



“DORIVOR O‘SIMLIKLARNI YETISHTIRISH VA ULARDAN FOYDALANISHNING DOLZARB MASALALARI” MAVZUSIDAGI O‘ZBEKISTON – XITOIY XALQARO SIMPOZIUMI MATERIALLARI TO‘PLAMI



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PROCEEDINGS OF UZBEKISTAN-CHINA INTERNATIONAL SYMPOSIUM ON "CURRENT ISSUES IN THE CULTIVATION AND UTILIZATION OF MEDICINAL PLANTS"



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**SUSTAINABLE UTILIZATION OF MEDICINAL PLANTS: EXPLORING
THE ANTIOXIDANT AND ANTICANCER POTENTIAL OF POLARITY-
BASED PLANT FRACTIONS**

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Abstract. Medicinal plants remain an important source of bioactive compounds for the development of new therapeutics. In the present study, polarity-based fractions of *Ricinus communis*, *Baliospermum montanum*, *Luffa acutangula*, and *Coriandrum sativum* were evaluated for their antioxidant and antiproliferative activities against human breast cancer cell lines (MCF-7 and MDA-MB-231) and DPPH free radical scavenging assay. Several fractions exhibited significant, dose-dependent inhibition of cancer cell growth, with ethyl acetate and chloroform fractions showing the strongest activities and DPPH free radical inhibition. Chemical profiling by GC–MS/MS and LC–MS/MS tentatively identified a broad range of bioactive metabolites, including phenolics, terpenoids, and fatty acid derivatives. The findings suggest that these medicinal plants possess promising antioxidant and anticancer potential and may serve as valuable sources for the discovery of novel plant-derived therapeutic agents.

Keywords: Medicinal Plants, Anticancer and Antioxidant Activity, Bioactive Metabolites, GC–MS/MS and LC–MS/MS Profiling

Introduction. The Indian and Chinese system of traditional medicines well documented the role and importance of natural products to treat variety of human ailments, promote healing, and maintain overall well-being [1-3]. In recent years, there has been a resurgence of interest in medicinal plants for sustainable, and cost-effective solutions to modern health challenges [3]. Breast cancer in women is one of the leading causes of cancer associated mortality worldwide. Additionally, the reactive free radicals have been associated in progression of different diseases directly or indirectly with every human disease [4, 5]. The present study investigated the anti-proliferative effect of different polarity-wise fractions against breast cancer cell lines and DPPH free radical inhibition through in vitro experimentations and identification of chemical constituents through GC-MS/MS and LC-MS/MS.

Research Methodology. The antiproliferative effect of the different polarity-wise fractions from *Ricinus communis*, *Baliospermum montanum*, *Luffa acutangula* and *Coriandrum sativum* selected plants against MCF-7 and MDA-MB-231 were assessed by using SRB assay. The antioxidant potential was evaluated by DPPH free radical scavenging assay. The GC and LC-mass spectrometry was used to explore the chemical constituents in the bioactive fractions.

Results and Discussion. The SRB assay showed the dose dependent inhibition in cell proliferation of MDA-MB-231 and MCF-7. Among the compounds, EARC and CFBM demonstrated highest toxicity on MCF-7 with their IC₅₀ values at 16.0 µg/ml each, however the fraction EACS showed least toxicity on MCF-7 with an IC₅₀ value of 292.0 µg/ml. Regarding MDA-MB-231, EALA exhibited highest toxicity with an IC₅₀ at 16.0 µg/ml whereas MFRC was found to be least toxic, with an IC₅₀ value of 301 µg/ml. The IC₅₀ values indicated varying sensitivity of both the cell lines to the compounds. Evidently, MCF-7 exhibited greater sensitivity with many compounds depicting strong antiproliferative activity at low concentrations. Similarly, the fractions obtained through chloroform and ethyl acetate solvents were found to be more effective in DPPH free radicals' inhibition. The Gas chromatography and Liquid Chromatography coupled with mass spectrometry profiling of bioactive fractions revealed tentatively identification of several different classes molecules which may attributed to bioactivity of studied plants materials.

Conclusion. The present study demonstrated that polarity-based fractions derived from *Ricinus communis*, *Baliospermum montanum*, *Luffa acutangula*, and *Coriandrum sativum* possess significant cytotoxic activity against human breast MDA-MB-231 and MCF-7 cancer cell lines. Among the investigated fractions, EARC, CFBM, and EALA exhibited the most prominent cytotoxic effects. Integrated GC–MS/MS and LC–MS/MS analyses explore extensive chemical variety within the active fractions, including sulfur-containing compounds, fatty acid derivatives, terpenoid-like metabolites, phenolics, glycosides, oxygenated lipids, and heterocyclic compounds. The coexistence of multiple bioactive metabolites suggests that the observed anticancer effects may arise from synergistic interactions targeting oxidative stress regulatory pathways. The findings facilitate valuable insight into the metabolite composition and biological significance of these medicinal plant fractions and support their potential as promising sources for the discovery of novel plant-derived anticancer agents. Further investigations involving high-resolution metabolomics, molecular networking, metabolite isolation, and in vivo validation are warranted to identify the precursor compounds responsible for the observed pharmacological activities and to elucidate their precise molecular mechanisms.

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DESIGN OF SPINEL NANOMATERIALS FOR PHOTOCATALYTIC DEGRADATION OF WATER CONTAMINANTS

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Abstract: Water contamination caused by industrialization, urbanization, and agricultural activities has emerged as a major global environmental challenge. The presence of persistent organic pollutants, dyes, pharmaceuticals, pesticides, and heavy metals in aquatic systems poses serious risks to both human health and ecosystems. Among various wastewater treatment technologies, photocatalysis has gained significant attention as an environmentally friendly and sustainable approach for the degradation and mineralization of water contaminants. In recent years, spinel nanomaterials with the general formula MFe_2O_4 ($M = Co, Ni, Zn, Mn, Mg, Cu, \text{etc.}$) have emerged as promising photocatalysts owing to their unique structural, optical, magnetic, and electronic properties. Their narrow band gaps, high chemical stability, facile magnetic recovery and tunable surface characteristics make them suitable candidates for visible-light-driven photocatalytic applications. This review provides a comprehensive overview of the design strategies employed to enhance the photocatalytic performance of spinel nanomaterials for water purification. Particular emphasis is placed on the degradation mechanisms of various water contaminants, including organic dyes, pharmaceutical residues, pesticides, and emerging pollutants under UV and visible-light irradiation. This review aims to provide valuable insights into the rational design of next-generation spinel photocatalysts for effective remediation of water contaminants.

Keywords: Spinel nanomaterials; Photocatalysis; Water remediation; Advanced oxidation processes (AOPs); Charge carrier dynamics; Environmental nanotechnology

PROBLEMS OF INTRODUCTION OF MEDICINAL PLANTS IN UZBEKISTAN

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