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Perspective

Antioxidant and Antimicrobial Activities of Aromatic Plants

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PERSPECTIVE

Aromatic herbs are frequently employed as natural remedies. Natural resources, particularly plant-based products, have become an intriguing area of medication discovery and development research. Aromatic plants are mostly used for extracting essential oils, which are used in industries such as cosmetics, flavouring and fragrance, spices, insecticides, repellents, and herbal beverages. Only a few researches on aromatic plants, particularly for radioprotection, are known, despite the fact that several medicinal herbs have been studied to treat various conventional ailments. Many plant extracts have been shown to contain antioxidants that scavenge free radicals created by radiation, giving them radio protective properties. Medicinal and aromatic plants are plants with medicinal or aromatic properties that are used in pharmacy and/or perfumery; however, medical, aromatic, and cosmetic plants would be a better name because many medicinal and aromatic plants are also used in cosmetics. Aromatic plants contain aromatic chemicals, which are essentially volatile essential oils at room temperature. These essential oils are highly concentrated molecules that are odorous, volatile, hydrophobic, and volatile. Flowers, buds, seeds, leaves, twigs, bark, wood, fruits, and roots are all sources. Essential oils are complex combinations of secondary metabolites made up of phenylpropenes and terrenes with low boiling points. These oils often include tens to hundreds of terpenoids with low molecular weight. Even undiscovered trace ingredients may be responsible for a significant change in the smell, flavour, and bioactivity of the oil.

Aromatic plant antioxidant and antibacterial activities have been extensively studied and proved to offer health benefits in the prevention and reduction of diseases such as inflammation, atherosclerosis, cardiovascular disease, and cancer. Due to their strong antioxidant effects, certain plant families, particularly Lamiaceae, Apiacea, and Zinziberaceae, have been explored in depth for their therapeutic usefulness. The antioxidant activities of aromatic plants are influenced by a variety of factors, including growing conditions, processing/extraction methods, and, most importantly, antioxidant constituents. As a result, the methods used to determine antioxidant capacity and extraction play a critical role. Radiation is a potent cytotoxic agent, as everyone knows. Ionizing radiation in the biologic system produces reactive oxygen species such as superoxide anion, singlet oxygen, hydroxyl radical, nitric oxide, hydrogen peroxide, and proxy radicals, which are responsible for cellular destruction to DNA and proteins. Due to oxidative damage to the sugar moiety and base components, free radicals created by ionising radiation attack DNA, causing single strand breaks (SSBs) and double strand breaks (DSBs). Unrepaired or incorrectly repaired DSBs cause chromosomal abnormalities, which can contribute to mutagenesis, carcinogenesis, and genetic disorders. As a result, DSBs are thought to be the most sensitive type of radiation-induced DNA damage. In eukaryotic cells, homologous recombination and no homologous end joining are two primary mechanisms for DSB repair.

DSBs are the most sensitive type of radiation-induced DNA damage. In eukaryotic cells, homologous recombination and no homologous end joining are two key mechanisms involved in DSB repair. The molecular sensor for DSBs in the no homologous end joining pathway is DNA-dependent protein kinase (DNA-PK), which is made up of DNA-PKcs (DNA-PK catalytic subunit) and the Ku70/Ku80 (also known as Ku86) heterodimer. DNA ligase IV, in collaboration with XRCC4 and XLF, seals DSBs at the end (also known as Cernuous). In reaction to radiation, DNA-PK phosphorylates a number of proteins, including XRCC4. Although the role of XRCC4 phosphorylation in DSB repair is unknown, the phosphorylation status of XRCC4 in living cells will serve as a measure of DNA-PK functioning. As a result, the harmful consequences of radiation-induced changes in biologic systems via reactive oxygen species formation play a critical part in the body's metabolic equilibrium. As a result, any disruption in homeostasis causes oxidative stress, which can be alleviated by supplementing with naturally occurring plant-based antioxidants. Antioxidants have been found to be able to stop the oxidation process by using several techniques such as scavenging, chelating, or transferring hydrogen atoms. It has been suggested that radio protectors must have both antioxidant and radical-scavenging characteristics; however, not all antioxidants give radioprotection.

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