Report*

**2. Associated Institution Types**

**3a. Outcome Type:**

**3b. Quantitative Outcome**

Year	Quantitative Target	Actual
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**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
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**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

Public Policy changes

Government Regulations

**Brief Explanation**

**V(I). Planned Program (Evaluation Studies and Data Collection)**

**1. Evaluation Studies Planned**

Before-After (before and after program)

During (during program)

**Evaluation Results**

**Key Items of Evaluation**