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Diversifying lycopene and bioactive compounds: An exploration of alternative sources in various types of underutilized edible herbs

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Malaysia is globally recognized for its abundant unique flora, fauna, and distinctive culinary traditions. Unfortunately, there is limited awareness and understanding of the significant, nutritious, and medicinal herbs found in the country, primarily stemming from a lack of knowledge and neglect of these readily available and affordable edible crops. This oversight extends to the underestimation of the functional food potential of numerous underutilized edible herbs due to a lack of recognition for their essential bioactive compounds and lycopene content. In this regard, bioactive compounds and lycopene content were tested in underutilized edible herbs such as Etlingera coccinea (wild ginger), Etlingera elatior (torch ginger), Hibiscus sabdariffa (Roselle), Eleutherine bulbosa (wild onion), and Clitoria ternatea (butterfly pea flower).

Methodology and data collection: Essential antioxidant compounds, including Total Phenolic Content (TPC), Total Flavonoid Content (TFC), Total Carotenoid Content (TCC), β-Carotene Content, and Lycopene Content, were determined. The antioxidant activity was assessed through 1,1-Diphenyl-2-Picrylhydrazyl (DPPH) and Ferric Reducing Antioxidant Power (FRAP) assays. Here tomato was considered as control.

Findings: This study revealed that Torch ginger exhibited the highest lycopene content at 442.62 mg/100g, followed by wild ginger (440.46 mg/100g) and Roselle (436.87 mg/100g); surprisingly, all these amounts did not differ significantly from the lycopene content of Tomato (444.53 mg/100g; control). Furthermore, Butterfly pea (385.67 mg/100g) and Wild onion (347.86 mg/100g) also had satisfactory amounts of lycopene. Wild ginger also demonstrated the highest beta-carotene content (401.22 mg/g) compared to other samples. However, Roselle stood out with the highest Total Phenolic Content (TPC) at 126.86 mg GAE/g, along with the highest DPPH antioxidant activity, having the lowest IC50 values of 73.82 µg/ml. On the other hand, Butterfly pea flower contained the highest Total Flavonoid Content (TFC) at 1.37 mg QE/g, the highest Total Carotenoid Content (TCC) at 2.41 µg/g and FRAP antioxidant activity at 4.147 µmol TE/g, respectively. Since each herb possesses unique lycopene and other bioactive compounds, they may indeed offer distinct health benefits.

Conclusion & Significance: Through a comprehensive analysis, it is evident that these herbs possess a rich array of bioactive compounds, including but not limited to antioxidants, flavonoids, and lycopene. Ultimately, the assessment of underused edible herbs has demonstrated their capacity as abundant reservoirs of vital bioactive substances, including lycopene. Incorporating these herbs into our meals may be a pragmatic and efficacious method to enhance health and nutrition. Despite Torch ginger having the highest lycopene content, the other four underutilized edible herbs also contain a considerable amount of other essential bioactive compounds, suggesting greater health benefits. However, additional investigation and efforts to raise awareness are necessary to encourage the growth, consumption, and integration of these herbs into widely accepted dietary habits, thus developing a comprehensive approach to nutrition and well-being.

Biography

Dr. Md Amirul Alam is an Agriculture graduate with Master of Science in "Genetics and Plant Breeding". Dr. Alam obtained his PhD in "Agronomy" from University Putra Malaysia (UPM). Currently he is working as "Senior Lecturer" at the Faculty of Sustainable Agriculture, University Malaysia Sabah (UMS). Dr. Alam is well-known as a professional reviewer of various international peer reviewed journals and reviewed more than 75 journal manuscripts and published more than 80 research articles. Dr. Alam's current Google Scholar h-index is 23, RI score 1403 with h-index 22 and Scopus h-index 18. He is now working on nutritional biofortification of several crops through agronomic and breeding approach; evaluation of indigenous, underutilized crop plants along with diverse weed germplasms to find out alternative food crops for the future to mitigate the effect of climate change on food security and sustainability. He is also involved in microgreen productions and quality seed productions of various crops.