Research Article

Antioxidant activity of Plants at Govt. College of Engineering Campus, Salem, Tamil nadu, India

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ABSTRACT

The plants were collected from Govt. College of Engineering campus, Salem. Fresh leaves were collected and brought to laboratory for phenolic, flavonoid analysis and also for metal chelating ability, reducing power assay, phosphomolybdenum antioxidant assay, nitric oxide scavenging activity. The phenol and flavonoid content was found to be in significant amount in all plants studied. Likewise, except Nitric oxide scavenging activity, all other antioxidant tests were showing good activity and thus justifying plants as a good source of natural antioxidant.

Keywords: Antioxidant activity, Flavonoid, Govt. Engineering College, Phenol, Plants.

INTRODUCTION

Free radicals are chemical entities characterized by a high reactivity, varying reactivity's notwithstanding, free radicals inclusives have been known to be generally less stable than non-radicals. Free radical formation during the metabolism of xenobiotics is therefore an important mechanism employed by toxic agents in causing cellular damage. Today, plant materials remain an important resource for combating illnesses, including infectious diseases and many of these plants have been investigated for novel drugs or templates for the development of new therapeutic agents.[1] Various plants have been shown to possess significant antioxidant property[2-4] and different classes of phytochemicals have been demonstrated to be responsible for the plants antioxidant activity.[5-7] Antioxidants have been reported to prevent oxidative damage by free radical and ROS, and may prevent the occurrence of disease, cancer and aging. It can interfere with the oxidation process by reacting with free radicals, chelating, catalytic metals, and also by acting as oxygen scavengers.[8,9] Flavonoids and phenolic compounds widely distributed in plants which have been reported to exert multiple biological effect, including antioxidant, free radical scavenging abilities, anti-inflammatory, anticarcinogenic etc.[10] They were also suggested to be a potential iron chelator.[11,12] Novel natural antioxidants from some plants have been extensively studied in the past few years for their antioxidant and radical scavenging properties. Hence, the present study was undertaken to know the amount of phenol and flavonoid content present in plants located at this particular site and furthers its antioxidant potential.

MATERIALS AND METHODS

Sample collection

Fresh leaves were collected from the study site, Government College of engineering, Salem during the month of March - April, 2013. 100mg of leaf sample was used for the aqueous extraction process and 0.1ml of extract was used for the analysis.

Secondary metabolites

The phenol[13,14] and flavonoid[15] content of aqueous leaf extract was analyzed for the collected plants. Total phenol values are expressed in terms of gallic acid equivalent (mg/g of dry mass), which is a common reference compound. Similarly, the concentrations of flavonoid in the extract were calculated from the calibration plot and expressed as mg quercetin equivalent/g of sample.

Antioxidant assay

Nitric oxide scavenging assay,[16] Reducing power,[17] Metal chelating activity,[18] Phospho-molybdenum antioxidant assay[19] were performed. Quercetin, Vitamin C, Ethylene Diamine Tetra Acetic Acid was used as positive control and calibration curve was plotted to know the amount present in the extract.

RESULTS

The results of phenol and flavonoid content of leaves were given in table 1.

According to the obtained results, *Nerium indium, Spathodea campanulata* showed highest phenol content, whereas phenol content was low with *Madhuca longifolia, Tectona grandis, Ocimum sanctum, Bambusa bambos* while moderate amount ranging from 2.1 – 4.35mg/g was seen in rest of the plants. Likewise, the flavonoid content was high with *Plumeria acutifolia*, *Cupressus sempervirens, Psidium guajava* while flavonoid content of all plants was moderate ranging from 4.6 – 8.9mg/g. No plant from the experimental site showed very low flavonoid content.

Antioxidant assay

The recorded findings of different antioxidant assays were shown in Table 2.

Niric oxide scavenging activity was high in *Mangifera caesia having* 2.22mg/g and it was low with *Bambusa bambos, Mangifera indica* and moderate amount in the range of 0.50-1.70 mg/g was observed with most of the plants studied.

Reducing power activity was more in *Nerium indium, Mangifera caesia* and it was moderate with all the other plants ranged from 1.75 – 3.15mg/g. None of the plant showed very low reducing power activity.

Metal chelating activity was found to be high in *Manilkara Zapota*, *Spathodea campanulata, Psidium Guajava*, *Acacia Arabica, Mangifera caesia* while chelating ability was moderate with rest of the plants collected and ranged from 2.10 – 6.80mg/g, while it was well below this range for *Nerium oleander, Borassus flabellifer, Theobroma cacao.*

Phosphomolybdenum antioxidant activity was high in *Tamarindus indica, Plumeria acutifolia, Albizia amara, Mangifera caesia, Azadirachta indica, Polyalthia Longifolia, Acacia Arabica, Mangifera indica* whereas it was low with *Ocimum sanctum*. Moderate activity was found with the remaining plants. This was in the range of 12.0 – 21.6mg/g.

Table 1: Depicting phenol and flavonoid content

Medicinal Plants	Phenols (mg gallicacid/g extract)	Flavonoids (mg quercetin/g extract)
Spathodea campanulata	5.0	8.0
Nerium indium	4.75	7.4
Mangifera caesia	2.1	8.9
Ceiba speciosa	3.3	7.7
Ficus religosia	3.4	6.2
Manilkara zapota	3.7	8.1
Ficus Benghalensis	4.3	4.8
Azadirachta indica	3.4	6.0
Polyalthia Longifolia	3.35	8.0
Psidium Guajava	4.15	9.4
Borassus flabellifer	4.0	4.6
Nerium oleander	3.25	8.8
Acacia Arabica	2.1	5.8
Madhuca longifolia	1.8	8.6
Ocimum sanctum	1.35	6.5
Tectona grandis	1.45	8.9
Cupressus sempervirens	4.35	9.5
Calotrpis gigantea	2.05	6.1
Plumeria acutifolia	4.1	9.5
Moringa oleifera	3.3	6.6
Albizia amara	3.15	6.8
Tamarindus indica	4.25	8.7
Mangifera indica	4.6	4.7
Theobroma cacao	4.2	7.0
Rhus lancia	3.65	7.8
Bambusa bambos	1.05	7.6

DISCUSSION

The present study demonstrated the radical scavenging property of several plants found in Government college of Engineering, Salem, Tamil Nadu, India. Polyphenolic compounds tend to be a potent free radical scavengers and their abilities to act as antioxidants mainly depends on their chemical structure, capability to donate / accept electrons, thus delocalizing the unpaired electron within the aromatic structure and the polyphenols are broadly classified into two categories, flavonoids and phenolic acids.[20] Phenolic compounds are the principal antioxidant constituents of natural products and are composed of phenolic acids, and flavonoids, which are potent radical terminators.[21] Many plants exhibit efficient antioxidant properties owing to their phenolic constituents.[22] Putative antioxidants involves various mechanisms, such as radical

scavenging, decomposition of peroxides, binding of transition metal ion catalysts, prevention of chain initiation and prevention of continued hydrogen abstraction.[23] Hence, the free radical scavenging capacity of an extract may serve as a significant indicator of its potential antioxidant activity.

Table 2: Showing various antioxidant assays

Medicinal Plants	Nitric oxide Scavenging assay (mg quercetin /g extract)	Reducing power assay (mg ascorbic acid/g extract)	Metal chelating assay (mg EDTA /g extract)	Phospho mol -ybdenum antioxidant assay(mg Ascorbic acid/g extract)
Spathodea campanulata	1.02	2.35	8.60	12.6
Nerium indium	1.55	3.75	3.90	21.8
Mangifera caesia	1.12	3.70	8.10	27.6
Ceiba Speciosa	2.22	3.00	4.20	20.4
Ficus Religosia	0.95	2.20	4.70	16.8
Manilkara Zapota	1.70	1.75	8.90	17.4
Ficus Benghalensis	1.67	2.55	4.40	12.3
Azadirachta indica	0.60	2.60	4.60	25.8
Polyalthia Longifolia	1.50	2.85	6.80	24.9
Psidium Guajava	1.30	2.25	8.50	19.5
Borassus flabellifer	0.75	2.80	1.90	16.8
Nerium oleander	1.05	2.50	1.80	18.3
Acacia Arabica	1.47	2.60	8.40	25.5
Madhuca longifolia	0.95	2.50	6.10	16.5
Ocimum sanctum	0.77	2.45	2.80	9.6
Tectona grandis	1.27	3.00	2.60	12.0
Cupressus sempervirens	1.17	2.85	2.70	16.5
Calotrpis gigantea	1.07	2.55	2.40	11.1
Plumeria acutifolia	0.55	2.20	2.30	28.5
Moringa oleifera	0.50	2.15	2.10	21.6
Albizia amara	0.87	2.50	6.50	27.6
Tamarindus indica	1.62	3.20	2.70	29.7
Mangifera indica	0.10	2.45	4.40	24.6
Theobroma cacao	0.72	2.60	1.90	18.3
Rhus lancia	0.70	3.15	4.00	19.4
Bambusa bambos	0.10	2.60	4.30	19.5

CONCLUSION

The aqueous extracts of the selected plant leaves, were found to exhibit remarkable radical scavenging. Our results showed that aqueous extract of maximum plants were rich in phenol and flavonoid constituents and demonstrated good antioxidant activity. Overall, the plant extract is a source of natural antioxidants, justifies their application in nutrition and health.

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