

**New York State  
Environmental Investment Program  
Research Assistance Project Summary**

**Ecovative Design, LLC**

**Project Background**

Ecovative Design is a biomaterial start-up company that literally grows a drop-in replacement for plastic foams (expanded polystyrene, EPS) commonly found in protective packaging. This technology leverages the binding capability of fungal mycelium, the filamentous, root-like tissue of a mushroom, to bond low-value agricultural waste into a structural composite. All energy required for growth is derived from the farm waste, and the process is complete in just five days. This research studied the use of lignocellulosic waste streams from NYS's paper and agricultural industries as potential feedstocks for this biological platform technology.

**Project Description**

The research conducted under this scope of work sought to reduce the inherent waste and green house gas emissions associated with the synthetic materials used as protective packaging and structural cores. Ecovative's mycological (mushroom) material technology has served in protective packaging applications in the past, but the raw material inputs (agricultural waste and grain spawn) were imported into New York with a significant environmental and economic cost. This research first identified local lignocellulosic waste streams (buckwheat hulls, oat hulls, cellulose sludge) that are abundant and could be sourced from within 500 miles of Ecovative's facility in Green Island, NY. This research found an optimal

blend of these substrate constituents that met the growth (< 7 days) and mechanical metrics required for the packaging sector. Second, Ecovative's research team developed a new tissue culture media that removed the process' dependency on food-grade recourses at a fraction of the cost. Grain spawn, typically winter rye or millet, serves as a carrier for the fungal mycelium and is the standard inoculum for mushroom cultivation. This procedure, however, requires the use of consumable plastic bags and a large volume of material (grain). The tissue suspension developed under this grant leverages reusable glass fermentation vessels, and requires 40% of the total incubation volume.

**Project Results**

The mycological materials developed under this study, leveraging the NYS waste streams and novel inoculation method were tested to International Safe Transit Association standards for protective packaging, structural core performance for furniture and home compostability. The buckwheat hull, cellulose sludge (paper industry) product blend was found to meet the performance criteria for blocking and bracing applications. This product will now be able to serve in packaging applications that are shipping heavy goods such as furniture and consumer electronics.

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**Contractor:** Ecovative Design, LLC  
**County:** Albany  
**ESD Region:** Capital  
**ESD Contact:** 518/292-5340

**NYS EIP Investment:** \$134,383.15  
**Contractor Match:** \$134,383.16  
**Total:** \$268,766.31  
**Completion Date:** January, 2013