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Medicinal plants with antioxidant potential of leaf extracts of selected medicinal plants

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Abstract
Traditional system of medicine is a part of Indian life. The present study was carried out to know the anti oxidant activity of selected medicinal plants *viz, Aegle marmelos*, *Butea monosperma*, *Comnifora wighti*, *Holostemma ada-kodien*, *Decalepis hamiltonii*, *Gloriosa superba*, *Gymnema sylvestre* and *Santalum album* were studied from Indalwai forest of Nizamabad. DPPH, Nitric Oxide, Superoxide, Hydrogen peroxide scavenging activity of methanol leaf extracts at different concentrations were studied (ascorbic acid used as standard). The present study revealed the anti oxidant activity of the leaf extracts of selected plants at all concentrations tested.

Keywords: Anti oxidant, *Aegle marmelos*, *Gloriosa superba*, *Gymnema sylvestre* and *Santalum album*, Ascorbic acid

Introduction
Ayurveda is the oldest and offers a holistic approach and it is popular in practice since the Vedic period. Medicinal plants are connecting links between the traditional (Homeopathic) and modern (Allopathy) systems. In India traditional system almost runs parallel to the modern medicine health care providers. Government of India officially recognized and established AYUSH ministry.

Since time immemorial, medicinal plants have been exploited for their medicinal use. Nature has been the source a large number curative compounds in addition to the resources. The use of ancient traditional medicine is a part of the people in the third world countries. There is an ever increasing demand for extraction, isolation, purification and development of drugs for chemotherapy from traditional medicinal plants. (UNESCO, 1998) [1].

The phytochemicals in medicinal plants are responsible for the activities like antioxidant, antimicrobial and antipyretic (Cowman, 1999; Adesokan *et al*., 2008) [2, 3]. As per W.H.O, plants are life saving as they are sources of drugs and should be screened for their safety and efficacy (Nascimento *et al*., 2000) [4]. Evidences suggest that humans might have employed the pharmacological properties of plants and their parts to treat the diseases since the inception of civilization. The phenolic and flavonoids are antioxidant and aids in free radical scavenging activity along with anti-inflammatory and anti cancerous in nature (Asha *et al*. 2011) [8].

Antioxidants scavenge free radicals, and convert reactive oxygen species, antioxidant nature is due to phytochemicals. As of late developing proof has been collected demonstrating the contribution of reactive oxygen species (ROS) in the pathogenesis of numerous sicknesses (Halliwell *et al*., 1992). These ROS significantly targets lipids, proteins, catalysts, RNA and DNA, brought about unsettling influences of redox balance in a solid body and therefore causes degenerative/oxidative sicknesses, like cardiovascular infections, malignant growth, neuro-degenerative malady and so forth (Ames *et al*., 1993) [6].

Deepa Babu *et al*., (2013) [7] have assessed the antioxidant activity of the ethanolic extract of "Triphala". Polyphenols in Triphala exerts anti oxidant activity. The flavonoids, saponins and tannins may be dependable to some extent for the observed pain relieving and calming impact. The utilization of medicinal plants is wide spread internationally and it's increasing day by day and due to the advantages of traditional medicine and its outreach it was planned to study the anti oxidant nature of *Aegle marmelos*, *Butea monosperma*, *Commifora wighti*,

Holostemma ada-kodien, Decalepis hamiltonii, Gloriosa superba, Gymnema sylvestre and *Santalum album leaf* extracts.

Materials and Methods

DPPH radical scavenging activity

The total anti-oxidant potential was determined by Brand-Williams *et al*., and Parejo *et al*., Various concentrations of test sample were prepared by serial dilution and 0.1mL of each dilution was added to 3.9 mL of a 6.0×10^{-5} µM methanol solution of DPPH, followed by vortexing. The reaction was allowed to take place in the dark at room temperature to reach a plateau.

The decrease in the absorbance was measured at 517 nm was determined by using a Shimadzu spectrophotometer. The concentration of remaining DPPH in the reaction medium was calculated from the calibration curve as follows:

$$\text{Scavenging effect (\%)} = \frac{(1 - \text{A Sample (517nm)})}{\text{A Control (517nm)}} \text{X } 100$$

Super oxide free radical scavenging activity

Different concentrations of 50, 100, and150 µg/mL (10, 20, 30 µL) of plant extracts were taken and the volume was made up to150 µL with methanol, to each of this, 100 µL of riboflavin, 200 µL EDTA, 200 µL methanol and 100 µL NBT was mixed in test tubes and further diluted up to 3 mL with phosphate buffer and absorbance was measured after illumination for 5 min, at 590 nm on UV visible spectrophotometer (Shimadzu, UV-1601), Japan and results were compared with ascorbic acid (10 µg/mL as standard).

Scavenging of nitric oxide

Sodium nitroprusside (5 µM) in standard phosphate buffer solution was incubated with different concentration of the test extracts dissolved in standard phosphate buffer (0.025 M, pH 7.4) and the tubes were incubated at 25°C for 5 h. After 5 h, 0.5 mL of incubation solution was removed and diluted with 0.5 mL Griess reagent (prepared by mixing equal volume of 1% sulphanilamide in 2% phosphoric acid and 0.1% naphthyl ethylene di amine dihydro chloride in water). The absorbance of chromophore formed was recorded at 546 nm.

The control experiment was also carried out in similar manner, using distilled water in the place of extracts. The activity was compared with ascorbic acid.

Scavenging of hydrogen peroxide

A solution of hydrogen peroxide (20 mM) was prepared in phosphate buffered saline (PBS, pH 7.4). Various concentrations of 1mL of the extracts or standards in methanol were added to 2 mL of hydrogen peroxide solutions in PBS. The absorbance was measured at 230 nm, after 10 min against a blank solution that contained extracts in PBS without hydrogen peroxide. IC_{50} value is the concentration of the sample required to scavenge 50% free radical.

The percentage inhibition was calculated by using the following formula.

$$\text{Scavenging activity (\%)} = \frac{\text{OD of control -OD sample}}{\text{OD of control}} \text{ x } 100$$

Results and Discussion

The present study, DPPH scavenging activity revealed the leaf extracts of *Aegle marmelos, Butea monosperma, Commifora wighti, Holostemma ada-kodien, Decalepis hamiltonii, Gloriosa superba, Gymnema sylvestre, Santalum album* possesses scavenging activity at the studied concentrations.

Pairing of unpaired electrons results in neutralization and converts it into 1-1 di phenyl-2- picryl hydrazine and becomes colorless from purple color.

The DPPH radical was measured at 517 nm. DPPH, Superoxide, Nitric oxide, Hydrogen Peroxide scavenging activity of *Aegle marmelos, Butea monosperma, Commifora wighti, Holostemma ada-kodien, Decalepis hamiltonii, Gloriosa superba, Gymnema sylvestre* and *Santalum album* methanol leaf extracts at different concentrations measured [ascorbic acid (10 µg/ml) was used as standard]. The present study revealed that the *Aegle marmelos, Butea monosperma, Commifora wighti, Holostemma ada-kodien, Decalepis hamiltonii, Gloriosa superba, Gymnema sylvestre* and *Santalum album* methanol leaf extracts were observed for significant reduction of the super oxide anions and they inhibited the formation of formazan.

It interacts with O_2 and results in nitrites and peroxy nitrites formation. Sodium nitroprusside at an optimum pH results in nitric oxide formation and it reacts with O_2 and forms nitrate ions, they are quantitatively measured by use of Greiss reagent. The leaf extracts of selected plants were potent scavengers of nitric oxide and subsequently competes with oxygen (to inhibit the production of nitric oxide). H_2O_2 oxidizes thiol (-SH) groups and inactivates some enzymes. The cytotoxicity of H_2O_2 is due to hydroxyl radical generated by H_2O_2 interaction with $Fe^{+2}$and Cu^{+2} in the cell. Methanol leaf extracts were noticed for significant inhibitory activity of H_2O_2 due to the antioxidant and free scavenging of radical activity (Table no's 1-8 and Figure no's 1-8).

Table 1: Anti oxidant activity of *Aegle marmelos (*All values in this table represent the mean ± SD (n=6))

Aegle Marmelos	**Extract 50µg/ml**	**Extract 100µg/ml**	**Extract 150µg/ml**	**Standard 10µg/ml**
DPPH	68 ± 0.17	75 ± 0.18	82 ± 0.59	92 ± 0.05
Superoxide	38 ± 0.19	43 ±0.84	52 ± 0.71	68 ± 0.11
Nitric Oxide	66 ±0.14	68 ± 0.21	70 ±0.32	80 ± 0.14
Hydrogen Peroxide	37 ± 0.22	41 ± 0.41	51 ± 0.71	67 ± 0.16

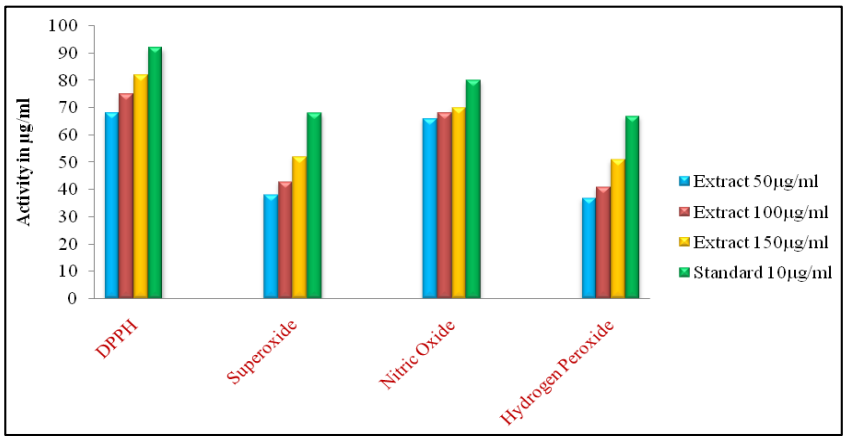

Fig 1: Anti oxidant activity of *Aegle marmelos*

Table 2: Anti oxidant activity of *Butea monosperma*. (All values in this table represent the mean ± SD (n=6))

Butea monosperma	**Extract 50µg/ml**	**Extract 100µg/ml**	**Extract 150µg/ml**	**Standard 10µg/ml**
DPPH	62 ±0.21	73 ±0.11	80 ±0.49	92 ±0.16
Superoxide	37± 0.14	41±0.33	50 ±0.48	68±0.19
Nitric Oxide	65 ±0.21	67±0.18	69 ±0.52	80±0.14
Hydrogen Peroxide	36± 0.31	41±0.19	50±0.61	67±0.13

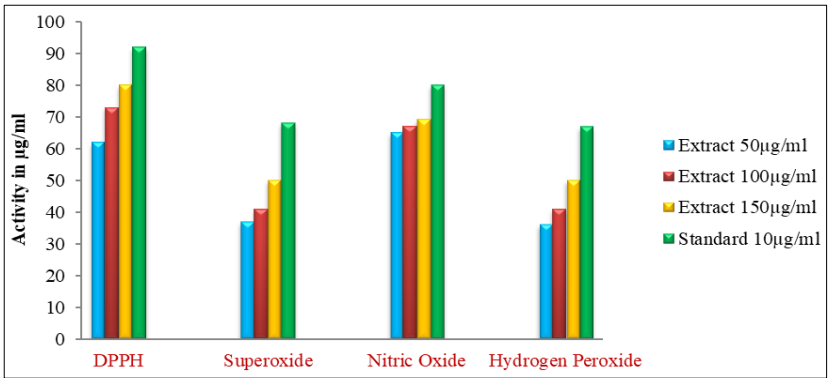

Fig 2: Anti oxidant activity of *Butea monosperma*

Table 3: Anti oxidant activity of *Comnifora wighti* (All values in this table represent the mean ± SD (n=6)

Comnifora wighti	**Extract 50µg/ml**	**Extract 100µg/ml**	**Extract 150µg/ml**	**Standard 10µg/ml**
DPPH	63 ±0.14	74 ±0.41	81 ±0.16	92± 0.11
Superoxide	38± 0.18	40±0.43	51±0.17	68±0.12
Nitric Oxide	66±0.19	67±0.49	70±0.12	80±0.13
Hydrogen Peroxide	37±0.41	42±0.47	51±0.13	67±0.16

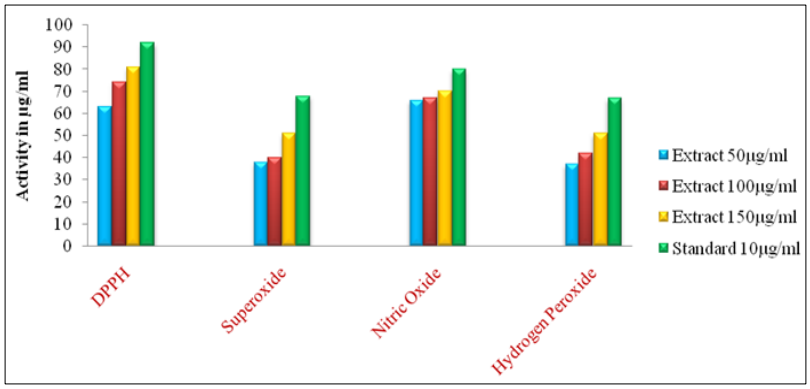

Fig 3: Anti oxidant activity of *Comnifora wighti*

Table 4: Anti oxidant activity of *Holostemma ada-kodien* [All values in this table represent the mean ± SD (n=6)]

Holostemma ada-kodien	**Extract 50µg/ml**	**Extract 100µg/ml**	**Extract 150µg/ml**	**Standard 10µg/ml**
DPPH	60 ±0.17	70±0.39	80±0.41	92 ±0.04
Superoxide	40±0.16	40±0.33	50±0.44	68±0.12
Nitric Oxide	60±0.21	65±0.34	70±0.35	80±0.16
Hydrogen Peroxide	35±0.26	35±0.31	50±0.34	67±0.12

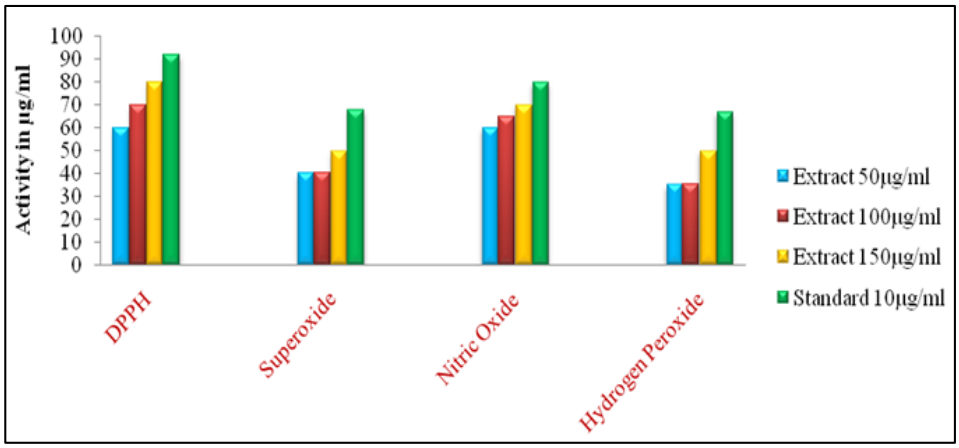

Fig 4: Anti oxidant activity of *Holostemma ada-kodien*

Table 5: Anti oxidant activity of *Decalepis hamiltonii* [All values in this table represent the mean ± SD (n=6)]

Decalepis hamiltonii	**Extract 50µg/ml**	**Extract 100µg/ml**	**Extract 150µg/ml**	**Standard 10µg/ml**
DPPH	65 ±0.21	75±0.31	85 ±0.17	92 ±0.12
Superoxide	44±0.28	44±0.33	55±0.54	68±0.18
Nitric Oxide	66±0.29	71±.38	75±0.24	80±0.10
Hydrogen Peroxide	38±0.24	40±0.23	58±0.26	67±0.13

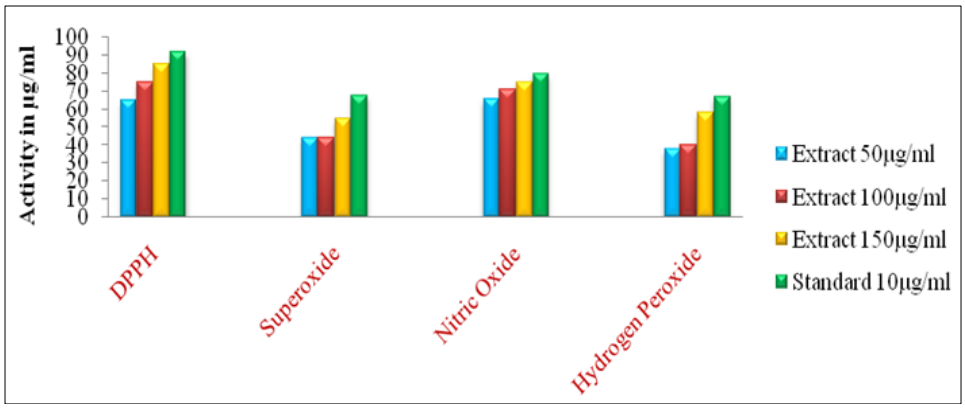

Fig 5: Anti oxidant activity of *Decalepis hamiltonii*

Table 6: Anti oxidant activity of *Gloriosa superba* (All values in this table represent the mean ± SD (n=6)

Gloriosa superba	**Extract 50µg/ml**	**Extract 100µg/ml**	**Extract 150µg/ml**	**Standard 10µg/ml**
DPPH	66±0.25	76 ±0.16	86±0.24	92±0.11
Superoxide	45±0.21	45±0.21	56±0.21	68±0.14
Nitric Oxide	67±0.22	72±0.18	76±0.24	80±0.16
Hydrogen Peroxide	39±0.19	41±0.17	59±0.19	67±0.10

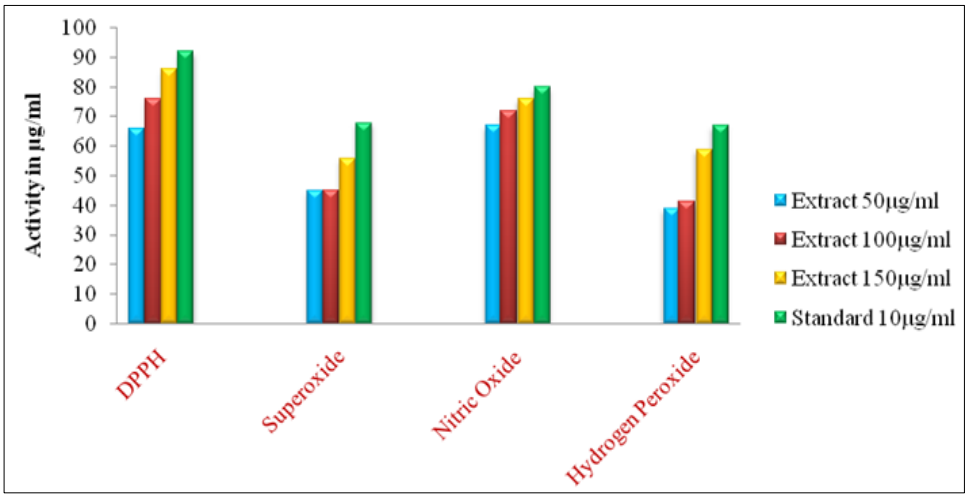

Fig 6: Anti oxidant activity of *Gloriosa superba*

Table 7: Anti oxidant activity of *Gymnema sylvestre* (All values in this table represent the mean ± SD (n=6)

Gymnema sylvestre	Extract 50µg/ml	Extract 100µg/ml	Extract 150µg/ml	Standard 10µg/ml
DPPH	67±0.18	77±0.16	87±0.31	92±0.10
Superoxide	46±0.24	46±.21	57±0.18	68±0.15
Nitric Oxide	68±0.31	73±.24	77±0.17	80±0.11
Hydrogen Peroxide	40±0.25	42±0.22	60±0.21	67±0.16

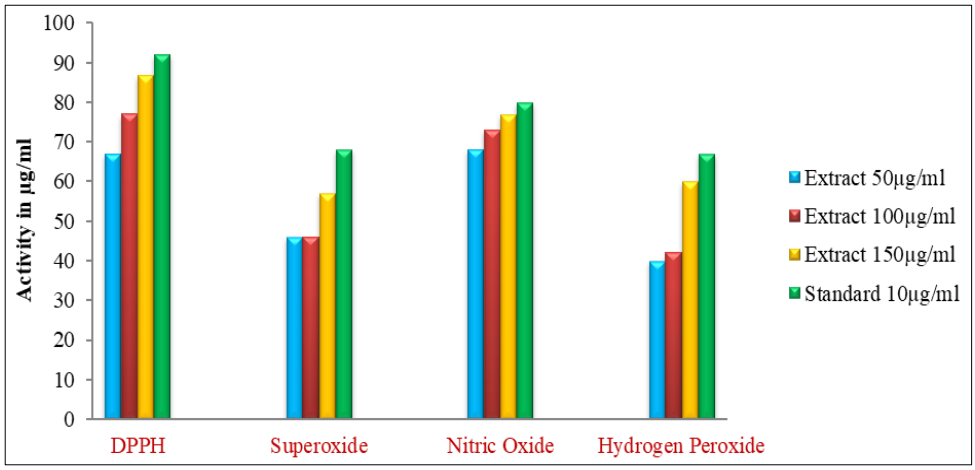

Fig 7: Anti oxidant activity of *Gymnema sylvestre*

Table 8: Anti oxidant activity of *Santalum album* (All values in this table represent the mean ± SD (n=6)

Santalum album	Extract 50µg/ml	Extract 100µg/ml	Extract 150µg/ml	Standard 10µg/ml
DPPH	74 ±0.11	76 ±0.25	85 ±0.25	92±0.09
Superoxide	42±0.21	44±26	46±0.27	68±0.11
Nitric Oxide	65±0.24	70±0.29	74±0.31	80±0.15
Hydrogen Peroxide	37±0.19	39±0.18	57±0.34	67±0.12

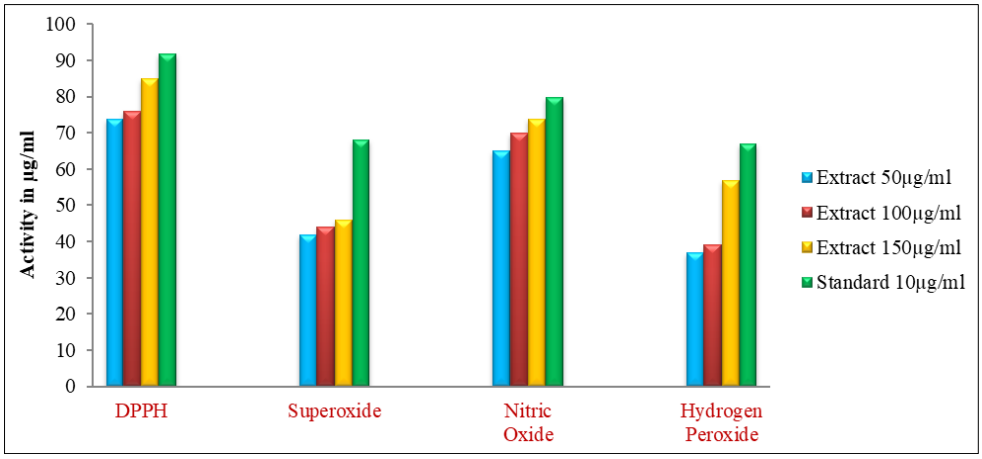

Fig 8: Anti oxidant activity of *Santalum album*

The DPPH scavenging activity of selected plant extracts reveals anti oxidant activity of the leaf extracts of *Aegle marmelos*, *Butea monosperma*, *Commifora wighti*, *Holostemma ada-kodien*, *Decalepis hamiltonii*, *Gloriosa superba*, *Gymnema sylvestre Santalum album* exhibited good scavenging activity at all tested concentrations (ascorbic acid of 10 µg/mL was used as standard).

4. Conclusion

The plants leaf extracts may be considered as a drug candidate, but requires further confirmation and safety and efficacy must be taken into account and there is a need to study the role of each individual components activity. Identification and isolation of individual phytochemical components in the extracts also has to be done for further investigations.

There is a need to popularize the cultivation of Medicinal plants with the necessary packages of practices. Further pharmacological investigations are necessary.

5. References

1. UNESCO Culture and Health, orientation-Texts world Decade for cultural Development. Document CLT/DEC/PRO, Paris, France. 1998, 129.
2. Cowan MM. Plant Products as Antimicrobial Agents. Clinical Microbiology Reviews. 1999;12:564-582.
3. Adesokan AA, Akanji MA, Yakubu MT. Anti bacterial potential; of aqueous extracts of Enantia chlorantha

stem bark. African Journal Pmtechnology. 2008;6(22):2502-2505.
4. Nascimento F, Locatelli, Juliana, Freitas C, Silva L. Antibacterial activity of plant extracts and phytochemicals on antibiotic-resistant bacteria. Brazilian Journal of Microbiology. 2000;31(4):247-256.
5. Halliwell B, Gutteridge JMC, Cross CE. Free radicals, antioxidants and human diseases: where are we now? J. Lab. Clin. Med. 1994;119(6):598-620.
6. Ames BN, Shigenaga MK, Hagen TM. Oxidants, antioxidants, and the degenerative diseases of aging. Proc Natl Acad Sci U S A. 1993;90(17):7915-7922.
7. Deepa Babu, Prema Gurumurthy, Sai Krishna Borra, Cherian KM. Anti oxidant and free radical scavenging activity of triphala determined by using different *in vitro* models. Journal of medicinal plants research, 2013;7(39):2898-2905.
8. Asha Devi S, Deepak Ganjewala. Antioxidant Activities of Methanolic Extracts of Sweet-Flag (Acorus calamus) Leaves and Rhizomes, Journal of Herbs, Spices & Medicinal Plants. 2011;17(1):1-11.