MORINGA
"The Miracle Tree"

SUAIB LUQMAN

Leaves

POD/Fruit

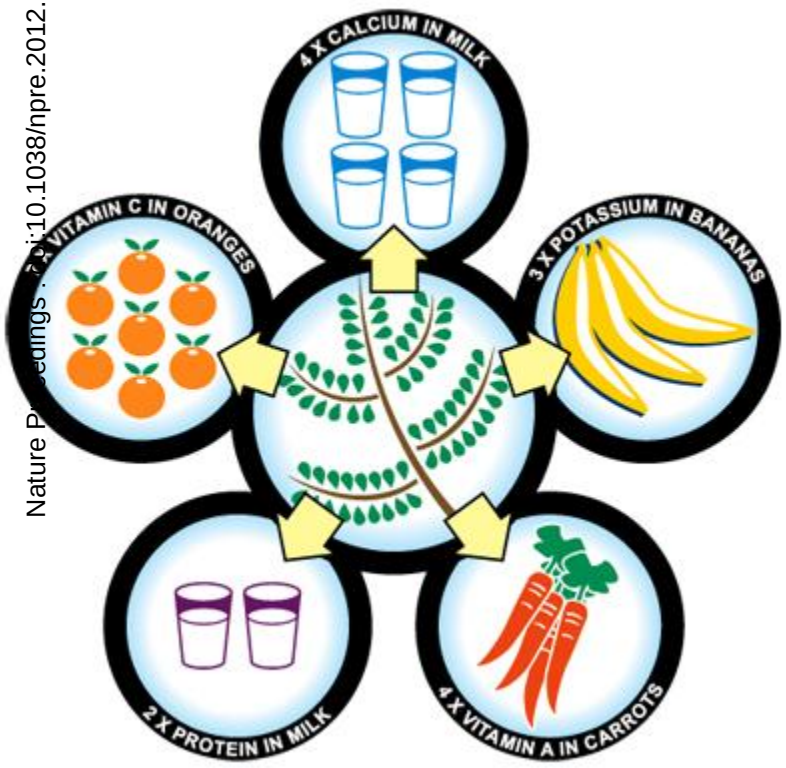
Ferric reducing antioxidant power and free radical scavenging activity of *Moringa oleifera*: Relevance in oxidative stress

India's ancient tradition of Ayurveda medicine sites 300 diseases that are treated with the leaves of the Moringa. Modern medical science confirms this basic idea.

Scientific research indicates Moringa is not only a medical phenomenon, but also provides a powerhouse of nutritional value.

Unfortunately, even though medical science praises the benefits of Moringa leaves, this essential information has not reached the people who need it most.

This humble plant, often called "the Miracle Tree," is just recently finding its way to center stage in western society



Nutrient	Moringa Leaves	Other Fruit
Vitamin A	6780 mcg	Carrots: 1890 mcg
Vitamin C	220 mg	Oranges: 30 mg
Calcium	440 mg	Cow's milk: 120 mg
Potassium	259 mg	Bananas: 88mg
Protein	6.7 gm	Cow's milk: 3.2 gm

- **The moringa tree is native to northwestern India.**
- **Moringa is a hearty plant that grows quickly.**
- **It is also widely grown in other parts of the tropics, including tropical Asia, many regions of Africa, Indonesia, Haiti and South and Central America.**

10 times the VITAMIN A of Carrots

17 times the CALCIUM of Milk

15 times the POTASSIUM of Banana

25 times the IRON of Spinach

9 times the PROTEIN of Yoghurt

Folkloric

Decoction of leaves used for hiccups, asthma, gout, back pain, rheumatism, wounds and sores.

Pods for intestinal parasitism.Constipation: Leaves and fruit

Decoction of boiled roots used to wash sores and ulcers.

Decoction of the bark used for excitement, restlessness.

Pounded roots used as poultice for inflammatory swelling.

Juice of roots is used for otalgia.

Decoction of roots is use as gargle for hoarseness and sore throat.

Boiled leaves used to help increase lactation and the flow of milk.

Seeds for hypertension, gout, asthma, hiccups, and as a diuretic.

Rheumatic complaints: Decoction of seeds; or, powdered roasted seeds applied to affected area.

Juice of the root with milk used for asthma, hiccups, gout, lumbago.

Poultice of leaves applied for glandular swelling.

The flowers boiled with soy milk thought to have aphrodisiac quality.

Malunggay capsule (Natalac) - containing 250 mg dried young malunggay leaves, one to two capsules daily.

Constituents

Ben oil, 36% - palmitic, stearic, myristic, oleic, and behenic acids, phytosterin; two alkaloids the mixture of which has the same action as epinephrine.

Uses

Commercial

Oil, known as ben oil, extracted from flowers can be used as illuminant, ointment base, and absorbent in the enfleurage process of extracting volatile oils from flowers. The oil, applied locally, has also been helpful for arthritic pains, rheumatic and gouty joints.

Nutritional

Flowers, leaves and *pods* eaten as a vegetable.
Source of calcium, iron, phosphorus and vitamins A, B and C.
100 gms or 1 cup of cooked malunggay leaves contain 3.1 g protein, 0.6 g fiber, 96 mg calcium, 29 mg phosphorus, 1.7 mg iron, 2,820 mg beta-carotene, 0.07 mg thiamin, 0.14a mg riboflavin, 1.1 mg niacin, and 53 mg of vitamin C.
(Source: Dr. Lydia Marero of the Food and Drug Research Institute (FNRI)

In the news

In Leyte, extracted malunggay juice is mixed with lemonsito juice to make ice candies or cold drinks, making it more plalatble and agreeable to children who detest vegetables.

It is a very effective in removing unstable free radicals that is damaging to molecules and pro-aging.

For the men: The fruit could increase the sperm count !

For increasing breast milk: Leaf powder will provide the woman's daily iron and calcium needs during pregnancy and breast-feeding.

Recent uses and preparation:

Constipation: Eat one or two cups of the cooked leaves at supper time, with plenty of water.

Wound wash: Apply crushed leaves directly to the wound, maintaining cleanliness during the process.

Supertitions

Malunggay ingestion is avoided in the immediate period after a family member's death. Its origin is borne from the observation that a branch or twig will shed off all its leaves within a few hours of being snapped off the tree, and ingesting it might bring death to relative; an avoidance that might last for all the nine days of prayers.

Nature Precedings : doi:10.1038/npre.2012.6924.1 : Posted 23 Feb 2012

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Moringa Root Capsule with BIO-*i*

Moringa Soap

MORINGA SAFARIS
Familie Böhmcker

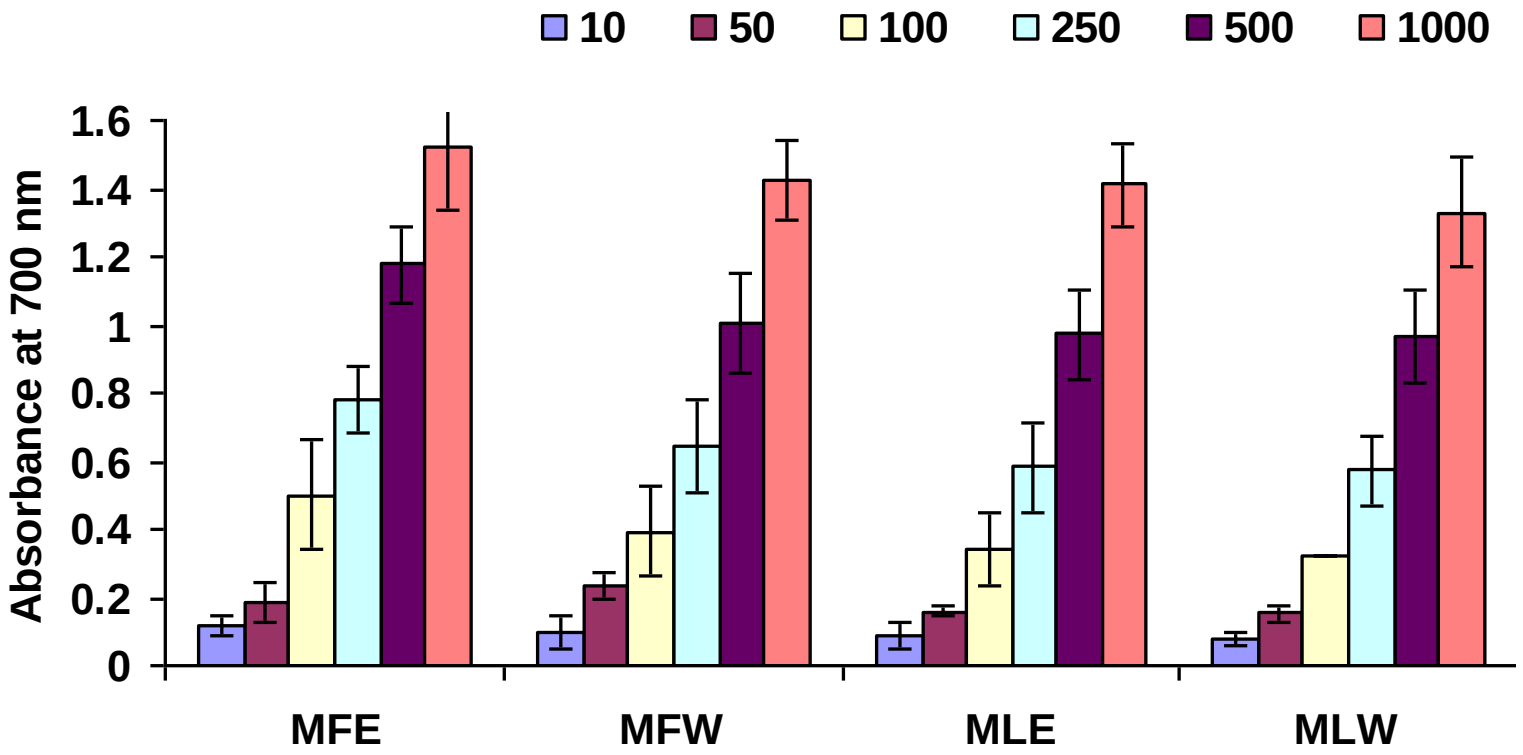
MORINGA OLEIFERA
"The World's Greatest Unknown Supplement"

CULINARIES & PRODUCTS

Research Objective (s)

To present investigation focuses on concentration-dependent antioxidant potential of *Moringa oleifera* (leaves and pod) using *in vitro* assay as described under:

- **FRAP assay was carried out by the method of Benzie and Strain (1996) as described by Pulido et al., (2000)**
- **DPPH radical scavenging activity of plant extract was measured according to method of Chung et al., (2002)**
- **The content of total phenolic compounds in plant extracts by Folin-Ciocalteu reagent method of Singleton and Rossi (1965)**
- **Reducing power of plants extracts (Yen and Chen, 1995)**
- **The total antioxidant capacity of plant extract was measured using the standard method of Preito (1999)**
- **Hydroxyl radical scavenging activity of two genotypes namely KS 1 and gulabi of vetiver root extract using deoxyribose degradation assay**
- **Reduced glutathione concentration in erythrocytes was estimated using standard method of Beutler *et al* (1984) as reported by Rizvi and Luqman (2002)**
- **Erythrocyte malondialdehyde formed during lipid peroxidation was measured according to the method of Esterbauer and Cheeseman (1990) as described previously (2006)**

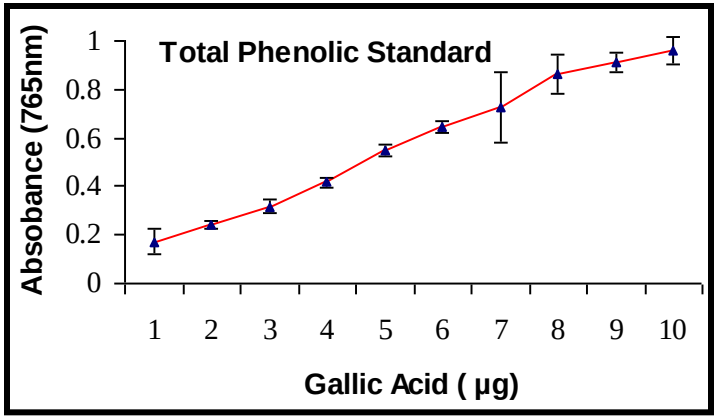


In the reducing power assay, the presence of reductant (i.e. antioxidants) in the sample (extract/antioxidant) would result in the reducing of Fe^{+++} to Fe^{++} by donating an electron.

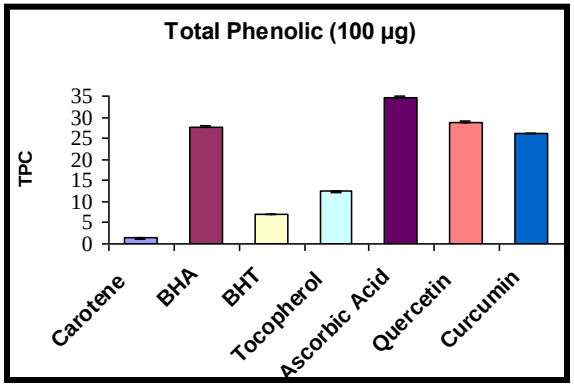
Amount of Fe^{++} complex can be then be mentioned by measuring the formation of Pearl's Prussian blue at 700 nm. Increase in absorbance indicates an increase in reductive ability

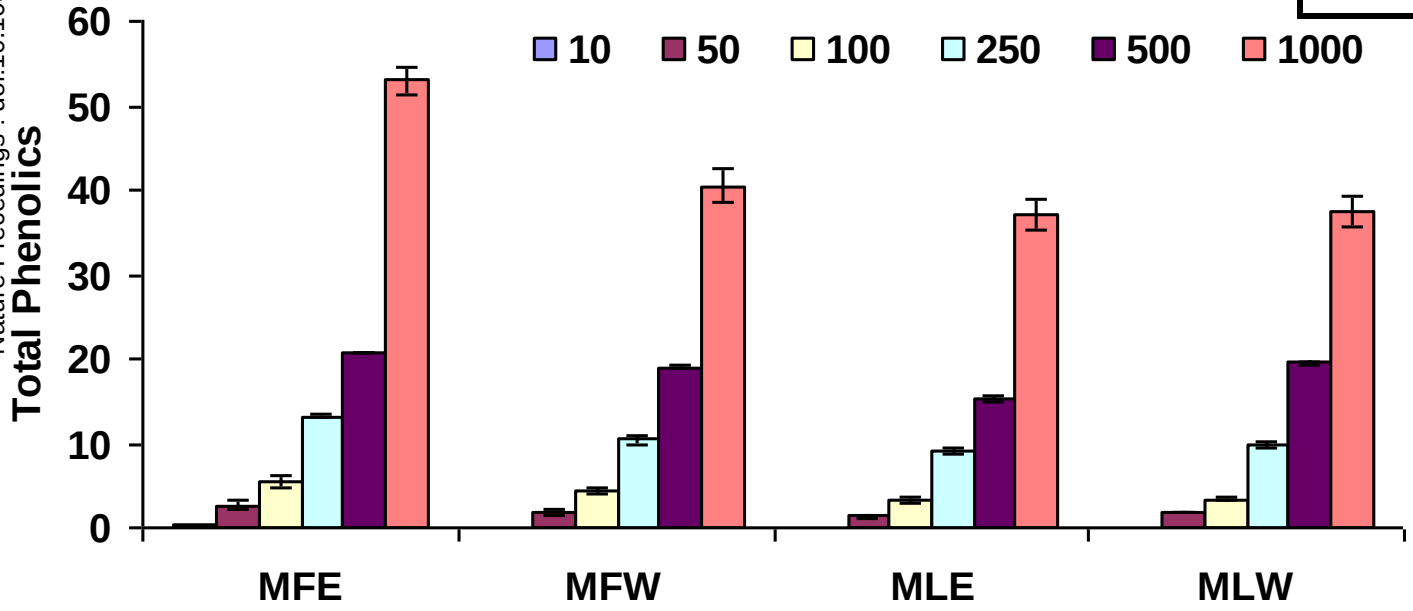
The reducing properties are generally associated with the presence of reductones, which have been shown to exert antioxidant action by breaking the free radical chain by donating a hydrogen atom. Reductones are also reported to react with certain precursors of peroxide, thus preventing peroxide formation.

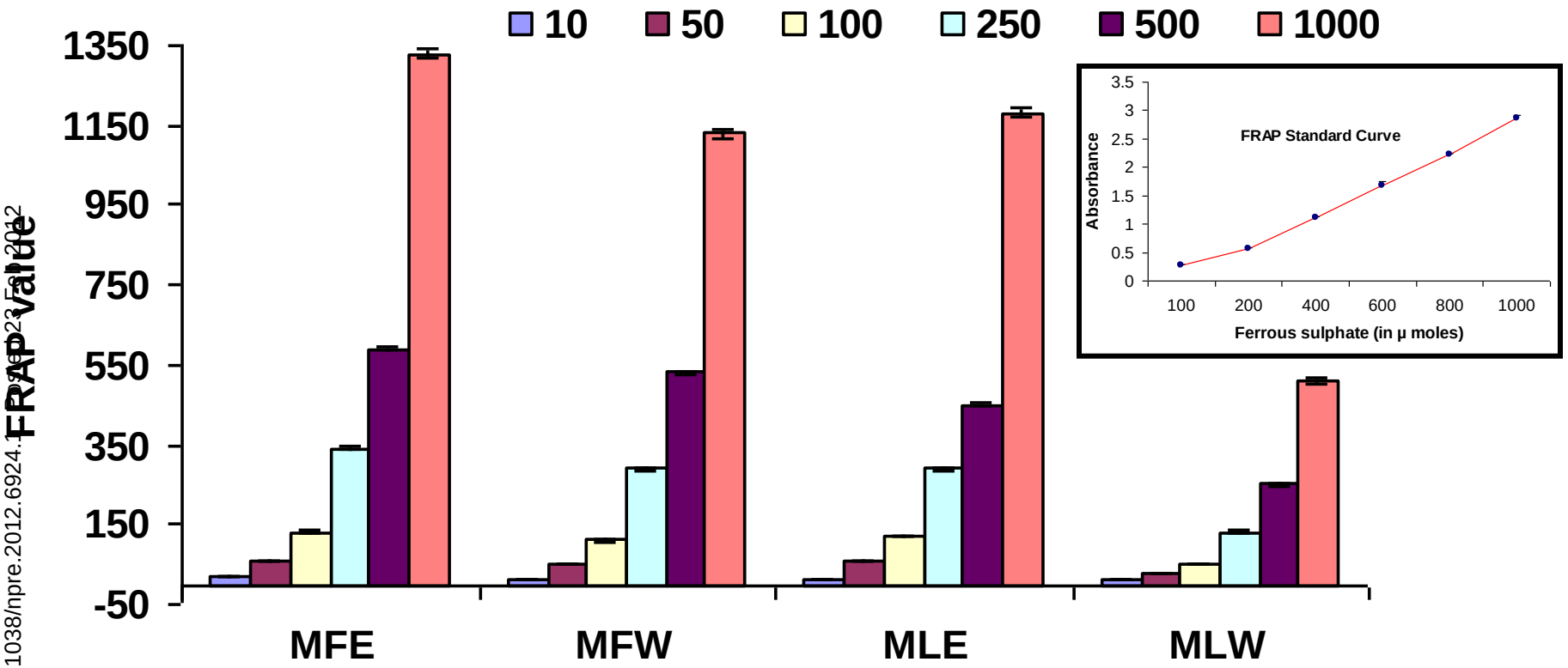
The content of total phenolics in the fruit and leaf extracts of *Moringa oleifera* is determined using the Folin–Ciocalteu assay, calculated from standard curve and expressed as gallic acid equivalents (GAE)



Plant phenolics constitute one of the major groups of compounds acting as primary antioxidants or free radical terminators, it is worth determining their total amount

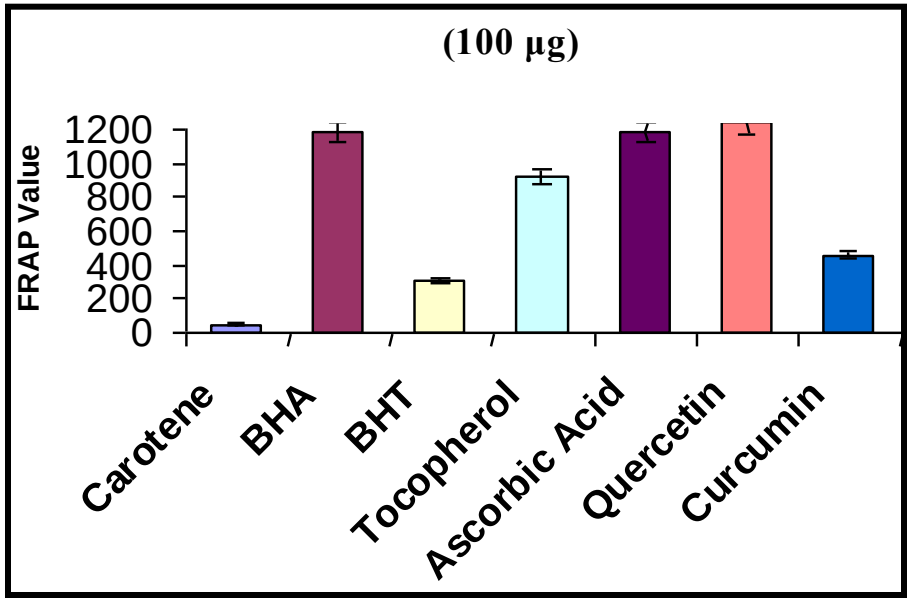


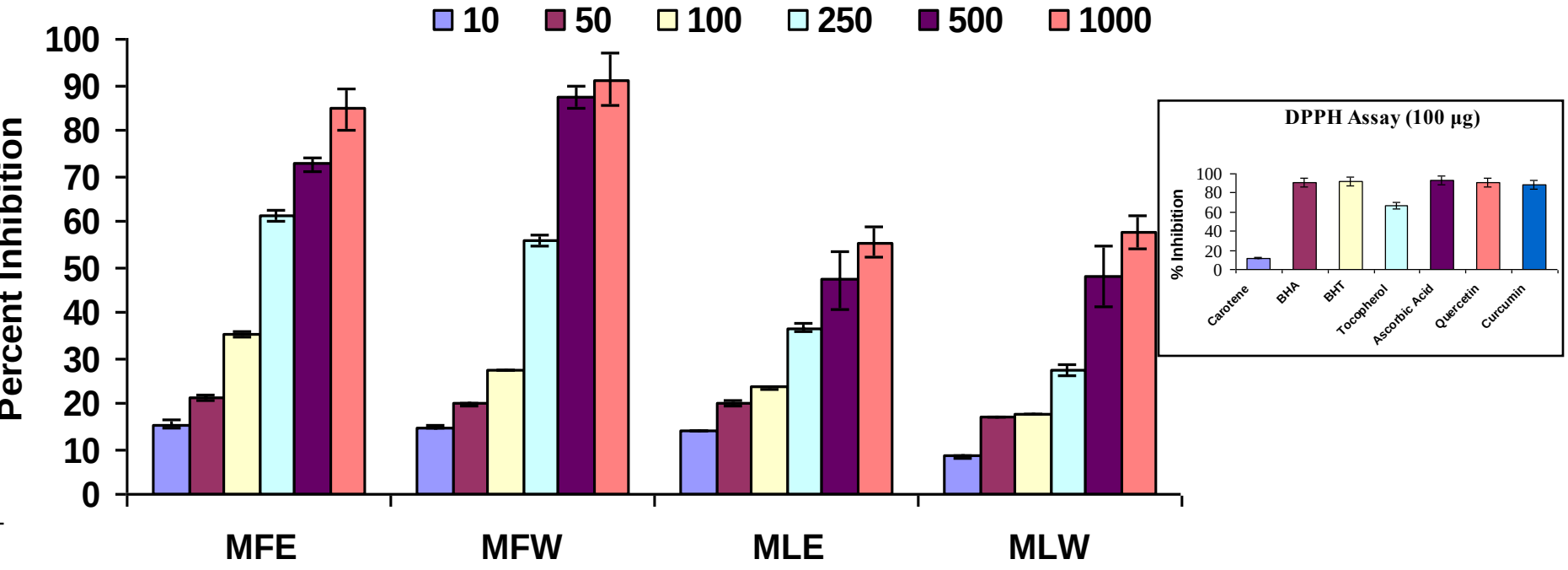




FRAP assay quick and simple to perform, and the reaction is reproducible and linearly related to the molar concentration of the antioxidants and plant extracts

FRAP assay measured the change in absorbance at 593 nm owing to the formation of blue color Fe^{++} from Fe^{+++} oxidized form by the action of electron donating antioxidants.



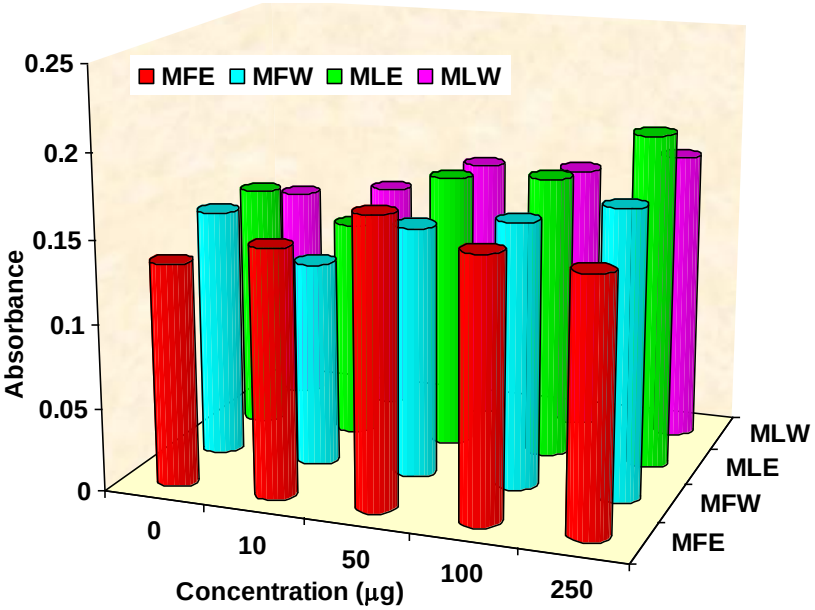


Free radical scavenging activity of antioxidants was evaluated using DPPH as a reagent. DPPH is a stable free radical and accepts an electron or hydrogen radical to become a stable diamagnetic molecule.

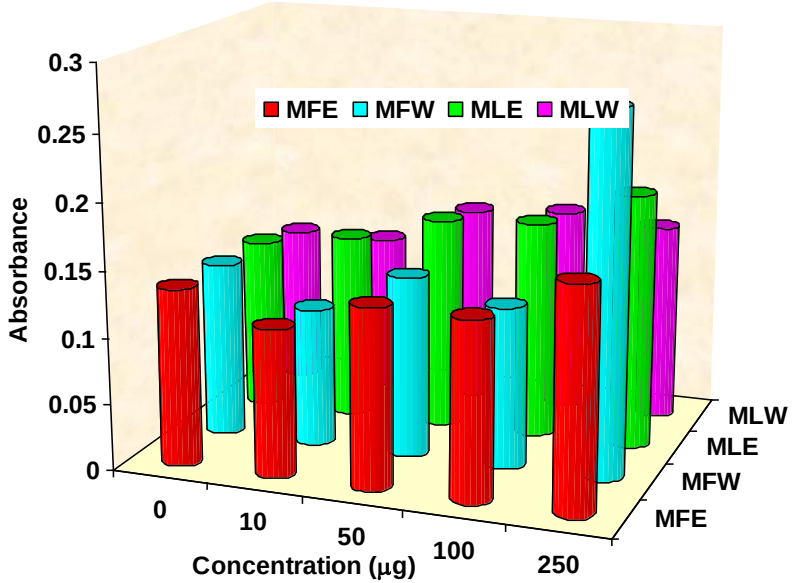
The reduction capability of DPPH radical is determined by the decrease in absorbance at 517 nm induced by antioxidants and plant extracts

The extracts are able to reduce the stable radical DPPH to the yellow-colored diphenylpicrylhydrazine.

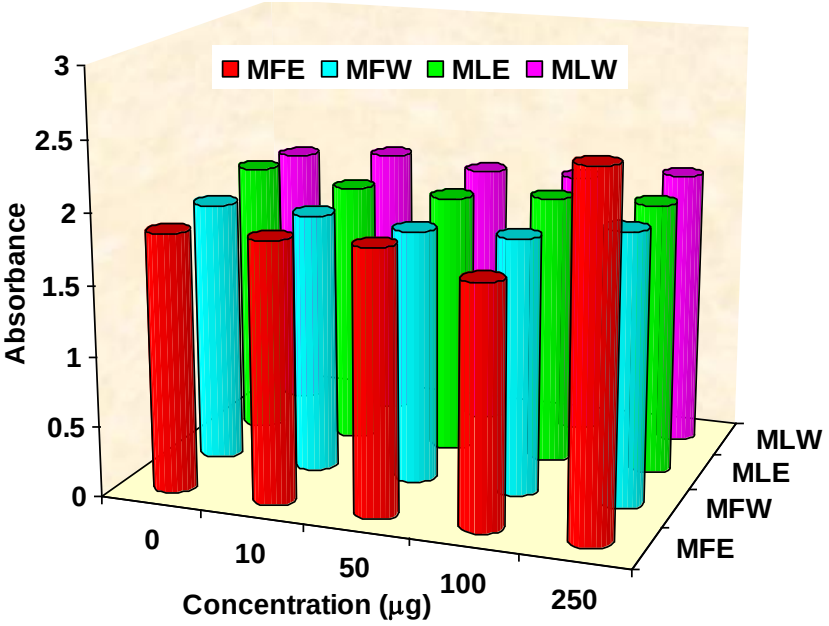
In the presence of Ascorbic Acid and EDTA



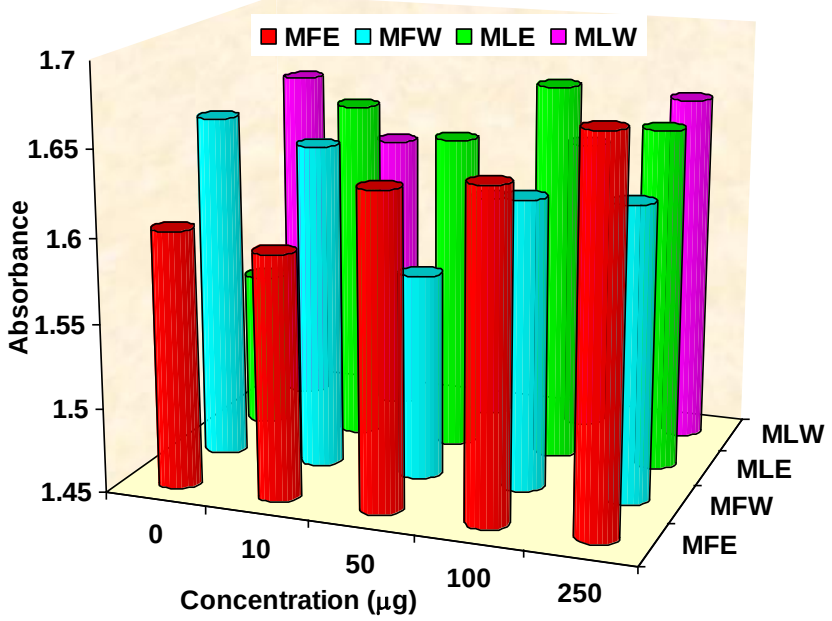
In the presence of EDTA but absence of Ascorbic Acid

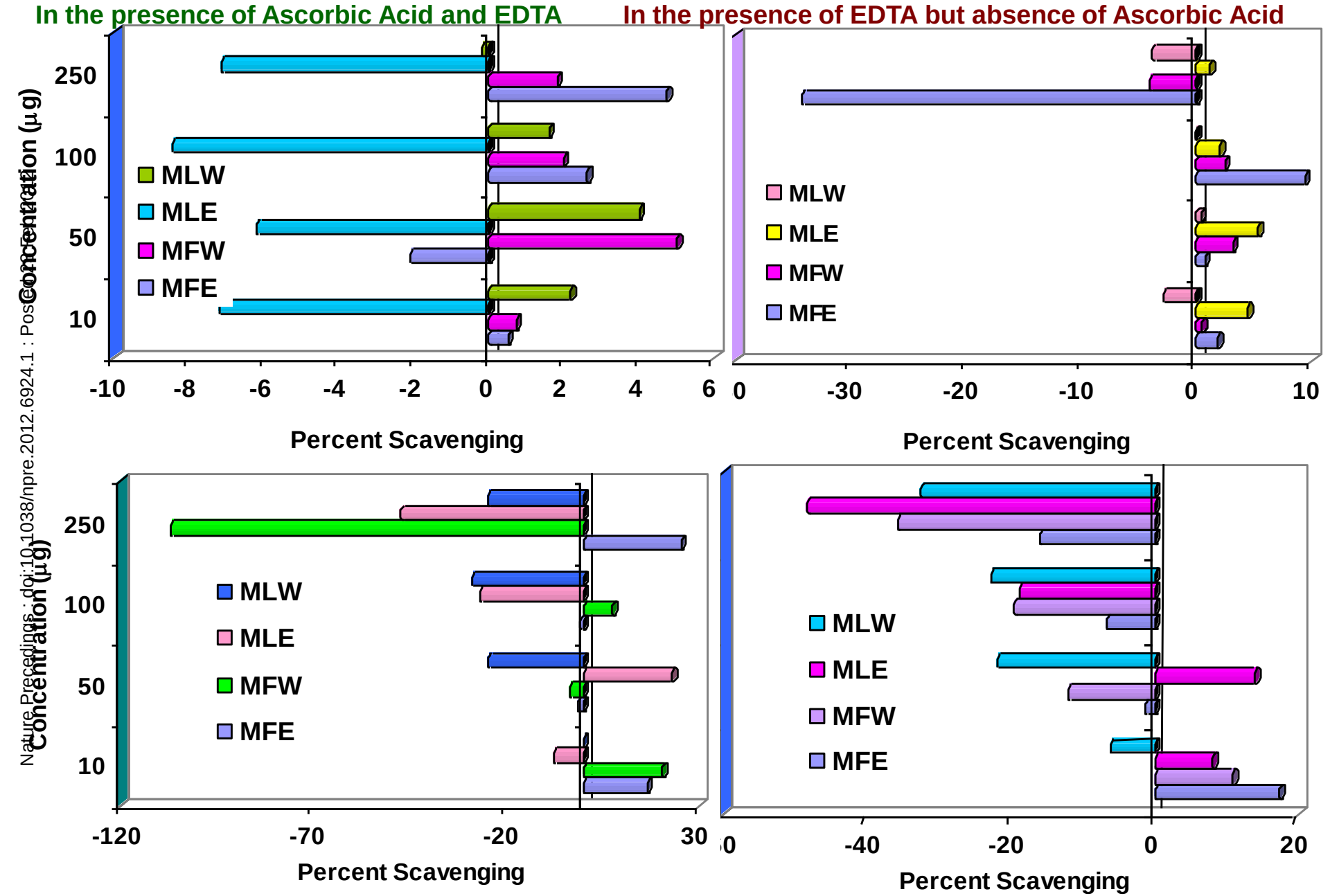


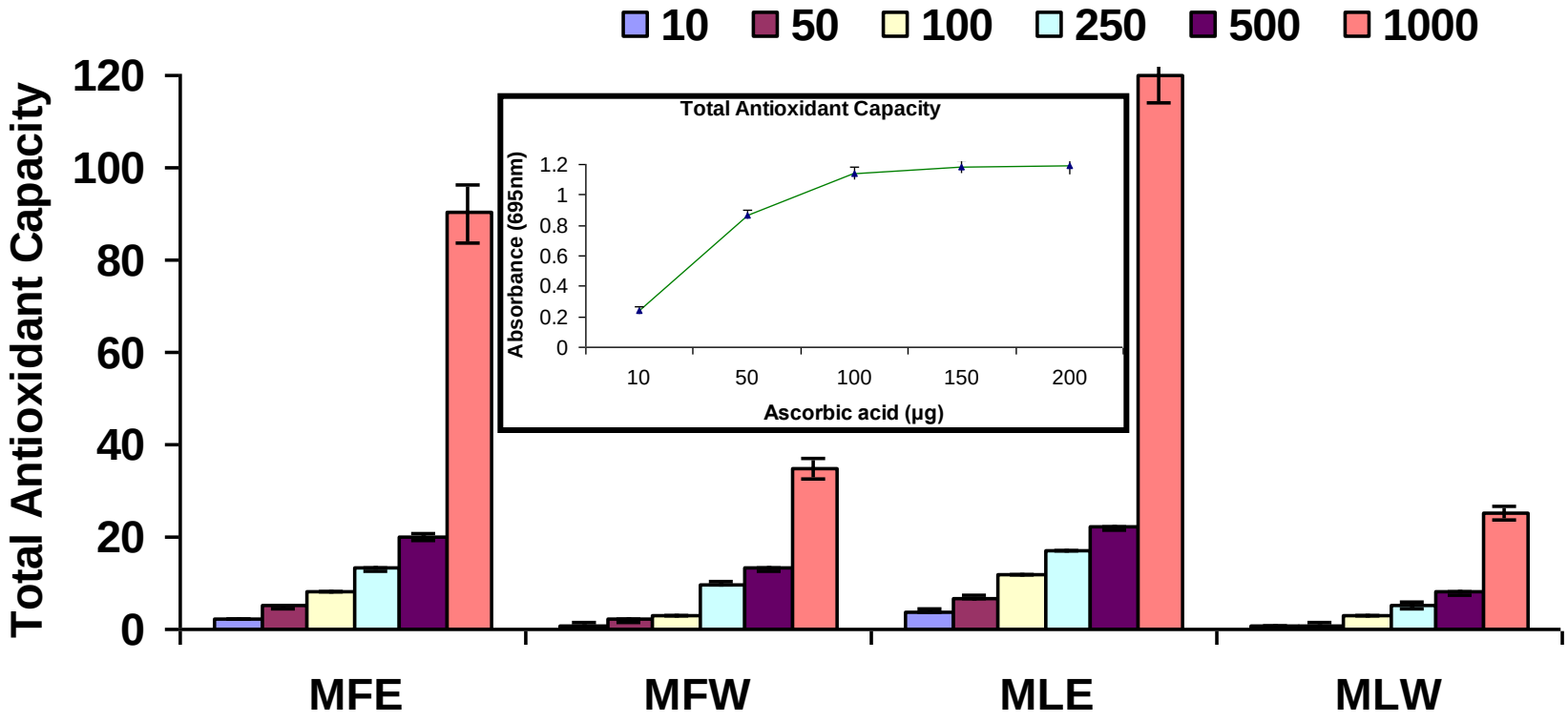
In the presence of Ascorbic Acid but absence of EDTA



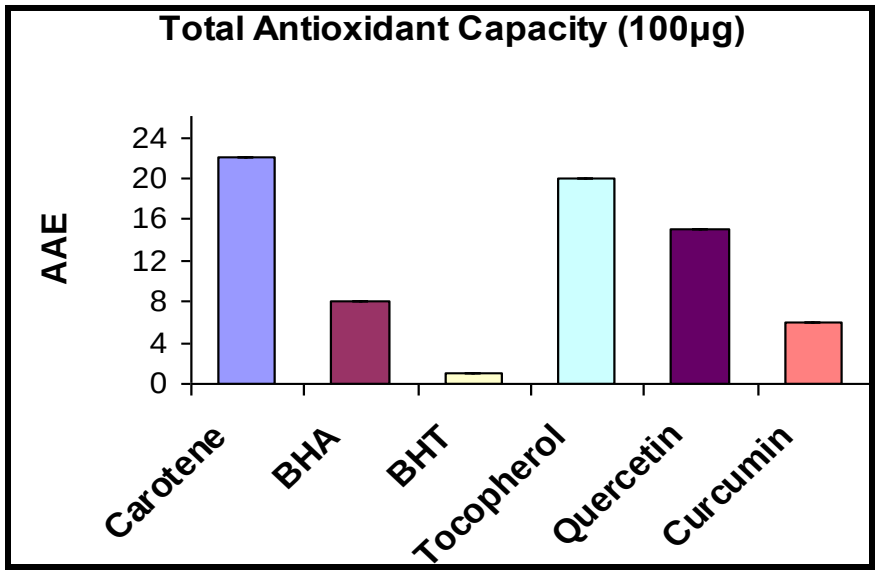
In the absence of both EDTA and Ascorbic Acid

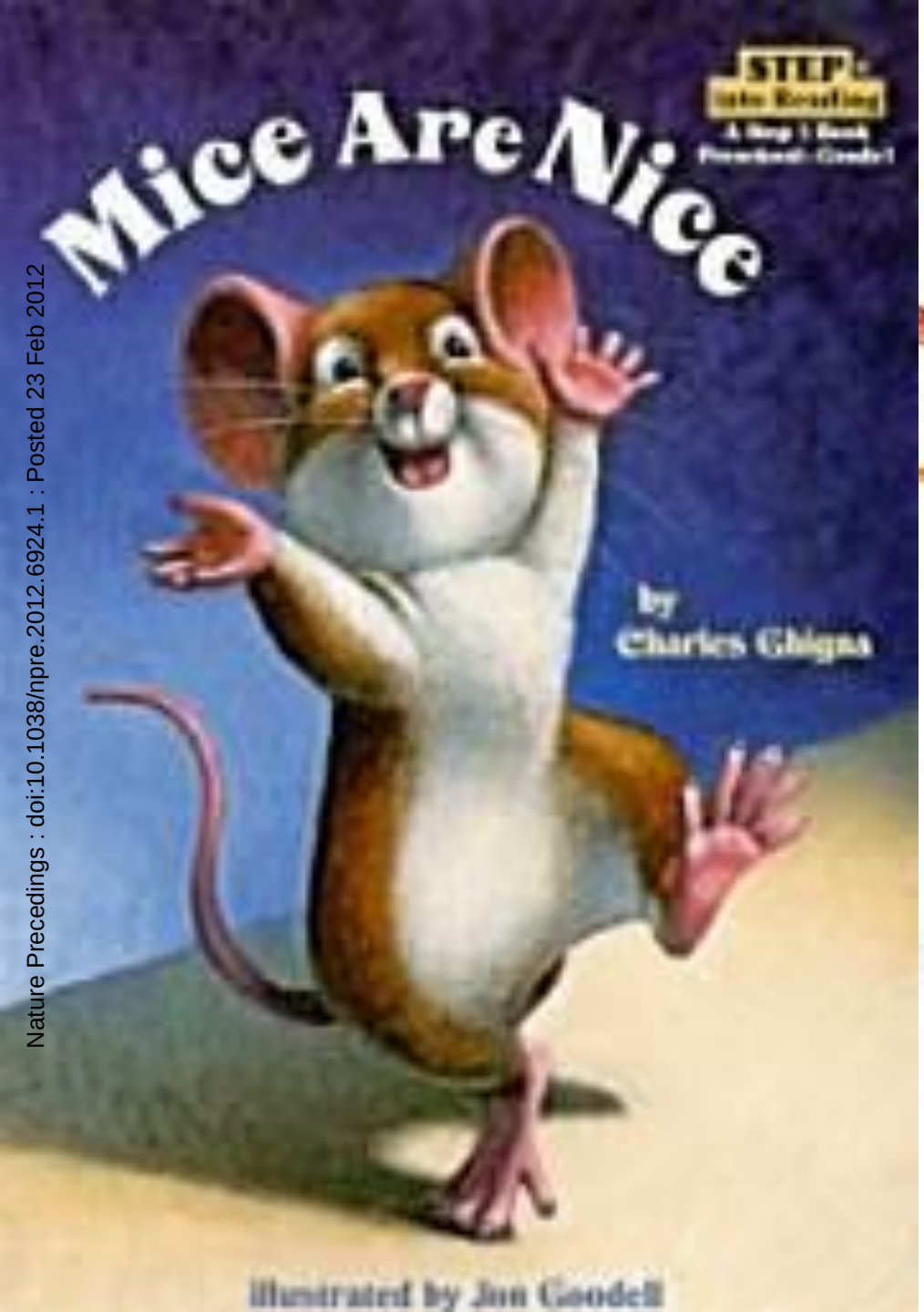


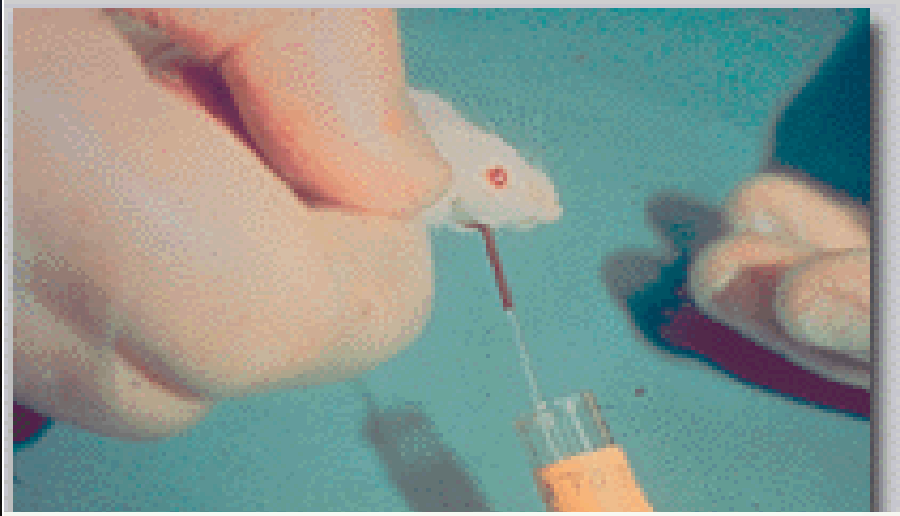




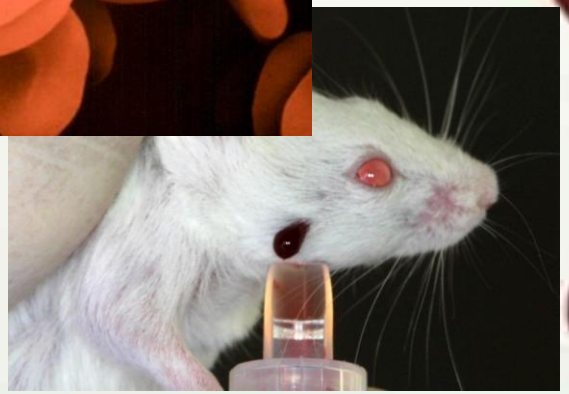
The antioxidant capacity by phosphomolybdenum method is based on the reduction of Mo (VI) to (V) by the antioxidant compounds and the formation of green Mo (V) complex with a maximal absorption at 695 nm.



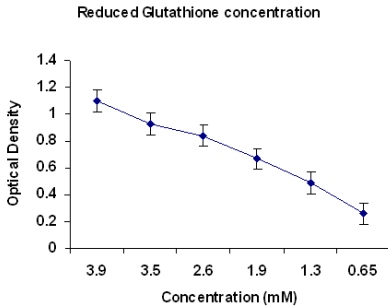


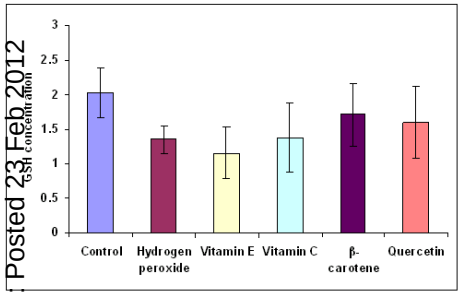


Subject	Mean (n)	Age (days)	Sex	Body (g)	Weight	Hemoglobin (g/100ml)	Pulse Rate (per min)
Healthy Mice (*Mus musculus*)	30	120-145	M	35 6		14 ± 3	120 ± 5



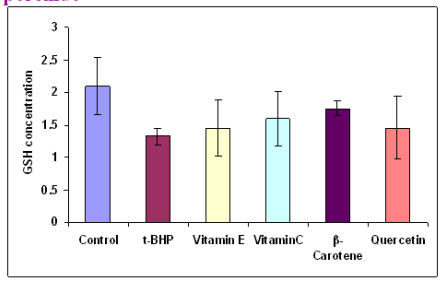
Standard curve of reduced glutathione (GSH)

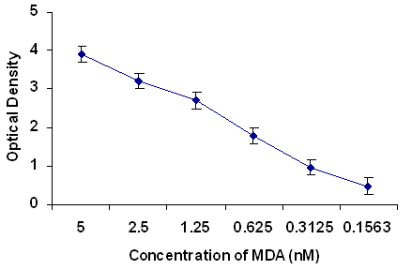




Protection of vitamins and flavonoid on erythrocyte reduced glutathione concentration in erythrocytes stressed with tert butyl hydroperoxide

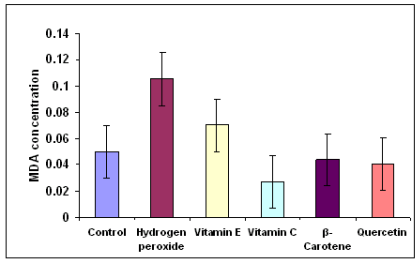
Protection of vitamins and flavonoid on erythrocyte reduced glutathione concentration in erythrocytes stressed with hydrogen peroxide



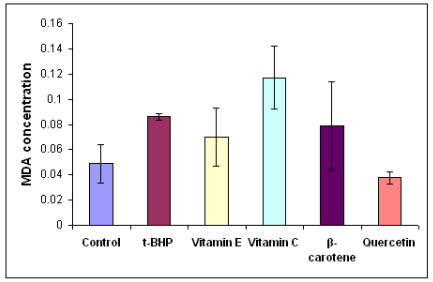


Standard curve of malondialdehyde (MDA)

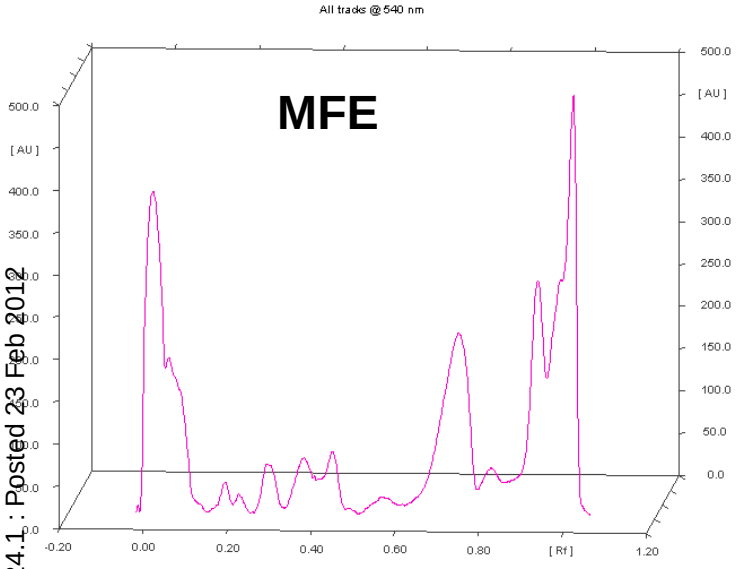
Protection of vitamins and flavonoid on erythrocyte malondialdehyde concentration in erythrocytes stressed with hydrogen peroxide

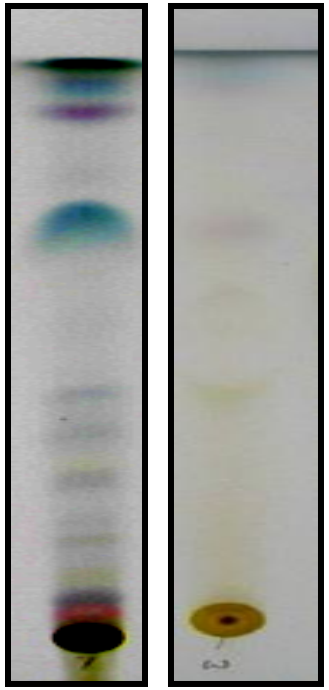


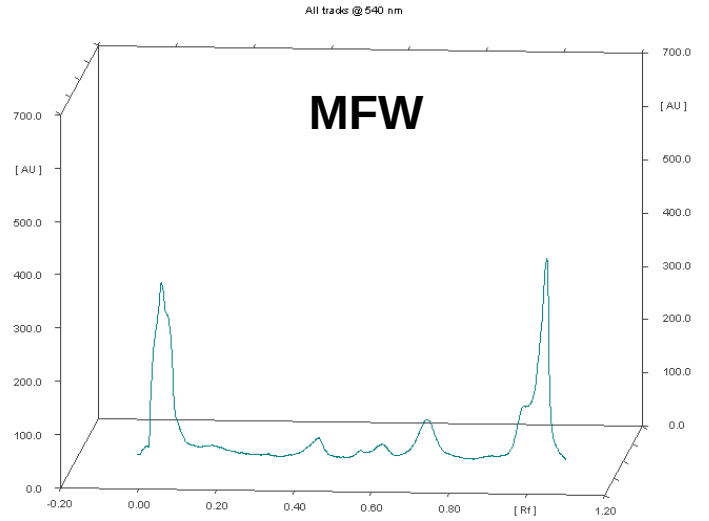
Protection of vitamins and flavonoid on erythrocyte malondialdehyde concentration in erythrocytes stressed with tert butyl hydroperoxide



Plant extract (s)	GSH concentration[1]		MDA concentration[2]	
	H_2O_2	t-BHP	H_2O_2	t-BHP
Moringa oleifera (Pod: Alc)	1.22 ± 0.23	1.82 ± 0.51	0.05 ± 0.007**	0.091 ± 0.03
Moringa oleifera (Pod: Aqs)	1.96 ± 0.61	1.97 ± 0.2*	0.05 ± 0.013**	0.077 ± 0.01
Moringa oleifera (Leaf: Alc)	2.14 ± 0.59	1.97 ± 0.41**	0.06 ± 0.01	0.128 ± 0.09
Moringa oleifera (Leaf: Aqs)	1.94 ± 0.49	1.843 ± 0.31	0.063 ± 0.009	0.08 ± 0.02
Control (without oxidation)	2.095 ± 0.44	2.039 ± 0.014	0.04996±0.005	0.0488 ± 0.015
Positive control (with oxidation)	0.915±0.16*	1.0314 ± 0.67**	0.1052±0.048**	0.086±0.014***

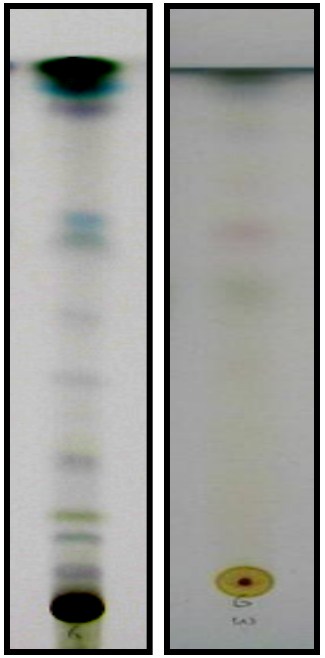


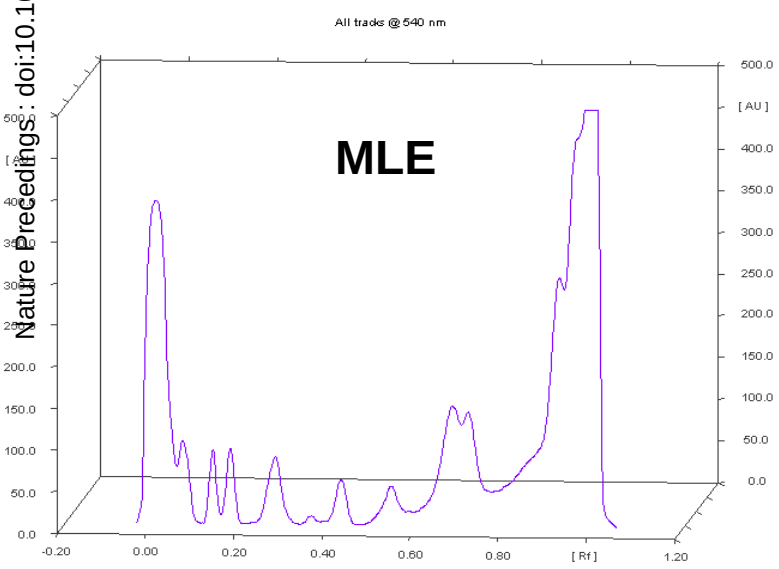


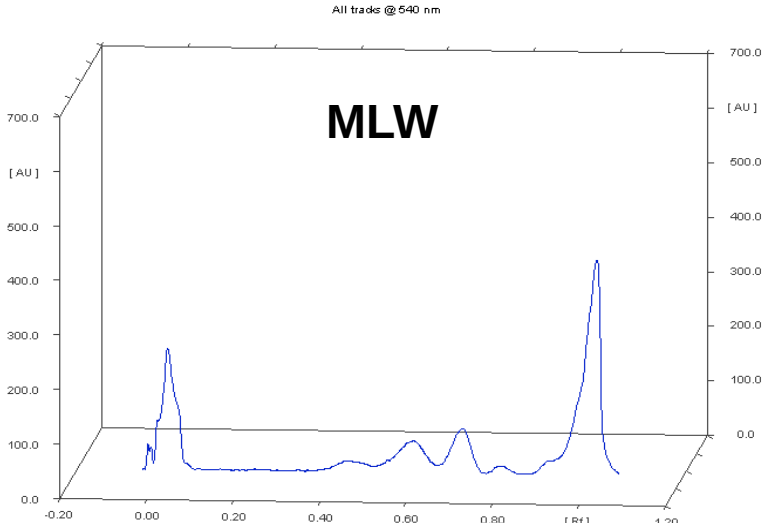


HPTLC

PROFILE







A new nitrile glycoside useful as a bioenhancer of drugs and nutrients and the process of its isolation from *Moringa oleifera*

(US Patent No. 6,858,588 granted on 22.2.2005)

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Determination of bioactive nitrile glycoside(s) in drumstick (*Moringa oleifera*) by reverse phase HPLC

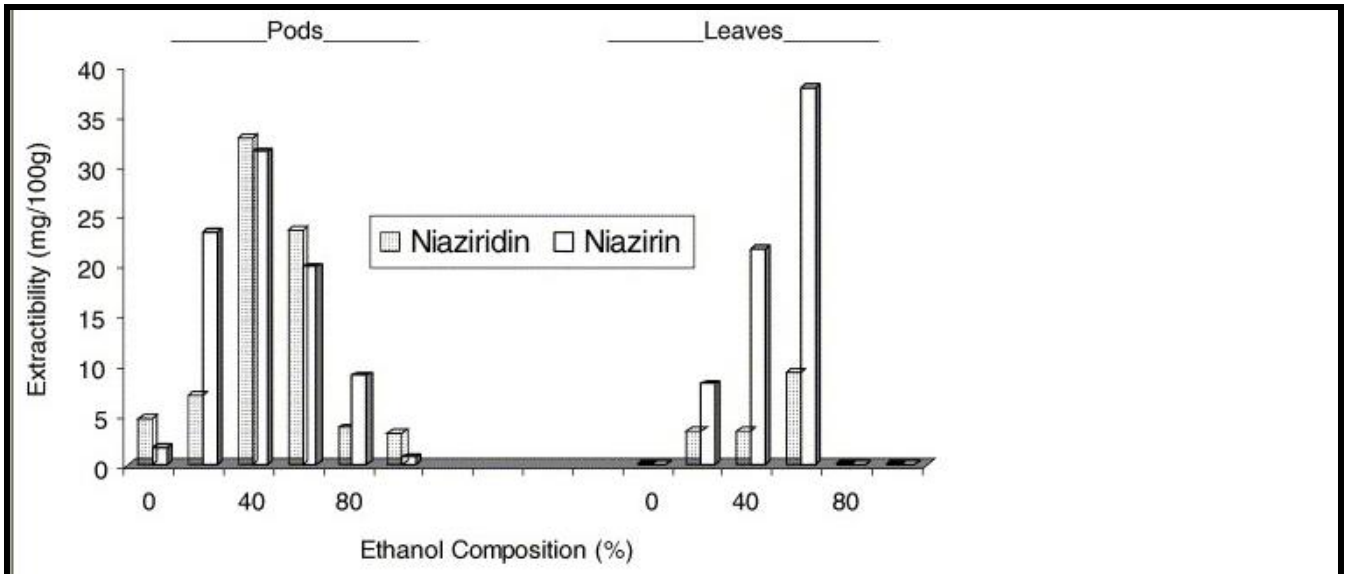

Fig. 3. Extraction of niaziridin and niazirin with various concentrations of ethanol–aqueous composition for pods and leaves of *M. oleifera*.

CONCLUSION

The useful observation in this study, however, is that ethanolic and aqueous extract of *Moringa oleifera* showed concentration-dependent ferric reducing antioxidant power and free radical scavenging activity.

Higher concentration of extract diminishes hydroxyl radical scavenging activity and promotes pro-oxidant activity.

The present finding has implication of isolating the active molecule useful as dietary/supplementary antioxidant from *Moringa oleifera* fruit and leaf.

The difference observed for level of ferric reducing antioxidant power, free radical scavenging activity being more in fruit (pod) over leaves indicates the possibility of differences in the constituents accumulated in leaves and fruits of *Moringa oleifera*.

Plants, which are more exposed to radical-forming radiation processes, are able to produce many types of scavenger molecules, mainly phenolic compounds.

Mammals lack the ability to generate phenolic compounds (except oestrogens), but this deficiency may be substituted for, in part, by the plants.

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