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Non-Enzymatic Antioxidants Activity Of Selected GLVs Grown In Freshwater, Crude Silk Dyeing Effluent And Biotreated Effluent

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The research work has been focused on the non-enzymatic antioxidant studies of the leaf tissues in the green leafy vegetables (GLVs), namely mustard (*Brassica juncea*), fenugreek (*Trigonella foenum*), sirukeerai (*Amaranthus polygonoides*), araikeerai (*Amaranthus tristis*) and agati (*Sesbania grandiflora*). The prepared extracts from the GLVs grown on freshwater as a control. The total phenol content was significantly high in *A. polygonoides*, *A. tristis* and *S. grandiflora* grew in biotreated effluent whereas it was highly reduced in *T. foenum* followed by *B. juncea* and *S. grandiflora* grew in untreated effluent. The tocopherol level of each of the GLVs did not vary much between freshwater and biotreated effluent. The vitamin C level of the *T. foenum* grown in freshwater and biotreated effluent was maximum when compared to the other GLVs. The levels of ascorbic acid of all the GLVs grown in 75% effluent were reduced significantly. Thus *Pseudomonas fluorescens* biotreated silk dyeing industrial effluent can be used for the growth of plants to improve the non-enzymatic antioxidants.

KEYWORDS

Pseudomonas fluorescens, *Azospirillum sp.*, Silk dyeing effluent, Mustard, *Brassica juncea*, Fenugreek, *Trigonella foenum*, Sirukeerai, *Amaranthus polygonoides*, Araikeerai, *Amaranthus tristis*, Agati, *Sesbania grandiflora*

1. INTRODUCTION

Antioxidants are compounds that dispose of, scavenge and suppress the formation of free radicals or oppose their actions. There are two main categories of antioxidants (enzymatic and non-enzymatic) whose role is to prevent the generation of free radicals that are generated [1]. Metabolism of oxygen is associated with the formation of reactive oxygen species (ROS), such as superoxide anion radical, hydrogen peroxide which is an inevitable consequence of an aerobic lifestyle. These molecules play an imperative role in the cytotoxic and the mutagenic effects of oxygen and caused oxidation of membrane fatty acids, resulting in lipid peroxidation, oxidation of proteins and DNA damage [2]. Oxidative stress generated by ROS has been linked to several cellular toxicity processes, including damage to proteins, membrane lipid peroxidation, DNA alteration and enzyme inactivation [3]. A highly capable antioxidant defence system is present in the plant cells for ROS detoxification including either the non-enzymatic or the enzymatic constituents [4].

Ascorbic acid occurs in all the plant tissues usually being higher in photosynthetic cells and meristems. It is the maximum in the mature leaf, where the chloroplasts are fully developed. Vitamin C has effects on many physiological processes including the regulation of growth, differentiation and metabolism of plants [5]. Tocopherol, a lipid soluble antioxidant is extensively distributed in eight different stereoisomers of which α-tocopherol is known to have the greatest biological activity and act as a potent inhibitor of lipid peroxidation both in vitro and in vivo. The amount of dietary fat and the food matrix of the meal influence the absorption and bioavailability of vitamin E [6]. Tocopherols occur widely in plants, but the form of tocopherol often differs in the leaves and the seeds of the same species. α-tocopherol is the primary form of tocopherols in the leaves of plants [7].

2. MATERIAL AND METHOD

2.1 Collection of silk dyeing effluent

The silk dyeing effluent was collected from the effluent disposal site of small scale silk dyeing industry in airtight plastic containers, located at Seelanaickenpatti in Salem district and the technical details, such as the type of dyes used and their composition from the silk dyeing industry were also obtained.

2.2 Collection of biofertilizer

The biofertilizers, such as *Rhizobium sp.*, *Pseudomo-*