Porous Xylem Plastic (P.X.P)

Lee, Yedam (School: Boyoung Girls' High School)
Kim, Chaerin (School: Boyoung Girls' High School)
Cho, Gahyeon (School: Boyoung Girls' High School)

Expanded Polystyrene(EPS) called Styrofoam is a porous material with characteristics of high insulation and light weight. However, EPS is threatening the environment significantly as it is not dissolved naturally and it generates significant amount of CO2 in the chemical process. Also the annual increase in microplastics is the problem because marine life and sea birds eat them. This study intends to make natural porous plastic using porous xylem of 1-year old herbaceous plants to reduce the dependency on EPS. Unlike xylem of woody plants, many herbaceous plants have soft porous xylem. The herbaceous plants in this study is Ambrosia trifida which grows high within short time. The study targets eco-friendly process without any chemical process. First, unit particles of the porous xylem plastic were produced by separating porous xylem with low specific gravity from the stem using underwater centrifugal grinding based on specific gravity differences. Then, the porous xylem plastic with various properties was developed by finding optimal natural binding liquid extracted from Pachymeniopsis elliptica to make the porous unit particle absorb it and by dissolving natural additives into binding liquid. The porous xylem plastic is used to make a product which has the same purpose of the existing EPS product for comparison of functions. The analysis shows that natural porous plastic is excellent in terms of insulation, light weight, workability, and recyclability. In particular, this method is highly sustainable in that 1-year-old herbaceous plants are turned into useful resources to preserve the environment of the earth.

Awards Won: