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Optimizing Bioactive Properties of *Garcinia queasita* and *Moringa oleifera* Combinations: Phytochemical, Antioxidant, and Anti-inflammatory Insights

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Garcinia and Moringa are widely recognized for their medicinal properties. The objective of this study was to determine the optimal combination of the two plant species to maximize their *in vitro* bioactivity. Air-dried, mechanically-powdered, and sieved *Garcinia queasita* fruit and *Moringa oleifera* mature leaves were mixed in nine different ratios (G90:M10, G80:M20, G70:M30, G60:M40, G50:M50, G40:M60, G30:M70, G20:M80, and G10:M90). All the combinations and the unmixed plant samples were analysed through *in vitro* bioassays. The radical scavenging activity was analysed by the 2, 2-diphenyl-1-picrylhydrazyl (DPPH) assay. The radical scavenging ability of G70:M30 combination demonstrated the most potent IC_{50} of 0.202 mg/mL while unmixed *G. quaesita* and *M. oleifera* exhibited IC_{50} values of 0.331 mg/mL and 0.770 mg/mL, respectively. The standard ascorbic acid showed an IC_{50} of 0.399 mg/mL. The G70:M30 combination demonstrated the most potent IC_{50} of 0.120 mg/mL in the *in-vitro* anti-inflammatory experiment, which was carried out using the human red blood cell (HRBC) membrane stabilization assay. *G. quaesita* and *M. oleifera* alone showed IC_{50} values of 0.124 mg/mL and 0.674 mg/mL, respectively, while standard ibuprofen recorded an IC_{50} of 0.141 mg/mL. The total phenolic content (TPC) was analysed by the Folin-Ciocalteu assay. The highest TPC was observed in the G30:M70 of all combinations, with a value of 261.80 mg GAE/g ± 22.62 . *M. oleifera* and *G. quaesita* demonstrated 226.08 mg GAE/g ± 66.93 and 276.45 mg GAE/g ± 38.31, respectively. The aluminum chloride colorimetric assay determined total flavonoid content (TFC). For the TFC assay, the G10:M90 combination showed the highest value of 87.82 mg QE/g±0.22 while *M. oleifera* and *G. quaesita* exhibited values of 85.99 mg QE/g±0.96 and 50.67mg QE/g±0.11, respectively. These findings suggest that specific combinations of the plants can significantly enhance bioactive properties, highlighting their potential in therapeutic research.

Keywords: *bioactive synergies, garcinia, moringa, radical scavenging activity, anti-inflammatory activity, optimal combinations*