Chapter 13
Antioxidative Agents From Medicinal Plants

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ABSTRACT

The medicinal plants have been used by humans since ancient times, and the great civilizations of the world in ancient times were well aware of the benefits brought by the use of medicinal plants. This chapter provides important information regarding medicinal plants that have a wide variety of antioxidative agents ranging from bitter compounds that stimulate digestion system, phenolic compounds for antioxidant and numerous other pharmacological properties, antibacterial, and antifungal to tannins that act as natural antibiotics, diuretic substances, alkaloids, and so forth.

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INTRODUCTION

Medicinal plants are utilized by humans since history and also the great civilizations of the world were well aware of their use. However, the use of medicinal plants keeps on increasing after understanding their detailed functions and the components present in them. The use of medicinal plants were used by adding plant parts or extracts as additives in different types of foods and various herbal drinks for enhancing their effectiveness. Antioxidants are the substances which act against oxidative reaction. Within the biological systems, the antioxidant is the biological active molecule that is capable of preventing a precise oxidation reaction catalyzed by enzymes or a material which reacts with oxidizing agents before it causes oxidative damage to the other molecules.

Antioxidants even in trace amounts can stop or pause the oxidation process of easily oxidizable biomolecules present in the cell (Brewer, 2011). Free radicals are generated in the form of reactive oxygen species within the living organisms by completely different biochemical and physiological pathways has been observed, however, increased production of those may result in toward the progress of various diseases (Halliwell, 2007). Reactive oxygen species generation is necessary for many physiological processes e.g. cell proliferation, differentiation and programmed pathway for death of cell. They are intermediates of many important signaling processes; however, they are also toxic byproducts of normal metabolism (Mittler, 2017).

Reactive oxygen species are generated by the incomplete reduction of environmental oxygen (O_2) i.e., by excitation of oxygen to reactive half singlet oxygen (O_2^1) or by the transfer of electrons to oxygen which in turn forms superoxide radical (O_2^-), hydroxy radical (HO^-) or hydrogen peroxide (H_2O_2). Reactive oxygen species can cause oxidation of cellular organelles and results in the destruction of cells and tissues by oxidative processes (Asada & Takahashi 1987).

We have identified many potential sources of ROS generation in plants. Some of them are the normal reactions going down within the cell and concerned in normal metabolisms, such as respiration and photosynthesis. Reactive oxygen species may also be created by alternative factors like pathways increased throughout abiotic stress e.g. glycolate oxidase enzyme in peroxisomes during the process of photorespiration. Few new sources of reactive oxygen species generation have been identified in plants e.g. amine oxidases, peroxidases bounded to cell wall, and NADPH oxidases. These processes are tightly regulated and participates in reactive oxygen species generation during apoptosis and defense from pathogen (Asada & Takahashi, 1987).

The medicinal plants are simply accessible and great supply of antioxidative compound as they contains a blend of various chemical substances that can demonstrate individually or unitedly to fix health problems and improvement in diseases. Indeed,