



## GC-Mass Based Evidences of Rich Foliar Antioxidant Potential of A Seed Amaranth *Amaranthus Hypochondriacus* L, Accession No. IC47434)

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### Abstract

The present study explores the antioxidant potential of the leaf tissue of a promising accession of a seed amaranth, *Amaranthus hypochondriacus* (Accession no. IC47434). GC-MS separated fractions of hydroethanolic leaf extract have complex chemical composition with several -OH rich phytochemicals. The hydroethanolic leaf extracts of mature leaf tissue of the experimental accession of *Amaranthus hypochondriacus* exhibited several major constituents. Most of these phytochemicals are rich in -OH and may therefore be used as terminators of free radical chain reaction or may chelate transition metal ions required for Fenton type reaction for the generation of more toxic ROS. Quantitative antioxidant profiling of methanolic leaf extracts based on in-vitro radical scavenging property (DPPH radical scavenging assay) and estimations of monophenol, diphenol, total polyphenol, flavonoids, anthocyanin, betacyanin and carotenoids also revealed significant antioxidant potential of the leaf extract of the experimental accession.

**Keywords:** *Amaranthus hypochondriacus*; Antioxidants; Phenolics; Flavonoids; GC-MS analysis; Hydroxy phenol rich compounds

### Introduction

Antioxidants have been shown to be effective in the treatment of various degenerative diseases and health problems, including atherosclerosis, ageing, diabetes mellitus, cancer, neurodegenerative diseases, systemic and infectious diseases etc [1]. The pseudocereal *Amaranthus* belongs to the family Amaranthaceae that include more than 60 species, of which *Amaranthus hypochondriacus* is essentially recognized as a grain crop for their excellent nutritional and functional values associated with their seeds [2]. No detailed data were published about antioxidant potential based on profiling of antioxidants (both quantitative and qualitative) in different plant parts. Therefore, in this investigation an effort has been made to access the antioxidant potential of methanolic leaf extracts of two promising accessions of *A hypochondriacus* (Accession No IC47434) through quantitative antioxidant profiling (in term of availability of total poly phenol, diphenol, monophenol, flavonoids, β-cyanine, anthocyanine, carotenoids and DPPH radical scavenging properties). The GC-MS study was also conducted to identify the presence of hydroxyl containing compounds with antioxidant properties of the experimental accessions of *A hypochondriacus*.

### Materials and Methods

Seeds of the experimental accession of *Amaranthus hypochondriacus* L. (IC47434) were collected from National Bureau of Plant Genome Research (NBPGR), New Delhi, India, and were cultivated in Crop Research and seed Multiplication Farm, University of Burdwan, West Bengal, India, based on Standard Procedure.

For GC-Mass study, the procedure of Paranthaman, et al. [3] was followed. For quantitative estimation of monophenol, diphenol, polyphenol, flavonoids, anthocyanin, betacyanin, carotenoids and the assessment of DPPH radical scavenging property the processes of Keshavkant, et al.[4], Mahadevan, et al. [5], Mc Donald, et al. [6], Chang, et al. [7], Ali, et al. [8-10].

### Result and Discussion

GC-MS method was employed for ethanolic extract of young leaf for testing the availability

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**Table 1:** Antioxidant potential (assessed in terms of availability of total polyphenol, monophenol, diphenol, flavonoids, carotenoids, anthocyanins, betacyanins, and DPPH radical scavenging property) of foliar tissue extract of *Amaranthus hypochondriacus* L. (accession no. IC47434). (Results are mean of three replicates  $\pm$  SE).

Accession of <i>A.hypochondriacus</i>	Total Polyphenol (mg g <sup>-1</sup> dry mass)	Monophenol (mg g <sup>-1</sup> dry mass)	Diphenol (mg g <sup>-1</sup> dry mass)	Flavonoids (mg g <sup>-1</sup> dry mass)	Carotenoids (μmol g <sup>-1</sup> dry mass)	Anthocyanin (μmol g <sup>-1</sup> dry mass)	Betacyanin (μmol g <sup>-1</sup> dry mass)	DPPH Radical Scavenging property (% g <sup>-1</sup> dry mass)
IC47434	5.32 $\pm$ 0.02	3.75 $\pm$ 0.03	5.84 $\pm$ .03	6.78 $\pm$ 0.02	1.56 $\pm$ 0.06	0.62 $\pm$ .01	3.64 $\pm$ .06	33.4 $\pm$ .2

of hydroxyl-rich phytochemical constituents (phenolics). It is evident from GC-MS spectra (Figure 1) that all fractions have a complex chemical composition. Thirty five compounds have been identified based on library data (NIST and WILEY) of corresponding compounds. These compounds are important constituents of plant for their radical scavenging activity due to the presence of -OH groups. Phytochemicals (phenolics) with -OH groups works as powerful chain breaking antioxidant through H-atom donation. The result pertaining to the quantitative antioxidant profiling of young leaf samples of experimental accessions of *A. hypochondriacus* (IC47434) also revealed significant accumulation of monophenol, diphenol, total polyphenol and flavonoids (Table 1). The antioxidant pigments anthocyanine,  $\beta$ -cyanine and carotenoids also revealed significant accumulation in the young leaves of the experimental plant. Radical scavenging property of the methanolic leaf extract of the experimental plant also corroborate significant total antioxidant potential (Table 1). In conclusion, flavonoids, phenolics and antioxidant pigments of the foliar tissue of the experimental seed amaranth found to have significant contribution to the total antioxidant capacity. GC-MS study further indicated presence of several hydroxyl rich phytochemical constituents (phenolic compounds) in the ethanolic leaf extracts. Finally, the present study proved the immense potential of leaf tissue of seed amaranth with significant antioxidant potential.

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