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A.C. Kılınc, M. Atagur, O. Ozdemir, I. Sen, N. Kucukdogan, K. Sever, O. Seydibeyoglu, M. Sarikanat, Y. Seki



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## Manufacturing and Characterization of Vine Stem Reinforced High Density Polyethylene Composites

A. C. Kılınc<sup>1</sup>, M. Atagur<sup>1</sup>, O. Ozdemir<sup>2</sup>, I. Sen<sup>3</sup>, N. Kucukdogan<sup>1</sup>, K. Sever<sup>4</sup>, O. Seydibeyoglu<sup>1</sup>, M. Sarikanat<sup>5</sup>, Y. Seki<sup>3</sup>

<sup>1</sup> Katip Çelebi University Department of Materials Science and Engineering, Cigli İzmir

<sup>2</sup> Dokuz Eylul University Department of Mechanical Engineering, Buca İzmir

<sup>3</sup> Dokuz Eylul University Department of Chemistry, Buca İzmir

<sup>4</sup> Katip Çelebi University Department of Mechanical Engineering, Cigli İzmir

<sup>5</sup> Ege University Department of Mechanical Engineering, Bornova İzmir

### Abstract

Vine stem is an agricultural side product and has limited economic value. Alternative uses of such agricultural powder into value-added products such as thermoplastic composites can provide remarkable environmental and economic benefits. Vine stem filler may be used as a potential reinforcement in polymeric materials. In this study, vine stem reinforced high density polyethylene (HDPE) composite materials were manufactured and characterized. Agricultural waste of vine stem was collected from Manisa region, Turkey. Vine stems were ground in a grinder and thereby turning into the powder form. Composites were obtained using twin screw extruder by adding different amounts of vine stem powder (5, 10 and 20% wt.) into HDPE. Mechanical, thermal, water absorption and crystallographic properties of waste vine stem reinforced HDPE composites were investigated. HDPE containing 10% waste vine stem exhibited the highest tensile strength and flexural strength. Vine stem powder addition into HDPE delayed the thermal decomposition of HDPE. DMA analyses showed that the storage modulus values of reinforced HDPE are higher than neat HDPE throughout the whole temperature scale.

**Keywords:** A. Particle-reinforcement, B. Thermal properties, A. Thermoplastic resin, B. Mechanical properties, A. Recycling

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