

Post-harvest handling effect on chemical composition and antibacterial properties of rose-scented geranium essential oil cultivated in the Western Himalayas

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Received 10 July 2025; revised received 28 November 2025; accepted 01 January 2025

The present investigation aimed to evaluate the effect of various post-harvest drying intervals on the essential oil yield and chemical composition of rose-scented geranium. This study also assessed the antibacterial efficacy of essential oil extracted from rose-scented geranium (*Pelargonium graveolens* L'Her.) cultivated under mid-hill agro-climatic conditions of the Western Himalayas. In this study, four post-harvest drying intervals were evaluated: T1 (0 h), T2 (24 h), T3 (48 h), and T4 (72 h). The essential oil extraction was conducted by hydro-distillation, and the chemical profiling was performed by gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS). The principal constituents identified in the essential oil included citronellol (44.2–49.4%), geraniol (17.0%), linalool (2.1–3.3%), iso-menthone (6.3–7.14%), and citronellyl propanoate (4.3–6.3%). The highest essential oil yield was observed after 24 hours of drying (T2), accompanied by a desirable citronellol to geraniol (C: G) ratio of approximately 3:1 (citronellol 49.4%; geraniol 17.4%). The antibacterial activity of the essential oil was evaluated against six bacterial strains: three Gram-negative (*Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, and *Escherichia coli*) and three Gram-positive (*Bacillus subtilis*, *Micrococcus luteus*, and *Staphylococcus aureus*). The minimum inhibitory concentrations (MICs) of the essential oil ranged from 0.625% to 10% (v/v), indicating significant antimicrobial potential. In conclusion, a post-harvest drying duration of T2 (24 h) was found to optimise essential oil yield, maintain a favourable compositional profile and enhance its antibacterial efficacy. These findings suggest that properly timed post-harvest processing can enhance the pharmaceutical applicability of *P. graveolens* essential oil.

Keywords: Bacterial strains, Citronellol, Essential oil, Geraniol, Gram-negative, Hydro-distillation

IPC code; Int. cl. (2021.01)– A61K 36/00, A61P 31/00