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"Antioxidant from natural source"

Bangar Pratibha Dashrath*
1)Mr.L.D.Hingane, 2)Mr.L.D.Hingane
(M.Pharm, PHDScholar)
(M.Pharm,PHD Scholar)
College: Aditya pharmacy college, Beed.
Address: Nalwaldi Naka Beed Maharashtra
Pincod : 431127

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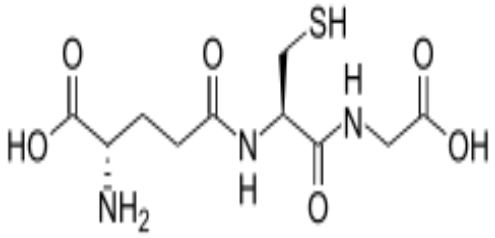
ABSTRACT:-

- Natural antioxidants are widely distributed in food and medicinal plants. These natural antioxidants, especially polyphenols and carotenoids, exhibit a wide range of biological effects, including anti-inflammatory, anti-aging, antiatherosclerosis and anticancer.
- The effective extraction and proper assessment of antioxidants from food and medicinal plants are crucial to explore the potential antioxidant sources and promote the application in functional foods, pharmaceuticals and food additives.
- The present paper provides comprehensive information on the green extraction technologies of natural antioxidants, assessment of antioxidant activity at chemical and cellular based levels and their main resources from food and medicinal plants. .hydrostatic pressure extraction, pulsed electric field extraction and high voltage electrical discharges extraction. Moreover, to further assess the antioxidant capacities of extracts from natural products, especially those frequently consumed by people, different evaluation assays have been developed.

Antioxidants arecompoundsthat inhibitoxidation.Oxidationis achemicalreactionthat can producefreeradicals, thereby leading tochainreactionsthat may damage thecellsof organisms. Antioxidants such asthiolsorascorbicacid(vitamin C) terminate these chain reactions. To balance theoxidativestress,plants and animals maintain complex systems of overlapping antioxidants, such asglutathioneandenzymes (e.g.,catalaseandsuperoxidedismutase), produced internally, or thedietaryantioxidantsvitaminCandvitaminE.



Structure of the antioxidant glutathione.

The term "antioxidant" is mostly used for two entirely different groups of substances:industrialchemicalsthat are added to products to prevent oxidation, and naturally occurring compounds that are present in foods andtissue.The former, industrial antioxidants, have diverse uses: acting aspreservativesin food and cosmetics, and beingoxidation-inhibitors in rubber, synthetic plastics, and fuels.

Natural antioxidant :-

- Most of the natural antioxidants are derived from plant materials, such as fruits, vegetables, herbs and spices . These are particularly rich in phenolic compounds, vitamins and carotenoids.Halvorsen Halvorsen and Holme , stated that Rosacea, Empetraceae Ericaceous,Grossulariaceae, Juglandaceae, Asteraceae, Panaceas and Zingiberaceae are families of plants that contain compounds with high antioxidant activities, which include fruits, such as black berries, strawberries, blue

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berries, black currants, walnuts, pomegranates and others.

- Essential oils from spices and herbs, such as oregano, thyme, dittany, marjoram, lavender and rosemary, have also been demonstrated to be excellent sources of natural antioxidant molecules, but with more limited ranges of applications due to their strong flavour characteristics Aqueous tea extracts have also been used as sources of natural antioxidants because of their contents of several compounds, such as catechism, tannins and other flavonoids, with the advantage of not presenting a strong flavour like essentials oils.
- Concerning fruit and legumes, the processing industries are constantly struggling to reduce by-products, not only because the environmental problems associated, but due to the socio-economic losses .

For example, in fruit processing, as in the case of production of juices, pulps, canned fruit and others, industries generate particular by-products in the form of peels, cores, seeds, leaves and others that are discarded. More than half of the agricultural-food residues are derived from this sector, so a change of behaviour, including initiatives and projects aimed at reducing the by products of processing.

Atioxidant in plants:-

- These natural antioxidants from plant materials are mainly polyphenols (phenolic acids, **flavonoids**, anthocyanins, lignans and stilbenes),**carotenoids** (xanthophyll's and carotenes) and vitamins (**vitamin E** and C).
- The use of synthetic and natural food antioxidants regularly in medicine and foods particularly those having fats and oils to shield the food from oxidation. Butylated hydroxytoluene (BHT) and butylated hydroxyanisole (BHA) are the synthetic and natural food antioxidants which have been used extensively in cosmetic, food and therapeutic industries.
- In consideration of growing risk issues of humans to various lethal diseases, there has been a universal trend in the direction of the use of natural substances present in dietary and medicinal plants as curative antioxidants.

•Antioxidant from fruits &vegetables:-

- Vegetables and fruits are rich sources of antioxidants. There is good evidence that eating a diet that includes plenty of vegetables and fruits is healthy, and official U.S. Government policy urges people to eat more of these foods.
- Research has shown that people who eat more vegetables and fruits have lower risks of several diseases; however, it is not clear whether these results are related to the amount of antioxidants in vegetables and fruits, to other components of these foods, to other factors in people's diets, or to other lifestyle choices.

They are most abundant in **fruits and vegetables**, as well as other **foods** in clouding nuts, wholegrains and some meats, poultry and fish. Good **sources** of specific **antioxidants** include: allium Sulphur compounds – leeks, onions and garlic. anthocyanins – eggplant, grapes and berries.

Many fruits are high in antioxidants, packed with vitamins, and beneficial in a myriad of ways.These include cranberries, **red grapes**, peaches, **raspberries**, **strawberries**, red currants, figs, cherries, pears, guava, oranges, **apricots**, **mango**, **red grapes**, cantaloupe, watermelon, papaya, and tomatoes.

•Mushroom Antioxidant:-

- The term mushroom may come from Latin word mucus (slime) According to Chang and Miles mushroom is a macro fungus with a distinctive fruit body, which can be either epigeous (grow above the earth) or hypogenous (grow underground; i.e. truffles) and large enough to be seen with naked eye to be picked by hand".
- These organisms are a very large and diversified group of macro fungi (i.e. higher fungi) belonging to basidiomycetes and ascomycetes that can be edible or non-edible. The fungal spores for these two groups of macro fungi are located in a special structure called ascidium (for basidiomycetes) or ascus (for ascomycetes).
- Mushrooms grow mostly above the earth and some of them have an umbrella shaped fruiting body, where spores are produced (in lamellae, structures on the underside of the pileus or cap). Two phases of growth are distinguishable in these organisms; the reproductive phase (fruit bodies) and the vegetative phase (mycelia or mycelial growth).
- During substrate invasion, hyphae continually grow and branch to form a network of hyphae (mycelia) and a fruit body grows from

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underground mycelia by a process called fructification.

- Mycelial growth is generally coupled with increased enzyme production and respiration. Hyphae absorb digestive products, penetrating the substrate to some extent.
- The fungal cell wall can be formed by β-D-glycan's, proteins, and chitin (Fig.1). From the ecological point of view, mushroom can be apostrophes, parasites and mycorrhiza.
- There are only few parasitic mushrooms. Most of the cultivated mushrooms are astrographs. Mycorrhiza mushrooms have a symbiotic relationship with some vegetation, mainly trees, having a relationship of mutual need.
- Apostrophes are able to obtain nutrients from dead organic material and parasites obtain their food from living animals and plants, causing harm to the .Mushrooms have been eaten and appreciated for their exquisite flavour, economic and ecological values, and medicinal properties for many years. In general, mushrooms contain 90% water and 10% dry matter .
- They also have proteins, fats, ash, and glycosides. Volatiles oils, tocopherols, phenolic compounds, flavonoids, carotenoids, folates, organic acids, . The total energetic value of mushroom caps is between 250 and 350 cal/kg of fresh mushrooms . Mushrooms can be considered as functional food which provides health benefits in addition to nutritional value . They have been collected in several countries for hundreds of years and technological improvements have made possible their cultivation world-wide.

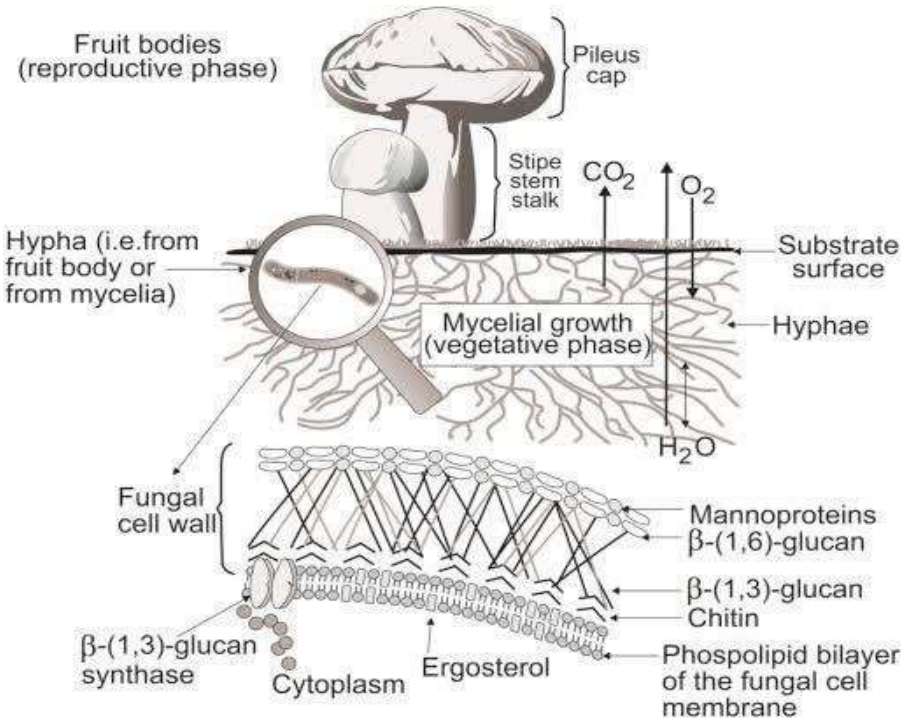

Fig.1 mushroom

- A wide range of mushrooms have been reported to possess antioxidant properties. Extracts from mushrooms contain many components, each of which is unique of a specific mushroom.

Agaricus Bosporus:-

- This mushroom is widely distributed in North America . . by trucks, most of which were loaded up in south-eastern Pennsylvania.
- Agaricsbosporus is so common that its common name is simply "mushroom." According to the USDA, it is cultivated by mushroom farmers to the tune of roughly $1 billion each year, during which the average American consumes more than 2 pounds of

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mushroom. The common grocery store form of Agaric's bisporus is completely white, but in recent years the mushroom industry has developed brown strains of the species, which it markets as "criminals" and "Portobello" mushrooms (the distinction is simply that the Portobello's have been allowed to mature past the button stage). Both of these forms are illustrated to the right.

- A 1995 study by Kerrigan and collaborators found that Agaric's bisporus exists in North America—outside of grocery stores and restaurants—both as a native species and as an introduced species.
- Genetically distinct, gpopu

Fig.2: Garlics Bosporus

Scientificclassification	
Kingdom:	Fungi
Division:	Basidiomycete
Class:	Agaricomycetes
Order:	Agaricales
Family:	Agricore
Genus:	Agaricus

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Species:	A. bisporus
Binomialname	
Agaricus bisporus(J.E.Lange) Imbach (1946)[1]	
Synonyms	
•Psalliota Hortense's f. bisporus J.E. Lange (1926)	

•Boletus edulis:-

- abasidiomycetefungus, and thetypespeciesof the genusBoletus.
- Widely distributed in theNorthernHemispherea cross Europe, Asia, and

North America, it does not occur naturally in the Southern Hemisphere, although it has beenintroducedto southern Africa, Australia, New Zealand, and Brazil.

- distinct species, and others previously classed as separate species areconspecificwith this species. The North American species commonly known as the California king bolete (Boletus edulis var. grandedulis) is a large, darker-coloured .
- Boletusedulis (English: cep, pennybun, porcino or porcini).

Medicinal plant & spices having Antioxidant:-

- Medicinal plants are still the mainstay of about 70–80% of the world population, largely in developing countries, for primary health care needs because of better cultural accept ability, better compatibility with the human body and lesser side effects (Kamboj 2000).
- The chemical constituents present in the medicinal plants area part of the physiological functions of living cells and hence they are believed to have better compatibility with human body.
- In contrast, plant-derived medicines are based upon the premise that they contain natural substances that can promote health and alleviate illness and proved to be safe ,better patient tolerance, relatively less expensive and globally competitive.
- India India is recognized to have a rich system of traditional medicines and one of the major raw materials producing nation. Over 8,000 plant species of medicinal value, which accounts for nearly 50% of all the higher flowering plant species, are reported from India.
- India has its own system of medicine widely known as 'Ayurveda' which is predominantly plant based. Ayurveda is supposed to be the oldest among the organized traditional system of medicine.
- The market of Ayurvedic medicine is estimated to be expanding at 20% annually. The major groups of the phytochemicals obtained from plant showed antioxidant activities and are known to prevent several degenerative diseases.
- A number of Indian medicinal plants are investigated for their antioxidant activity and found effective in various diseases however, selected medicinal plants growing in Indian Himalayan region (IHR) with their potential antioxidant activity are described in details.

•Allium sativum:- •Garlic (Allium sativum)

Garlic is widely used as a food and flavoring. Medicinally, there are hundreds of reported uses of garlic. The most prominent of these is moderation of cholesterol and other lipids, for which modest

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beneficial only one relevant human trial of the efficacy of garlic in treating the common cold has been reported. Josling reported a RCT in which 146 participants were randomized to daily garlic or placebo capsules for 12 weeks.

- **Dosage**

• My personal recommendation is to use fresh garlic in cooking as much and often as palatable while being conscious of the cardiovascular and cold-prevention benefits of garlic.

Fig.3: Allium sativum

•Capsicum annuum:-

- **Capsicum annuum** is a species of the plant genusCapsicum(chillies or peppers and capsicums or bell peppers) native to southernNorthAmericaandnorthernSouthAmeri ca.This species is the most common and extensively cultivated of the five domesticated capsicums.
- The species encompasses a wide variety of shapes and sizes of peppers, both mild and hot, such asbellpeppers,jalapeños,NewMexicoChile,andc ayennepeppers.Cultivars descended from the wild American bird pepper are still found in warmer regions of the Americasmany populations of C. annuum and are not consistently recognizable

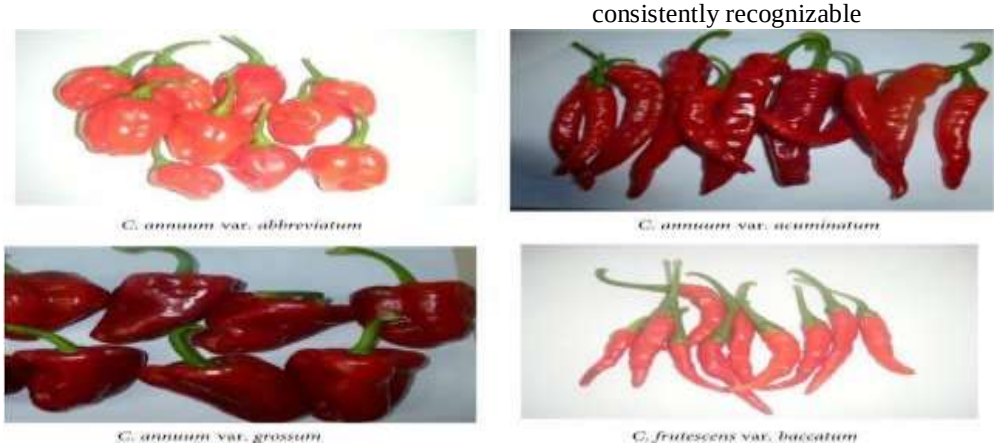

Fig.4: Calcium annuum

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Curcuma longa:-

- Curcuma longa (turmeric) is a perennial herb. It is cultivated in tropical regions, including India and China.Ayurvedain India used Curcuma longa (turmeric) is a popular spice in India and many other Asian countries.
- Major active ingredients of turmeric include three curcuminoids; curcumin (diferuloylmethane, the primary constituent responsible for yellow color of turmeric), dimethoxycurcumin, and bisdemethoxycurcumin. In addition, volatile oils (tumerone, atlantes, and zingiberene) also have pharmacological activity.
- In addition, sugars, proteins, and resins are also present in turmeric. Turmeric has excellent anti-inflammatory properties and is a superior antioxidant. The anticancer property of turmeric may be closely related to its anti inflammatory property.
- Based on studies using animal models, and review of clinical data, curcumin may have potential as a therapeutic agent in diseases such as rheumatoid arthritis, inflammatory bowel disease, pancreatitis, and chronic anterior uveitis as well as certain types of cancer .

Fig.5 curcuma longa

Scientific classification	
Kingdom:	Plantae
Clade:	Tracheophytes
Clade:	Angiosperms
Clade:	Monocots
Clade:	Commelinids
Order:	Zingiberales
Family:	Zingiberaceae
Genus:	Curcuma

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Species:	C. longa

•Salvia officinal is :-

- **Salvia officinalis** (sage, also called garden sage, common sage, or culinary sage) is a perennial, evergreensubshrub,with woody stems, greyish leaves, and blue to purplish flowers. It is a member of the mint familyLamiaceaeand native to theMediterraneanregion,though it has been naturalized in many places throughout the world.
- It has a long history of medicinal and culinary use, and in modern times it has been used as an ornamental garden plant. The common name "sage" is also used for a number of related and unrelated species.
- Salvia officinalis was described byCarlLinnaeusin 1753. It has been grown for centuries in the Old World for its food and healing properties, and was often described in oldherbalsfor the many miraculous properties attributed to it.
- The binaryname,officinalis, refers to the plant's medicinal use— the officina was the traditional storeroom of a monastery where herbs and medicines were stored. S. officinalis has been classified under many other scientific names over the years, including six different names since 1940 alone. It is thetypespeciesfor the genus Salvia.

Scientific classification	
Kingdom:	Plantae
Clade:	Tracheophytes
Clade:	Angiosperms
Clade:	
Clade:	
Order:	
Family:	
Genus:	
Species:	

- **Tomatoes licopene:-**

Lycopene (fromthe neoLatin Lycopersicum, the tomato species) is a bright red carotenoid hydrocarbon found in tomatoes and other red fruits and vegetables, such as red carrots, watermelons, grapefruits, and papayas, but it is not present in strawberries or cherries.Although lycopene is chemically a carotene, it has no vitamin A activity

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Properties	
Chemical formula	$C_{40}H_{56}$
Molar mass	536.888 g·mol^{-1}
Appearance	deep red solid
Density	0.889 g/cm^3
Melting point	177 °C (351 °F; 450)

Black Grapes:-

The health benefits of black grape shave been studied extensively. The chemicals they contain can give you healthier hair and skin, improve your heart health, and even protect your cells against cancer. Some varieties of black grapes are much higher in antioxidants than green or red grapes

Grapes are versatile fruits used in a wide range of popular foods from raisins to jelly to wine. They are also packed with nutrients and antioxidants, and have high amounts of the phytonutrient resveratrol, which is good for the heart, according to some studies. In fact, while grapes are good for your overall health, they are especially lauded for their heart benefits.

Apple quercetin:-

Quercetin is a pigment that adds color to many fruits and vegetables. It's found mainly in the skins and leaves of plants. Light stimulates the production of quercetin, so an apple at the top of a tree may have more quercetin than one that doesn't get direct sunlight.

Apples contain four different phytochemicals along with the beneficial fiber known as pectin. To get the benefits of quercetin, eat your apples unpeeled. Apple juice doesn't provide the same benefits as the whole fruit.

Apples are a significant source of bioflavonoids, especially quercetin. According to The International Journal of Food Properties, "Apple flavonols include several [forms of quercetin], which are dietary components with high anti-inflammatory and antioxidant properties."

Onions Quercetin:-

All onions contain quercetin, but since it's a pigment, red and yellow onions contain the most. To keep the quercetin, peel off as little as possible of the outer layers. Onions contain many other vitamins and minerals, and they are especially rich in the vitamin biotin.

Quercetin is a plant flavonol from the flavonoid group of polyphenols. It is found in many fruits, vegetables, leaves, seeds, and grains; red onions and kale are common foods containing appreciable amounts of quercetin. Quercetin has a bitter flavor and is used as an ingredient in dietary supplements, beverages, and foods.

Green tea catechins:-

Green tea catechins can undergo degradation, oxidation, epimerization and polymerization during food processing. Many factors could contribute to the chemical changes of green tea catechins, such as temperature, pH of the system, oxygen availability, the presence of metal ions as well as the ingredients added. Several detection methods have been developed for tea catechin analysis, which are largely based on liquid chromatography (LC) and capillary electrophoresis (CE) methods for getting a good separation, identification and quantification of the catechins.

Green tea is a type of tea that is made from Camellia sinensis leaves and buds that have not undergone the same withering and oxidation process used to make oolong teasand black teas. Green tea originated in China, but its production and manufacture has spread to other countries in East Asia.

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Green tea

Type
Tea
Country of origin
China
Region of origin
East Asia
Colour
Green
Ingredients
Tea leaves
Related products
Tea

Ajwain:-

Ajwain,Trachyspermum ammialso known as ajowan caraway, thymol seeds, bishop's weed,or carom—is an annual herb in the family Apiaceae (or Umbelliferae). Both the leaves and the seed-like fruit (often mistakenly called seeds) of the plant are consumed by humans. The name "bishop's weed" also is a common name for other plants. The "seed" (i.e., the fruit) is often confused with lovage "seed".

Flowers of Trachyspermum ammi

Scientific classification	
Kingdom:	Plantae
Clade:	Tracheophytes

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Clade:	Angiosperms
Clade:	Eudicots
Clade:	Asterids
Order:	Apiales
Family:	Apiaceae
Genus:	Trachyspermum
Species:	T. ammi
Binomial name	
Trachyspermum ammi	

- **Mentha:-**

Mentha is a genus of plants in the family Lamiaceae. The exact distinction between species is unclear; it is estimated that 13 to 24 species exist. Hybridization occurs naturally where some species range overlap.

- Higher classification: Mentheae
- Rank: Genus
- Family: Lamiaceae
- Kingdom: Plantae

- Scientific name: Mentha

Tulsi:-

Ocimum tenuiflorum (synonym **Ocimum sanctum**), commonly known as **holy basil** or **tulsi**, is an aromatic perennial plant in the family Lamiaceae. It is native to the Indian subcontinent and widespread as a cultivated plant tropics.

Tulsi is cultivated for religious and traditional medicine purposes, and also for its essential oil. It is widely used as a herbal tea,

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commonly used in Ayurveda, and has a place within the Vaishnava tradition of Hinduism, in which devotees perform worship involving holy basil plants or leaves.

Scientific classification	
Kingdom:	Plantae
Clade:	Tracheophytes
Clade:	Angiosperms
Clade:	Eudicots
Clade:	Asterids
Order:	Lamiales
Family:	Lamiaceae
Genus:	Ocimum
Species:	**O. tenuiflorum**

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Summary:-

- Plant and animal tissues contain unsaturated fatty acids, primarily in the phospholipid fraction of cell membranes. These lipids are especially susceptible to oxidation because of their electron K deficient double bonds. The breakdown products of oxidation can
- produce off-odours, new flavours, loss of nutrient content, and colour deterioration. To manufacture high-quality, stable food products the most effective solution is often the addition of anti-oxidants either synthetic or natural, which can serve as "chain breakers," by intercepting the free radicals generated during various stages of oxidation or to chelate metals. Chain-breaking antioxidants are genearly the most effective.
- A common feature of these compounds is that they have one or more aromatic rings (often phenolic) with one or more −OH groups capable of donating H· to the oxidizin lipid. Synthetic antioxidants, such as BHA, BHT, and propylgal late, have one aromatic ring. The natural antioxidants AA and α-troposphere each have 1 aromatic ring as well.
- Thefactsthattheyareproox However, many of the natural antioxidants (flavonoids and anthocyanins) have more than 1 aromatic ring. The effectiveness of these aromatic antioxidants is generally proportional to the number of −OH groups present on the aromatic ring(s). Depending on the arrangement of the −OH groups, these compounds may also chelate metals**.**

Conclusion:-

- Antioxidants derived from food and medicinal plants have been increasingly investigated for their various nutritional function and health benefits.
- In this review, the extraction methods of natural antioxidants, assessment methods of antioxidant activity as well as their main resources from food and medicinal plants are summarized.
- The non-conventional techniques described have potential to replace or enhance existing extraction techniques due to the less extraction time, energy consumption, and usage of harmful organic solvents, as well as higher extraction yields to recover antioxidant compounds from food and medicinal plants.
- Nevertheless, most of them are limited for industrial applications due to the high equipment costs and complicated installation procedures.

Result:-

The project on the Antioxidant from natural source was prepared & submitted successfully.

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