

Letter to the Editor

The research paper “Applications of Acid Protease for Ecofriendly Pre-Treatment of Goat Skin to Improve Antimicrobial Finish Using Herbal Natural Extracts” mainly focuses on the eco-friendly treatment of goat skin with acid protease enzyme to study its effect on surface and bulk properties and also on the uptake of plant extracts (Extracts from leaves of *Azadirachta Indica*, *Ocimum sanctum*, *Camellia sinensis*) which can render an antimicrobial finish. In the research paper, the authors have not claimed the antimicrobial finish for leather. With the word ‘finish’ the authors have tried to allude to the antibacterial property gained by the goat skin due to uptake of the plant extracts.

The material used in the experiment is ‘goat skin’; the title of the research paper and description of the material clearly states that this experimental study was performed using goat skin with all pre-tanning treatment. Also, the authors are aware that animal skin/hide after the beam house operations are subjected to the tanning process so that the skin/hide becomes resistant to bacterial growth and biodegradation and would have acquired thermal and mechanical stability. But before tanning, the hide/skin is highly susceptible to microbial degradation and that is why salt preservation/chemical preservation is used conventionally for preventing biodeterioration of hide/skin. Conventional processes can discharge high TDS and toxic chemicals in wastewater. Considering the environmental impacts associated with conventional wet chemical processes before tanning, now many researchers are working on preserving skin/hide with plant extracts (Vijayalakshmi, K. et al. 2009; Sirvaityte, J. et al. 2011; Samidurai, S. et al. 2022; Sivakumar, V. et al. 2016). Also, there is a trend to utilize various enzymes for beam house operation (De Souza, Et al. 2012; Saran, S. et al. 2013; Khambhaty, Y., 2020).

The antimicrobial finish provided to the goat skin may get lost if it is subjected to the tanning process. But that doesn’t mean the study is moot or scientifically insignificant as both enzymatic treatment and plant extracts have increasingly been utilized by contemporary researchers for the pre-tanning process. Taking into consideration the above-mentioned facts, please comprehend that the study presented in the research paper is an attempt to understand the effect of the acid protease on the surface and bulk properties of goat skin and how it would improve the uptake of the plant extracts to impart antibacterial property to the goat skin. There is even a possibility that the enzymatic treatment may improve the uptake of plant extracts used for vegetable tanning.

One question concerns the rationale for the research undertaken—“leather is highly prone to microbial proliferation and biodeterioration”. The microbial proliferation and biodegradation of leather depends on environmental conditions and with favorable conditions leather is susceptible to microbial growth, particularly fungi. There is scientific literature on improving the antimicrobial property of leather and hides by applying various antimicrobial agents (Luo, Q. et al 2016; Mahmud, Y et al. 2020; Elsayed, H. et al. 2021; Lkhagvajav, N. et al. 2015; Wu, X. et al. 2021).

The antimicrobial properties of any substrate are always characterized quantitatively and qualitatively. The agar diffusion test and zone of inhibition method have commonly been used for qualitative analysis. Antimicrobial agents adhered to the surface of the substrate leak off and disperse in agar, forming an inhibition zone. In the present study, the increased zone of inhibition in the case of the enzyme-treated goat skin finished with the plant extract compared to untreated goat skin finished with the plant extract indicates more uptake and better absorption of plant extract after the enzymatic treatment.

— Prof. Lalita Ledwani

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