

Accepted Manuscript

Extending the value chain of corn agriculture by evaluating technical feasibility and the quality of the interphase of chemo-thermomechanical fiber from corn stover reinforced polypropylene biocomposites

M. Delgado-Aguilar, F. Vilaseca, Q. Tarrés, F. Julián, P. Mutjé, F.X. Espinach



PII: S1359-8368(17)32161-3

DOI: [10.1016/j.compositesb.2017.11.006](https://doi.org/10.1016/j.compositesb.2017.11.006)

Reference: JCOMB 5368

To appear in: *Composites Part B*

Received Date: 27 June 2017

Revised Date: 18 September 2017

Accepted Date: 2 November 2017

Please cite this article as: Delgado-Aguilar M, Vilaseca F, Tarrés Q, Julián F, Mutjé P, Espinach FX, Extending the value chain of corn agriculture by evaluating technical feasibility and the quality of the interphase of chemo-thermomechanical fiber from corn stover reinforced polypropylene biocomposites, *Composites Part B* (2017), doi: 10.1016/j.compositesb.2017.11.006.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

1 **Extending the value chain of corn agriculture by evaluating technical feasibility and the**
2 **quality of the interphase of chemo-thermomechanical fiber from corn stover reinforced**
3 **polypropylene biocomposites**

4 By:

5 Delgado-Aguilar, M.^a, Vilaseca, F.^{b*}, Tarrés, Q.^a, Julián, F.^c, Mutjé, P.^a, Espinach, FX.^{c*}

6 ^a Laboratory of Paper Engineering and Polymer Materials (LEPAMAP), Department of Chemical Engineering,
7 University of Girona, C/ M. Aurèlia Capmany 61, Girona 17071, Spain

8 ^b Advanced Biomaterials and Nanotechnology (BIMATEC), Department of Chemical Engineering, University
9 of Girona, C/ M. Aurèlia Capmany 61, Girona 17071, Spain

10 ^c Design, Development and Product Innovation (PRODIS), Department of Organization, Business Management
11 and Product Design, University of Girona, C/M. Aurèlia Capmany 61, Girona 17071, Spain

12 * Escola Politecnica Superior. Avda. Lluís Santalo, s/n, 17071 Girona, Spain.
13 Francisco.espinach@udg.edu, Fabiola.vilaseca@udg.edu, tlf. +34 650 206 884, FAX +34 972
14 418 399

15 **ABSTRACT**

16 With the increasing concerns towards the environment, industries are interested in
17 substituting glass fibers by natural fiber. Nonetheless, filaments or strands from jute, hemp or
18 abaca, are mainly used as reinforcement. Such fibers are, in some cases, more expensive than
19 the glass fibers that are replacing. Grain corn harvest creates a huge amount of by-products in
20 the shape of corn stover. These stover usually remains in the field to be incinerated, or
21 recovered to prepare feedstuff, or bedding for livestock. Besides, corn is a globally spread
22 crop, and consequently, corn stover becomes available as renewable source for reinforcing
23 fibers. The aim and main novelty of the research is transforming a by-product as corn stover
24 into a cheap source of reinforcing fibers to obtain competitive biocomposites. To do so, such
25 biocomposites must show mechanical properties comparable to those materials currently
26 present in the market. In this work, biocomposites reinforced with natural fibers from corn
27 stover are used as reinforcement of polypropylene; their mechanical properties are
28 investigated and compared. Moreover, the interphase between the reinforcement and the
29 matrix is also modelled by means of the Kelly and Tyson equation to assess its quality.

30 **Keywords:** A. Fibres; B, Interphase, Strength; E, Injection molding

31 **1 INTRODUCTION**

32 Corn is one of the most extended crops in the world, and in some countries like the USA
33 is the most widely grown [1]. The estimated corn stocks availability is of 153 million dry tons
34 every year in the USA [2]. The worldwide production of corn for the 2016 was about 1030
35 million Tons. After harvesting, corn generates high amounts of by-products, in the shape of
36 straws, but also as stover [3, 4]. In terms of constituents, corn stover is composed of stalks
37 (including pitch), leaves, husks, and cob, being all of them lignocellulosic materials, rich in

Download English Version:

<https://daneshyari.com/en/article/7212316>

Download Persian Version:

<https://daneshyari.com/article/7212316>

[Daneshyari.com](https://daneshyari.com)