

(151)

**Proximate composition, fatty acid and mineral profiles of *Trichadenia zeylanica*
Thwaites nuts: from traditional use to scientific validation**

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Abstract

Trichadenia zeylanica Thwaites is a plant endemic to Sri Lanka, belongs to the family *Achariaceae*. It's commonly known as “*Tholol*” among the rural communities, and nuts are traditionally consumed as a delicacy. Despite its ethnobotanical uses, this species remains underexplored, and studies evaluating its nutritional potential have not yet been conducted. This study aimed to assess the nutritional composition of *T. zeylanica* nuts by analysing their proximate composition, fatty acid profile and mineral content. Samples were collected from Weddagala, Kalawana, Sri Lanka (6.4387719 °N, 80.4082348 °E), and subjected to proximate analysis with standard protocols. Fatty acid methyl esters (FAME) were prepared and analysed through gas chromatography-mass spectrometry (GC-MS). Inductively coupled plasma-mass spectrometry (ICP-MS) was utilized to evaluate mineral composition. Proximate analysis showed, nuts are rich in lipids, with a high crude fat content of 56.66±1.36%. These nuts also accounted for 17.53±0.12% of crude protein in their dry weight, serving as a notable plant-based protein source. The carbohydrate content was relatively low at 5.26±1.62%, complemented by a crude fibre content of 5.31±0.09%. The moisture content was 15.12±4.27% and the ash content was 2.55±0.28%. The fatty acid profile showed a composition dominated by saturated fatty acids (SFAs), which constituted over 62% of the total fat content. Palmitic acid was the most prominent SFA. Nuts also consisted 37% of unsaturated fatty acids, most abundantly with linoleic acid. The complex lipid profile warrants further investigation into its health implications. The mineral composition revealed a distinctive and complex profile. The seeds were rich in certain trace elements, such as Rubidium (31.5±0.339 µg/g) and Vanadium (27.4±0.189 µg/g), which are rarely reported in common edible nuts. Essential minerals such as Zinc (7.83±0.574 µg/g) and Copper (3.54±0.135 µg/g) were present at moderate levels. However, the analysis detected presence of heavy metals, including Arsenic, Cadmium, and Lead at trace levels which are below the recommended values. In conclusion, *T. zeylanica* seeds represent a promising, nutrient-dense wild food source, characterized by high levels of fat and protein, a unique mineral profile, and a complex fatty acid composition. The study scientifically validates nutritional composition and emphasizes the potential for developing of *T. zeylanica* seeds into a functional food or nutritional supplement through further studies including toxicity assessments.

Keywords: *Fatty acid profile, Mineral analysis, Nutritional potential, Proximate composition, Trichadenia zeylanica.*