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Research

Polycaprolactone/Cellulose Acetate Loaded *Psidium guajava* Essential Oil Electrospun Nanofibrous Mat Dressing for Healing Wounds

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ABSTRACT

Natural products and essential oils of medicinal plants are extensively employed in wound healing, particularly in the pharmaceutical industry. Essential oils obtained from *Psidium guajava* were utilised as an antibacterial agent against *Bacillus subtilis*, *Staphylococcus aureus*, and *Enterococcus faecalis*, and to control drug-resistant strains. In this study, electrospinning for applications in antimicrobial activity and drug delivery systems was used to develop biocomposite nanofibers of Polycaprolactone (PCL)/Cellulose Acetate (CA) and *Psidium guajava* essential oil (PGEO). Images from the FESEM revealed that the mean fire diameters were 120 nm for the PCL/CA and 223 nm for PCL/CA/PGEO biocomposite nanofibers. The diameters of the nanofibers were increased following the addition of PGEO into PCL/CA nanofibers. Furthermore, FTIR studies revealed the -OH peak in pure electrospun PCL/CA and PCL/CA/PGEO, lacking pure PGEO nanofibrous mats. These findings reflect that *Psidium guajava* essential oil/PCL/CA electrospun nanofibers are promising candidates for presenting bioactive compounds in wound management or other approaches for wound healing and bacterial infections.

Key words: Biocomposite nanofibers, cellulose acetate (CA), polycaprolactone (PCL), *Psidium guajava* essential oil (PGEO), wound healing

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INTRODUCTION

Psidium guajava, a medicinal plant known as 'Jambu batu' in Malaysia, has been produced in the country for a long period (Zuhaira *et al*., 2018). Nevertheless, it is only recently that researchers have developed an interest in elucidating its diverse properties. There are approximately 150 species in the *Psidium* genera and the economically significant species is *Psidium guajava*. Most of the species are cultivated in tropical and subtropical countries as shrubs and evergreen trees (Thenmozhi & Rajan, 2015). *Psidium guajava* is classified under the Maystrecea family with a history in medicine due to its antiinflammatory, antimicrobial, antimalarial and antitumour properties (Anand *et al*., 2016). The plant is grown worldwide given the significance of its leaves and fruits as food and nutritional values (Joseph & Priya, 2011). Meanwhile, the ethnomedicinal uses comprise crushing the leaves and applying the extract in wound management such as open injuries, infectious sites, and burned skin. The crushed leaves are also employed in treating acne lesions (Ekom & Tamokou, 2018).

The presence of specific active components such as tannins, polyphenols, flavonoids, and saponins are responsible for the antioxidant activities of *Psidium guajava* aqueous leaf. Nevertheless, quercetin derivatives are recognised as the main active constituent in the plant (Thenmozhi & Rajan, 2015). Most of them are essential oil-producing shrubs or evergreen trees. A prior study demonstrated that b-bisabolene, caryophyllene oxide b-copanene, farnesene, selinene, humelene, cardinene, and