



**INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS**

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Programme of Study	:	Ph.D.
Thesis Title	:	Green solvent extraction, purification, carrier design and food application of natural antioxidants from ginger varieties of northeast India
Name of Thesis Supervisor(s)	:	Professor Vaibhav V. Goud & Professor Chandan Das
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SHORT ABSTRACT

Antioxidants play a vital role in preventing or delaying autoxidation and have attracted commercial interest as additives and stabilizers in food product development, dietary supplements, natural health products, and a range of pharmaceutical products. Northeast India is one of the largest biodiversity hotspot regions of the world. Considering this as motivation, gaps were identified in the existing state of the art, and this research work has been undertaken towards exploring the antioxidant potential of northeast Indian ginger varieties and its food applications. A comprehensive database of chemical and physical properties of nine different varieties of ginger collected from various parts of northeast India is presented. *Sungro-sung* variety from Nagaland was best in terms of overall antioxidant as well as nutritive potential. For this variety, a single step green process using supercritical CO₂ (SCCO₂) extraction coupled with fractionation was developed for simultaneous separation of gingerols rich oleoresin and volatile oil. Optimized and scale-up validation of this process resulted in 5.95 % yield of (96.15 % pure) oleoresin having 51.2 wt % of major actives, and 2.71 % yield of volatile oil (95.94 % pure). The poor water solubility of the extracted gingerols rich oleoresin was improved by designing a food grade carrier system targeting non-lipid based food applications. The final formulation contains 27 wt % surfactant (Gelucire 44/14), 11 wt % co-surfactant (Transcutol 90), 46.5 wt % of ginger oleoresin, and 15.5 wt % of Capryol 90 as oily vehicle. The average globule size of the dispersion prepared from the formulation is in the nano range (<50 nm) and the dispersion is

stable until 24 h. The anhydrous formulation is found to be stable in a long term storage for 90 days in an accelerated condition (40 °C and 75 % RH). The developed formulation also shows 95.4 % enhancement in water dispersibility of ginger actives over pure oleoresin. The developed formulation is finally utilized for developing a ginger actives infused fruit based nutraceutical food product. Gingerols infusion into mango matrix not only improves its functional quality, but also results in substantial enhancement in overall sensory scores as well as shelf life of the developed product in a range of different storage conditions.

