ABSTRACT

This research work was conducted to study the internal structures and phytochemical properties of the *Marsilea quadrifolia* L. collected from Mandi Bahauddin, Punjab, Pakistan. *M. quadrifolia* L. was collected from the banks of the lakes from Mandi Bahauddin, Pakistan, section cutting was performed to study the anatomy of leaf and rhizome of *M. quadrifolia* L. through standard section cutting and staining procedures. The presence of aerenchyma and well developed cortex in the ground tissue showed the environmental adaptation of the plant in aquatic environment. As aerenchyma enables the plant to fulfill the demand for oxygen while growing in the aquatic habitat.

Phytochemical analysis were carried out by using methanolic extract of the plant for the screening of different Phytochemical groups i.e. alkaloids, proteins, saponins, tannins, carbohydrates, lipids, sterols, triterpenoids, flavonoids and glycosoids. After Phytochemical investigations of methanolic extracts it was subjected to fractionation by using the different solvents such as *n*-hexane, chloroform, ethyl acetate, *n*-butanol and aqueous. All the fractions were subjected to anti-oxidant assays. Five different anti-oxidant assays were performed such as DPPH (1,1 diphenyl-2-picrylhydrazyl), total anti-oxidant assay, FRAP (Ferric reducing anti-oxidant power assay), FTC (Ferric thiocyanate assay) and total phenolic content.

All fractions exhibited good anti-oxidant capacity. Aqueous fraction shows the highest values in comparison with all other fractions as in FRAP for leaf extract was 185±0.001 in *n*-butanol and for Rhizome/petiole extract was 312±0.001 *n*-butanol fraction. In TPC higher value was 42.33±0.002 for leaf extract in ethyl acetate and for rhizome/petiole extract the higher value was 54±0.01 in aqueous fraction. In FTC both leaf and Rhizome/petiole's aqueous fraction exhibited high values as 94.69±0.006 and 80.74±0.014. In DPPH the rhizome/petiole extract higher value was 82.14±0.001 in aqueous fraction and for leaf extract the higher value was 91.29±0.001 for aqueous fraction. In total anti-oxidant assay the higher value for rhizome and leaf extract was 0.997±0.0008 for aqueous fraction and for leaf extract it was 0.814±0.001 for aqueous and *n*-butanol fraction.