



## A REVIEW ON HERBAL ANTIOXIDANT AGENTS

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### ARTICLE INFO

### ABSTRACT

#### Key Words

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All over the world, the latest medical studies discovered the medicinal residences of plant life, which have been examined, due to their powerful pharmacological sports, financial viability, and their low toxicity. Reactive oxygen species enhancement via endogenous and exogenous stimuli can adjust redox circumstances of normal cells. To balance Reactive oxygen species mediated mobile damage, endogenous antioxidants, safety gadget subsists; however, when oxidation surpasses the manage mechanisms, oxidative strain will increase. Detrimental changes brought on in a spread of biomolecules together with proteins, lipids, and DNA which causes persistent escalation of oxidative stresses, which ultimately reasons tissue damage and consequences in numerous diseases. Antioxidants lessen the outcomes of Reactive oxygen species and help us in the prevention of such illnesses. Antioxidants can either be herbal or synthetic. Herbal antioxidants may be acquired eating regimen within the form of fruits, spices, vegetables, and many others. Synthetic antioxidants inclusive of butylated hydroxytoluene and butylated hydroxyanisole additionally decrease oxidation, however they were proved to be dangerous to humankind; therefore, investigation for non-poisonous antioxidants has multiplied in the current years.

### INTRODUCTION

Antioxidants performed a great role in fitness defensive mechanisms. Methodical indication recommends that antioxidants diminish the risk for persistent illnesses which include most cancers and coronary heart diseases. The whole grains, culmination, and vegetables are the predominant resources of certainly generating antioxidants. The antioxidants inclusive of phenolic acids, carotenes, vitamin C, and nutrition E received from plants had been documented to have the functionality to lower the hazard of diseases [1]. Synthetic antioxidants along with

butylated hydroxyanisole, tertiary butylhydroquinone, and propyl gallate from food had been used extensively. Chelators are also used widely due to the pro-oxidant effects of transition metal ions such as copper, magnesium, and iron in the meals producing industries. regarding the nicely being of sure guy made antioxidants as latent cancer agents, there has been strong difficulty and debate for many years. those artificial antioxidants had been nonetheless live at the list of generally diagnosed as secure, but drawbacks in their use were employed in USA, whereas butylated hydroxyanisole, tertiary butylhydroquinone, and propyl

gallate at a standstill require sanction in diverse states. consequently, there's emergent significance by way of meals enterprise and the users in replacing these man made antioxidants with alternatives of certainly produced substances that have been imagined to be innocent and feature widespread customer attractiveness [2], and the interest to utilize herbal antioxidants has been extended international. Plants were appeared as the primary supply of secondary metabolites showing fascinating biological moves. Normally, these chemical materials are the leader sources of some of structural arrangements and residences [3]. The examples of these secondary metabolites contain phenols, flavonoids, phenolic glycosides, cyanogenic glycosides, and saponins [4]. A few number of the plants with effective antioxidant activities are mentioned below:

#### 1. *Andrographis serpyllifolia* [5]

- **Family:** *Acanthaceae*.
- **Common name :** It is commonly known as round leaf Kariyat, Aaku chandrika.
- **Distribution :** It is mostly found in Tamil Nadu, Kerala, Andhra Pradesh, and Karnataka.
- **Chemical constituents:** The entire plant comprises phenols, alkaloids, steroids, saponins, flavonoids, terpenoids, tannins, anthraquinones, glycosides, phycobalamin, and sugar.
- **Uses :** The bioactive compounds of *A. serpyllifolia* are related to have important biological applications such as antibacterial, antiulcer, anti-diabetic, anticancer, and anti-inflammatory activities. *A. serpyllifolia* plant is used as traditional Indian herbal medicine for the treatment of dysentery and malaria. The plant extract is used to treat wounds and also effective in jaundice.
- **Extract:** The methanol leaf extracts.
- **In recent studies:** *In vitro* antioxidant activity was determined by superoxide dismutase, catalase,

glutathione peroxidase, and glutathione S-transferase.

#### 2. *Annona reticulata* [6]

- **Family:** Annonaceae.
- **Common name:** Ramphal, Bullock's heart, and Custard apple.
- **Geography:** It is native to India. It grows naturally in tropical and subtropical region.
- **Chemical constituents:** Fruit peel extracts revealed the presence of tannins, saponins, phenols, flavonoids, cardiac glycosides, coumarins, terpenoids, alkaloids, and steroids.
- **Uses:** Various extracts of different plant parts have shown anti-hyperglycemic, cytotoxic and recombinant caspase inhibitory activity, antinociceptive, analgesic and central nervous system depressant, analgesic and anti-inflammatory, tumor inhibitor and anti-proliferative
- **Extract:** Various extracts such as aqueous, ethanol, chloroform, acetone, and petroleum ether.
- **In recent studies:** *In vitro* antioxidant potential was evaluated by assessing 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activity by using ascorbic acid as a standard drug.

#### 3. *Bogor pineapple* [7]

- **Family:** Bromeliaceae
- **Common name :** The 'Bogor pineapple', also known as the 'snack pineapple'.
- **Geography:** Snack pineapples are native to the Okinawa prefecture in Japan where they have been cultivated since the 1920s.
- **Chemical constituents:** Fruits contain a proteolytic enzyme, bromelain, which can constitute nearly half the measured protein in the fruit.
- **Uses:** Bromelain is used in the pharmaceutical industry for digestive and antiinflammatory products, in the manufacture of cattle feed and to 'chill-proof' beer.

- **Extract:** Different parts of Bogor pineapple sample was extracted by reflux using different polarity solvents such as n-hexane, ethyl acetate, and ethanol.
- **In recent studies:**Antioxidant activities were determined using DPPH and FRAP assays, total phenolic content (TPC) using Folin–Ciocalteu reagent, flavonoid content by Chang’s method, and correlation with their IC50 DPPH and EC50 FRAP were analyzed by Pearson’s method.

#### 4. *Bangun-bangun*[8]

- **Family:** Lamiaceae
- **Common name:**Indian mint, Indian Borage.
- **Geography:** It is native to Southern and Eastern Africa.
- **Chemical constituents:**Bangun-bangun leaves contain saponins, flavonoids, polyphenols, essential oils, beta-carotene, niacin, carvacrol, calcium, fatty acids, oxalic acid, and fiber.
- **Uses :** The leaves are strongly flavoured and make an excellent addition to stuffings for meat and poultry.
- **Extract:** Ethanolic extract.
- **In recent studies:**The antioxidant activity test was performed by 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) free radical scavenging method with various concentrations of extract.

#### 5. *Barleria cristata* [9]

- **Family:** Acanthaceae.
- **Common name :**Philippine violet, Bluebell barleria.
- **Geography:** It grows in dry habitats.
- **Chemical constituents:** Phytoconstituents such as alkaloids, carbohydrates, glycosides, steroids, flavonoid, saponins, and phenolic compounds are present in different extracts of the leaf.
- **Uses :** It has been reported on a variety of pharmacological activities such as antimicrobial, hypoglycemic,

anti-inflammatory, and hepatoprotective.

- **Extract:** Ethanol extract, Petroleum ether extract.
- **In recent studies:** The antioxidant activity test was performed by 1,1-Diphenyl-2-picrylhydrazyl (DPPH) free radical scavenging activity, Ferric reducing antioxidant power (FRAP) by using Ascorbic acid as a standard.

#### 6. *Cardiospermum halicacabum*[10]

- **Family:** Sapindaceae.
- **Common name :**Balloon vine or Love in a puff.
- **Geography:**They are widely distributed in tropical and subtropical areas of the world. This plant is produced in the plains of Asia and Africa.
- **Chemical constituents:** Preliminary phytochemical screening of the ethanolic extract of *C. halicacabum* revealed the presence of alkaloids, flavonoids, saponins, proteins, carbohydrates, tannins, and glycosides.
- **Uses** It is used in the treatment of rheumatism, nervous diseases, stiffness of the limbs, and snakebite.
- **Extract:** Ethanol extract.
- **In recent studies:** Antioxidant and free radical scavenging activities of the aerial parts extract of *C. halicacabum* was determined by 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay, 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) radical scavenging assay, ferrous ion chelating assay, nitric oxide (NO) radical scavenging assay, superoxide radical scavenging assay, hydroxyl radical scavenging assay, and lipid peroxidation assay.

#### 7. *Coleus forskohlii*[11]

- **Family:** Lamiaceae.
- **Common name :** Indian Coleus.
- **Geography:**It is a common herb available in countries such India, Nepal, Myanmar, Sri Lanka, Thailand, and Africa.

- **Chemical constituents:** Lupeol, Oleanolic acid, Beta-sitosterol, Colonic acid, Demethylcryptojaponol, Coleolic acid.
- **Uses:** These compounds are found to exhibit anti-inflammatory, antioxidant, antidiabetic, antimicrobial, and anticancer properties. This plant has been used since ancient times to treat heart disorders such as high blood pressure and chest pain (angina), as well as respiratory disorders such as asthma.
- **Extract:** Dried tubers were extracted with different solvents such as aqueous, ethanol, and acetone (polar) and petroleum and chloroform (non-polar).
- **In recent studies:**The antioxidant activity of *Coleus forskohlii* was evaluated from the tubers ethanol extracts by measuring the total antioxidant capacity and total flavonoid, phenolic and flavonol contents.

#### 8. *Crataegus azarolus* [12]

- **Family:** Rosaceae.
- **Common name :** Hawthorn.
- **Geography:**This are shrubs or small tree usually with thorns with about 200 species commonly distributed throughout the Northern temperate region.
- **Chemical constituents:** *C. azarolus* have revealed the presence of polyphenols including flavonoids.
- **Uses :**It was used for heart diseases such as hypertension, angina, arrhythmia, and congestive heart failure. In traditional Arabic medicine, the leaf and fruit extract of *Crataegus aronia* are used for cardiovascular diseases, sexual weakness, cancer, and diabetes treatment.
- **Extract:** Methanol extract.
- **In recent studies:**The antioxidant activity of *Crataegus azarolus* was evaluated from CHCl<sub>3</sub> and n-butanol extracts by measuring the total

antioxidant capacity and total flavonoid, phenolic and flavonol contents.

#### 9. *Dendrophthoe pentandra* [13]

- **Family:**Loranthaceae.
- **Common name :**Malayan Mistletoe, Mango Mistletoe.
- **Geography:** From eastern India to Indo-China and western Malesia.
- **Chemical constituents:** Mistletoe contains different types of biological active compounds such as carbohydrates, fats, amino acids, oligosaccharides, polysaccharides, enzyme, flavonoid, glycoprotein (lectin MLT), polypeptide (viscotoxin), vesicles, and triterpene acids.
- **Uses :** Treating small sores, ulcers and other skin affections.
- **Extract:** Extracted using methanol, n-hexane, and ethyl acetate.
- **In recent studies:** The antioxidant activity of *Dendrophthoe pentandra* was evaluated from methanol, n-hexane, and ethyl acetate by the DPPH method.

#### 10. *Erythrina abyssinica* [14]

- **Family:** Fabaceae.
- **Common name :**Red-hot-poker, Coral tree, Lucky-bean tree.
- **Geography:** It is common and native to South Africa, especially in the Eastern Cape. The plant grows in wooded grassland as well as open-wooded and rocky hillsides.
- **Chemical constituents:** The phytochemical studies of this aqueous stem bark extract revealed the presence of saponins, flavanols, flavones, flavonoids, chalcones, and tannins.
- **Uses :**It is used for the treatment of several diseases such as meningitis, malaria, allergy, elephantiasis, trachoma, syphilis, burns, and swellings.
- **Extract:** Ethanolic leaf extract
- **In recent studies:**The antioxidant activity of ethanolic leaf extract has been studied by measuring DPPH

radical scavenging essay using ascorbic acid as standard compound.

11. *Hammada scoparia* [15]

- **Family:** Santalaceae.
- **Common name :** Kayu Sulaeman.
- **Geography:** It is mainly distributed in runnels and loessial plains of the wadis and exists with fewer and smaller individuals on slopes and tops of the neighboring hills.
- **Chemical constituents:** Phytochemical screening covering saponins, alkaloids, terpenoids, flavonoids, and tannins were carried out by standard methods.
- **Uses :** This plant against poisonous reptile bites such as scorpions, snakes and vipers as well as the treatment of digestive tract diseases, injuries, skin inflammations and diabetes.
- **Extract:** Methanolic crude extract.
- **In recent studies:** *In vitro* antioxidant activity was evaluated by the free radical scavenging activity by 2,2-diphenyl-1-picrylhydrazyl (DPPH), trolox equivalent antioxidant capacity by scavenging of 2,2'-azinobis-(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) radical cation assay, and the ferric reducing power assay (ferric reducing antioxidant power).

12. *Indigofera tinctoria* [16]

- **Family:** Fabaceae.
- **Common name :** Indigo.
- **Geography:** It is a leguminous plant which is widespread across tropical regions around the globe.
- **Chemical constituents:**
- Phytochemical screening revealed the presence of carbohydrates, reducing sugars, alkaloids, saponins, phenolic compounds, and flavonoids in methanolic leaf and root extracts.
- **Uses :** The plant is useful in the treatment of cancer, hydrophobia, gout, rheumatoid arthritis, cephalalgia, lumbago, epilepsy, insanity, blennorrhagia, urinary complaints, cough, bronchitis, rhinitis, asthma, palpitation, hepatitis, splenomegaly, hemorrhoids, sores, old ulcers, constipation, leucoderma,

grey hairs, snake bite, scorpion bite, and insect bite.

- **Extract:** Methanolic leaf extracts.
- **In recent studies:** The free radical scavenging activities of the methanolic extracts of leaves and roots were evaluated by 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay.

13. *Laurus nobilis* [17]

- **Family:** Lauraceae
- **Common name:** Bay laurel, Sweet bay.
- **Geography:** It is native to the Mediterranean region
- **Chemical constituents:** The leaves contain about 1.3% essential oils, consisting of 45% eucalyptol, 12% other terpenes, 8–12% terpinyl acetate, 3–4% sesquiterpenes, 3% methyleugenol, and other  $\alpha$ - and  $\beta$ -pinenes, phellandrene, linalool, geraniol, and terpineol. It contains lauric acid also.
- **Uses :** Both leaves and berries are traditionally considered as astringent, stomachic, stimulant and narcotic. A decoction of the leaves is used for treating problems of the urinary organs and dropsy.
- **Extract:** Ethanol and water extracts.
- **In recent studies:** Antioxidant properties were measured using three tests: Free radical scavenging activity against 2,2-diphenyl picrylhydrazyl (DPPH), reduction of molybdate, and reducing ( $Fe^{3+}/Fe^{2+}$ ) power.

14. *Syzygium cumini* [18]

- **Family:** Myrtaceae.
- **Common name:** Jamun.
- **Geography:** Most tropical and subtropical forest habitats in India.
- **Chemical constituents:** Phytochemical profiling revealed that the extract contains phenolic compounds, flavonoids, glycosides, alkaloids, tannins, and saponins.
- **Uses :** Both the seeds and the fruit are diuretic and have important carminative and astringent properties and fruit is given orally to treat diabetes.

- **Extract:** Ethanolic extract.
  - **In recent studies:** *In vitro* antioxidant activity was determined by 1, 1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activity.
15. *Tarennia polycarpa*[19]
- **Family:**Rubiaceae.
  - **Common name :**Marbosi-bosi.
  - **Geography:**Which commonly found in Sibolga, North Sumatera, Indonesia.
  - **Chemical constituents:** It contains flavonoids that used as antimicrobials and antioxidants. Its isolation contain flavon and terpenoid compounds.
  - **Uses :**It has been used as antidiabetes, cholesterol, anti-inflammatory and antibacterial.
  - **Extract:** Ethanol extract.
  - **In recent studies:** Antioxidant activity was examined by DPPH method.
16. *Tinospora cordifolia*[20]
- **Family:**Menispermaceae
  - **Common name :**Heart-leaved moonseed, Gaduchi
  - **Geography:** The species is endemic to India and is common throughout tropical and subtropical zones.
  - **Chemical constituents:** *Tinospora* contains diverse phytochemicals, including alkaloids, phytosterols, glycosides, and mixed other chemical compounds Columbin, tinosporaside, jatrorrhizine, palmatine, berberine.
  - **Uses :**It is used for diabetes, high cholesterol, allergic rhinitis (hay fever), upset stomach, gout, lymphoma and other cancers, rheumatoid arthritis (RA), hepatitis, peptic ulcer disease (PUD), fever, gonorrhea, syphilis, and to boost the immune system.
  - **Extract:** Methanolic extract.
  - **In recent studies:** Lipid peroxidation (TBARS), superoxide dismutase (SOD), catalase (CAT), and glutathione peroxidase (GPx) levels were determined with and without polysaccharide treatment in the cell lines and breast and liver tissues.
17. *Triticum aestivum*[21]
- **Family:** Gramineae.
  - **Common name :**Wheatgrass.
  - **Geography:***Triticum* is the genus of yearly and periodic grasses, yielding numerous types of wheat, inborn to South West Asia and Mediterranean region.
  - **Chemical constituents:** Young grass of common wheat plant components includes chlorophyll, flavonoids, and Vitamins A, C, and E.
  - **Uses :** Wheatgrass is used in Folklore medicine for treatment of skin diseases and wound healing.
  - **Extract:** Petroleum ether, Ethanol and Aqueous extracts.
  - **In recent studies:**It have been evaluated for *in vitro* antioxidant activity and wound healing activity by 1,1- diphenyl, 2 Picrylhydrazyl radical scavenging activity, and Chick chorioallantoic method, respectively.
18. *Ziziphus jujube* [22]
- **Family:**Rhamnaceae.
  - **Common name:** Chinee apple, **jujube**, Indian plum, Regi pandu.
  - **Geography:** widely distributed in milder climates to hot deserts of Asia and Africa.
  - **Chemical constituents:** phytoorganic constituents such as total carbohydrates, fats, proteins, crude fibers, and flavonoids were determined.
  - **Uses:** Seeds are reported to hypnotic-sedative and anxiolytic activity, and permeability enhancement activity. Fruits are reported to have anticancer and antioxidant activities; leaf has immunostimulant, cardiovascular anti-inflammatory, antiulcer, antiallergic, antidiarrheal, hypoglycemic, and anti-obese activities. Barks are reported to wound healing, antifertility, and

- antimicrobial activities. Roots and stems are an antimicrobial activity .
- **Extract:** Ethanolic fruit extract.
- **In recent studies:** The ethanolic fruit extract of *Z. jujuba* might possess antioxidant and anticancer activities.

**Table 1: Some medicinal plants with antioxidant properties**

Plant name	Common name	Family	Part used	Ref
<i>Agave cantala</i>	Agave	Agavaceae	Leaves	23
<i>Alangium salvifolium</i>	Sage leaved alangium	Alangeaceae	Whole plants	24
<i>Anethum graveolens</i>	Dill	Apiaceae	Seeds	25
<i>Aristolochia longa</i>	Indian Birthwort	Aristolochiaceae	Stems and leaves	26
<i>Allium sativum</i>	Garlic	Liliaceae	Bulb	27
<i>Bacopa monnieri</i>	Indian pennywort	Scrophulariaceae	Whole plant	28
<i>Boerhaavia diffusa</i>	<i>Punarnava</i>	Nyctaginaceae	Whole plant	29
<i>Boerhavia erecta</i>	erect boerhavia	Nyctaginaceae	Roots	30
<i>Boswellia ovalifoliolata</i>	Salai guggul	Burseraceae	Bark	31
<i>Canthium coromandelicum</i>	Coromandel <i>Canthium</i>	Rubiaceae	Leaf	32
<i>Cassia fistula</i>	golden shower	Fabaceae	Seeds	33
<i>Cassia siamea</i>	cassia tree	Leguminosae	Stem	34
<i>Catharanthus pusillus</i>	Periwinkle	Apocynaceae	Whole plant	35
<i>Citrullus vulgaris</i>	Water melon	Cucurbitaceae	Seeds	36
<i>Crataeva nurvala</i>	Barun'or Barna'	Capparidaceae	Leaves	37
<i>Cucumis sativas</i>	Cucumber	Cucurbitaceae	Flowers	38
<i>Datura stramonium</i>	devil's snare	Solanaceae	Seeds	39
<i>Dillenia indica</i>	Elephant apple	Dilleniaceae	Fruit	40
<i>Drynaria quercifolia</i>	Asvakatri	Polypodiaceae	Rhizome	41
<i>Garcinia brasiliensis</i>	Bacupari	Clusiaceae	Leaves	42
<i>Garcinia imberti</i>	Punanpuli	Clusiaceae	Leaves and Bark	43
<i>Hugonia mystax</i>	Modirakanni.	Linaceae	Fruits	44
<i>Hydrocotyle sibthorpiodes</i>	Water Pennywort punanpuli	Apiaceae	Whole plant	45
<i>Justicia gendarussa</i>	Jagatmadan	Acanthaceae	Stem bark	46
<i>Landolphia heudelotti</i>	Guinea gumvine	Apocynaceae	Roots	47
<i>Nicotiana tabacum</i>	Tobacco	Solanaceae	Stem	48
<i>Phyllanthus indofischeri</i>	Karanelli	Euphorbiaceae.	Bark	49
<i>Rauwolfia tetraphylla</i>	devil-pepper	Apocyanaceae	Leaf and fruit	50

## CONCLUSION

Within the present observe, some medicinal plants as shown in review for examples *Andrographis serpyllifolia*, *Annona reticulata*, *Bogor pineapple*, *Bangun-bangun*, *Barleria cristata*, *Cardiospermum halicacabum*, *Coleus forskohlii*, *Crataegus azarolus*, *Dendrophthoe pentandra*, *Erythrina abyssinica*, *Hammada scoparia* , *Indigofera tinctoria*, *Laurus nobilis*, *Syzygium cumini*, *Tarenna polycarpa*, *Tinospora cordifolia*, *Triticum aestivum*, *Ziziphus*

*jujube* had been proved to possess valuable antioxidant properties as they comprise a huge range of secondary metabolites together with flavonoids and phenolics. In addition to antioxidant interest, these compounds are also used as anticarcinogenic, antibacterial, antiviral and antifungal, antispasmodic, and antidiabetic.

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