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## An enzymatic-based process for the extraction of fibers from diss stems with for composites reinforcement

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The diss plant (*Ampelodesmos mauritanicus*) is an herbaceous perennial plant of the family *Gramineae* that lives on arid and sandy soils, typical of Mediterranean grassland. The species is widespread in North Africa, in coastal areas of Spain, France, Balkan, Turkey and Italy (in particular, on the arid coastal slopes of the Center-South, in Sicily and in the coastal region of Liguria). Its stems are composed of cellulosic filaments linked by lignin, pectins and hemicellulose. Short fibers can be obtained from the stems by aggressive extraction methods which eliminates the binders. They can be used for paper production. On the other hand, the extraction of long and flexible fibers, useful for the production of reinforcement of composites, is not yet developed and is therefore the subject of this work. Stems were treated with 0.25 M KOH in autoclave at 140°C for 1 h in order to remove lignin, in the presence of 1.5% of sodium hydrosulfite used as reducer agent. Delignified stems were then treated with different enzymes (pectinases, xylanases and a mixture of them) for pectin and hemicelluloses removal. This treatment was performed at 50°C, pH 4.5 for 1 h. The effect of enzymatic treatments on the morphological, chemical composition and mechanical properties of diss fibers was investigated and the effectiveness of enzymatic treatments has been evaluated. The results indicate that the tensile properties of fibers were greatly improved when an optimized enzymatic-based process was used to separate the fibers from the stems. This work also showed that enzymes offer an attractive and eco-friendly approach to extract plant fibers.



Figure 1: Diss plant.

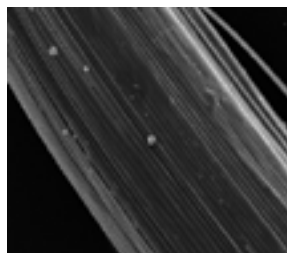


Figure 2: SEM image of a Diss fiber.

### Biography

Antonio Zuorro is a Professor of Biochemical Engineering Fundamentals and Chemical Engineering for BioMedical Systems in the Department of Chemical Engineering Materials and Environment of Sapienza University of Rome. He received his MS and PhD degrees in Chemical Engineering from Sapienza University of Rome. His research activity has been mainly focused on the development of innovative chemical and biotechnological processes for the recovery of high value-added compounds from by-products and agro-industrial residues, such as lycopene from tomato waste and phenolic antioxidants from artichoke and bilberries waste, olive pomace and coffee grounds. He also examined the possibility of including the extracts obtained in consumer food products to get new functional foods with high antioxidant activity. In the field of enzyme technology, he studied the use of multi-enzyme systems with enhanced activity for the recovery of lipids and bioactive compounds with high added value from microalgae. He is the author of over 60 scientific publications and several industrial patents, ranging from the biochemical extraction of valuable compounds to the fibers recovery for material applications.

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