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**Volatile Profiling and Assessment of the Bio-Efficacy of *Sandoricum koetjape* Essential Oil as a Botanical Insect Repellent Against *Sitophilus oryzae* (L.) (Coleoptera: Curculionidae)**Liyanage, H.T.<sup>1</sup>, Chinthaka, S.D.M.<sup>1\*</sup>, Perera, A.G.W.U.<sup>2</sup><sup>1</sup>Department of Chemistry, University of Sri Jayewardenepura, Nugegoda, Sri Lanka<sup>2</sup>Department of Zoology, University of Sri Jayewardenepura, Nugegoda, Sri Lanka\*[sdmchin@sjp.ac.lk](mailto:sdmchin@sjp.ac.lk)**Abstract**

Infestation caused by the ubiquitous cosmopolitan stored-grain insect pest, the rice weevil, *Sitophilus oryzae*, has become a globally significant problem owing to its heavy losses in post-harvest storage systems. Meanwhile, the escalating interest in the search for green alternatives to synthetic pesticides has become the impetus for the investigation, formulation, and evaluation of biorational pesticides that overcome the undesirable ecological and adverse human health impacts due to conventional pesticides. The major way these insect pests detect their substrates is through olfaction, and plant essential oils have been proven to result in promising repulsive properties by building repulsive odor barriers and thus acting as insect repellents. Therefore, the present study aimed at characterizing the volatile constituents of *S. koetjape* essential oil (SKEO) and evaluating the bio-efficacy of its insect repellent activity against *S. oryzae*. The essential oil was extracted from the wood of *S. koetjape* via hydrodistillation using a Clevenger-type apparatus, and the chemical composition was characterized through gas chromatography-mass spectrometry (GC-MS) analysis. Test insect cultures were maintained under ambient thermo-hygrometric conditions of 29±2° C and 84±10% relative humidity. One-week-old coetaneous mixed-sex cohorts of adult *S. oryzae* were used in all experiments. The area preference bioassay was conducted to assess the repellency of SKEO by determining the 100% repellent concentration (RC<sub>100</sub>) of SKEO and 95% repellent concentration (RC<sub>95</sub>) of SKEO was calculated through a probit analysis. The GC-MS analysis resulted in nine compounds accounting for 68.6% of the wood essential oil of *S. koetjape*, with Spathulenol (43.7%), a tricyclic sesquiterpene alcohol, being the predominant compound. Other major volatile compounds present were sesquiterpenoids: Viridiflorene (8.8%), and Viridiflorol (3.4%); Caryophyllene (4.8%), a sesquiterpene; and Myristicin (2.5%), an aromatic ether. All these compounds possess insect repellent activity, as per mentioned in literature. In the area preference bioassay, 100% repellency was observed at the highest dose, which was 3.77 µL cm<sup>-2</sup> after a six-hour exposure period, and the RC<sub>95</sub> value was recorded as 3.65 µL cm<sup>-2</sup>. Thus, it can be concluded that the wood essential oil of *Sandoricum koetjape* can be utilized as a botanical insect repellent against *S. oryzae*, and in future studies, the volatile organic compounds identified can be utilized in the formulation of novel phytochemical bio-pesticides in stored-grain insect pest management.

**Keywords:** *Sandoricum koetjape*, *Sitophilus oryzae*, Essential oil, Repellency, Botanical insect repellent