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Review Article

Review on herbal plants as an effective cough treatment

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ABSTRACT

The aim of this review was to systematically assess the literature on herbal medicine for cough as a symptom of upper respiratory tract infections. Cough is referred to the strong explosive exhalation which causes removal of secretions and foreign bodies from tracheobronchial tract. Given the prevalence of children's and adults' involvement with and acquisition of cough, this review article was aimed to report the plants used to treat and relieve cough in traditional culture. cough incidence in both children and adults and the significant role of medicinal plants in preventing and treating various diseases, This data demonstrated strong correlation between phytochemistry, pharmacological properties and medicinal uses Use of herbal drugs is increasing all over the world for various ailments including antitussive activity as they are safe and devoid of adverse effects. Medicinal plants are an important source for the discovery of novel bioactive compounds, which have served and continue to serve as lead molecules for the development of new drugs. Thus this review may provide an insight into herbs possessing antitussive activity.

Key words: Herbal plants, Cough, antitussive herbs, expectorants

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INTRODUCTION

A cough is a sudden and repetitively occurring process which helps to clear the breathing passages from secretions, irritants, foreign particles and microorganisms. Cough is caused by by reflex. It occurs due to simulation of receptor in throat, respiratory passage in lung. This sensitive receptor s are present in bronchioles tree, in Junction s of trachea.[5] When there is a blockage the throat or upper air passage, the brain thinks a foreign element is present and tells the body to cough to remove that element. Now days cough is one of the most common health problems. Coughing can also be due to a respiratory tract infection such as the common cold, acute bronchitis, pneumonia, pertussis, flu and smoking or health problems such as asthma, tuberculosis and lung cancer. In these cases, the cough has a pathological character and it is necessary sometimes to use cough suppressant drugs. The antitussive agents are used mainly to suppress dry, painful and patient-disturbing coughs; the use of this group of drugs suppresses only one symptom without influencing the underlying condition.[6] Administration of such drugs in cough associated with chronic bronchitis should be prevented because of possible harmful sputum thickening and retention, however agents with expectorant activity are preferable it can suppress cough by other mechanisms. The most frequently used antitussive drugs in clinical conditions belong to the group of narcotic analgesics, the antitussive dose is lesser than analgesic dose.[16]

Adverse effects like depression of the respiratory center, decreased secretion in the bronchioles and inhibition of ciliary activity, increased sputum viscosity, decreased expectoration, hypotension and constipation acts as limitation to the therapy. Use of Herbal drugs is increasing all over the world for various ailments including antitussive activity as they are safe and devoid of adverse effects. The cough is a protective reflex mechanism that removes foreign material and secretions from the bronchi and bronchioles of the airways (foreign objects, catarrhs of the respiratory system, etc.)[3]

It is inappropriately stimulated in various situations like inflammation of the respiratory tract or neoplasia. In these cases, the cough has a pathological character and it is necessary sometimes to use cough suppressant drugs. The antitussive agents are used mainly to suppress dry, painful and patient-disturbing coughs; the use of this group of drugs suppresses only one symptom without influencing the underlying condition.[5] Administration of such drugs in cough associated with satis or chronic bronchitis should be prevented because of possible harmful sputum thickening and retention, however agents with expectorant activity are preferable (secretomotorics and mucolytics), and can suppress cough by other mechanisms. The most frequently used antitussive drugs in clinical conditions belong to the group of narcoticanalgesics, the antitussive dose is lesser than analgesic dose.[17-19]

Thus this review may provide an insight into herbs possessing antitussive activity, Medicinal Plants as antitussive. The medicinal herbs proved to possess antitussive property are adhatodavasica, Asparagus racemosus, Glycyrrhizaglabra Linn, Allumsativum, Ginger.

MECHANISM OF COUGH:[9][10]

The mechanism of how cough develops is not entirely clear. Airway inflammation and inhaled irritant substances stimulate receptors in unmyelinated C-fibres of the vagus nerve, thus causing the release of neuropeptides from the C-fibres. This release of neuropeptides from C-fibres triggers a local response without central nervous system (CNS) stimulation and is called an 'axonal' reflex. Among these neuropeptides, which include tachykinins and calcitonin gene-related peptide (CGRP),

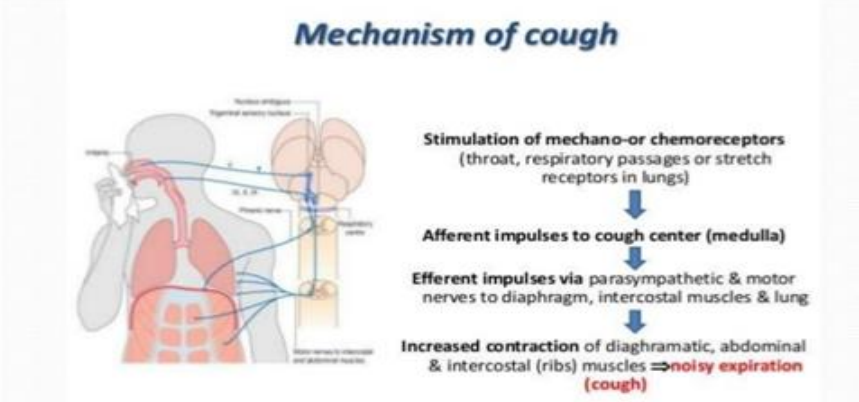

Fig. 1 mechanism of cough

Various herbal plants used in cough treatment

Adhatoda Vasica - :Vasaka
It is commonly known as Adosa or adulsa, is found many regions of India and throughout the world, with a multitude of uses in traditional Unani and Ayurvedic systems of medicine. It is also called "Vasaka". It is a well-known herb in indigenous systems of medicine for its beneficial effects, particularly in bronchitis. Vasaka leaves, bark, the root bark, the fruit and flowers are useful in the removal of intestinal parasites. Vasaka herb is used for treating cold, cough, chronic bronchitis and asthma. In acute stages of bronchitis, vasaka gives unfailing relief, especially where the sputum is thick and sticky.[2] It liquefies the sputum so that it is brought up more easily. For relief in asthma, the dried leaves should be smoked. The juice from its leaves should be given in doses of 2 to 4 grams in treating diarrhea and dysentery.

Family: Acanthaceae

Morphological Characteristics: Adhatoda vasica Nees belongs to the medicinal family Acanthaceae It grows to about a height of 1.5-2.0m with leaves about 10-15cm long & 5.0cm wide & white or purple flowers & 4-seeded fruits. The leaves are of dark green colors above & pale yellow below. Flowers are typical, white arranged in pedunculated spike. [1]

Plant Description:[3][13]
Adhatoda vasica Nees belongs to the medicinal family Acanthaceae. It is an evergreen shrub of 1-3 feet in height with many long opposite branches. Leaves are large and lance-shaped. Stem herbaceous above and woody below. Leaves opposite and exstipulate. Flower spikes or panicles, small irregular zygomorphic, bisexual, and hypogynou. It has capsular four seeded fruits. The flowers are either white or purple in colour. Its trade name Vasaka is based on Sanskrit name. Inflorescences in axillary spicate cymes, densely flowered; peduncles short; bracts broadly ovate, foliaceous. The leaves, flowers, fruit and roots are extensively used for treating cold cough, whooping cough, chronic bronchitis and asthma, as sedative, expectorant and antispasmodic. [3].

Fig. 2 Adhatoda Vasica. [13]

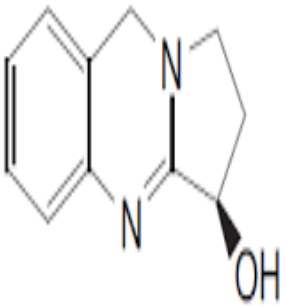

Fig.3 Chemical structure of vasicine

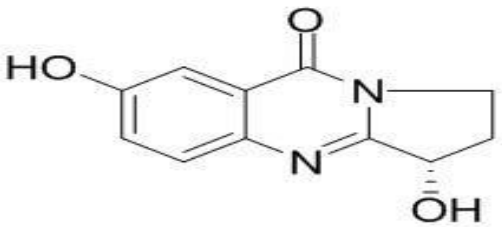

Fig 4.vasicinolon

Geographical Source: It is a common small evergreen, sub-herbaceous bush distributed throughout India, especially in the lower Himalayas (up to 1300 meters above sea level), India, Sri Lanka, Burma and Malaysia. These countries are the Major source of vasakavasaka. [11]

Cultivation and Collection: The uses of vasaka have been known since old times and it is included in different formulations of ayurveda. The plant is not cultivated on commercial scale. It is obtained from garden plants or wild sources. It can be easily propagated by stem cuttings and by seed germination. The plant is obtained in all seasons of

the year. It reaches to a height of 2 - 3 metres. It is also observed that the plant favourably grows in loamy soil, there are no specific conditions to grow the plant.[1]

Prepration:[13] The drug vasaka is often taken in the form of juice extracted from its leaves, mixed with ginger or honey, in doses of 15 to 30. The leaves can be made into a decoction or the dried leaves can be given in powder form in doses of 2 grams.

Chemical Constituent:[1][3]
The leaves, roots and young plants of adhatodavasica contain the quinazoline alkaloids vasicine, 7- hydroxyvasicine, vasicinolone, 3-deoxyvasicine, vasicol, vasicoline, vasicolinone, triterpenes, anisotineanisotine, betaine, steroids Loot vasica. Chemical compounds found in leaves and roots of this plant includes essential oils, fats, resins, sugar, gum, amino acids, proteins and vitamin C etc. [3] The leaves also contain a very small amount of an essential oil and a crystalline acid. An analysis published in India in 1956 showed the seeds as containing 25.8% of deep yellow oil composed of glycerides of arachidic 3.1%, behenic 11.2%, lignoceric 10.7%, cerotic 5%, oleic 49.9% and linoleic acids 12.3% and β-sitosterol 2:6%.[1]

Elemental analysis using atomic absorption spectrophotometry revealed the presence of major (K, Na, Ca and Mg) and trace (Zn, Cu, Cr, Ni, Co, Cd, Pb, Mn and Fe) elements in Adhatodavasica. From the data, concentration level of protein (8.5 %), vasicine (7.5%), vitamine C (5.2%), and fats (2.5%) were found in roots samples of Adhatodavasica. Whereas, level of such compounds was low in leaves except sugar (16.4%), fiber (5.2%), vasicinone (3.5%), Zn (0.6%), S (1.3%) etc.[3]

Antitussive activity: [14][3]
Experiment 1: The effect of the ethanol extracts of Glycyrrhizaglabra and Adhatodavasica on SO2 gas induced cough in experimental animals have very significant effects at the level of $P<0.01$ in inhibiting the cough reflex at a dose of 800 mg/kg and 20kgkg body wt. p.o., in comparison with the control group. Mice showed an inhibition of 35.62%, in cough on treatment with Glycyrrhizaglabra and 43.02% inhibition on treatment with Adhatodaasica within 60 min of the experiment. [14]
The antitussive activity of the extract was comparable to that of codeine sulphate (10, 15, 20 mg/kg body wt.), a standard antitussive agent. Codeine sulphate, as a standard drug for suppression of cough, produced 24.80%, 32.98%, and 45.73% inhibition in cough at a dose of 10 mg/kg, 15 mg/kg and 20 mg/kg respectively, whereas, codeine sulphate (20 mg/kg) showed maximum 45.73% ($P<0.001$) inhibition at 60 min of the experiment [14]

Experiment 2: The extract was 1/20 as active as the opiate in centrally induced cough (by vagus nerve stimulation) in the anaesthetized guinea pigs. Neverthless in peripherally induced cough model i.e mechanical stimulation of rabbit tracheal mucosa and electrical stimulation of guinea pig tracheal mucosa, the extracts was 1:10 and 1:4 as active as codeine respectively. These results indicate that oral administration of the extract has a better antitussive activity in peripheral cough model as compared to the central cough model[3]

Marketed Formulation:

1. Welex Welsama Capsule, by Welex Laboratories Pvt Ltd
2. Adulsa Syrup by Hindustan Biosynthpvt Limited[13]

USE:

1. As Antitussive from relif from Cough (with yellow thick sputum and fever)
2. Chronic cough due to Tuberculosis along with anti-tubercular medicines.
3. Asthma (wheezing, breathing trouble and chest congestion)
4. Upper respiratory infections (with a fever and productive cough)
5. Common cold (with thick yellow discharge or along with secondary bacterial infection)
6. Chronic Bronchitis
7. Sore throat
8. Throat pain
9. Throat Irritation
10. Tonsillitis (swelling or inflammation of tonsils with redness)
11. Throat ulcers. [2-3]

LIQUORICE
Glycyrrhizaglabra Linn is one of the most extensively used medicinal herbs from the ancient medical history of Ayurveda. It is also used as a flavoring herb. The word Glycyrrhiza is derived from the Greek term glykos (meaning sweet) and rhiza (meaning root).[4]

Glycyrrhizaglabra Linn, commonly known as 'liquorice' and 'sweet wood' belongs to Leguminosae family. Vernacular names for liquorice are Jeshthamadh (Marathi), Jothi-madh (Hindi), Yashtimadhu, Madhuka (Sanskrit), Jashtimadhu, Jaishbomodhu (Bengali), Atimadhuram,Liquorice consists of dried, peeled or unpeeled roots and stolon of Glycyrrhizaglabra. [4]

Family-: Leguminosae.

Morphlogical Characteristics: Colour –Unpeeled yellowish brown or dark brown externally & yellowish internally while peeled liquorice is pale yellow in colour. Odour -Faint & characteristics. Taste –Sweet Size –Length 20cm to 50cm & 2cm in diameter. Shape – Cylindrical pieces which are straight may peeled or unpeeled. Peeled liquorice is angular.[2-3]

Geographical Sources: Liquorice is grown in the sub-Himalayan tracts and Baluchistan. It is cultivated on a large scale in Spain, and Yorkshire in England.[2]

Varieties of Glycyrrhizaglabra: [4][13]

1. Glycyrrhizaglabravar. typica –(Spanish liquorice) -This plant has purplish blue colourpapilionaceous flower. It gives out large number of stolons.
2. Glycyrrhizaglabravar. glandulifera –(Russian liquorice) –It has a big root stock along with a number of elongated roots but does not bear stolons .
3. Glycyrrhiza glabra var. violacea –(Persian liquorice) –This plant shows violet colourflower.[4]

Fig. 5 Liquorice Root.[13]

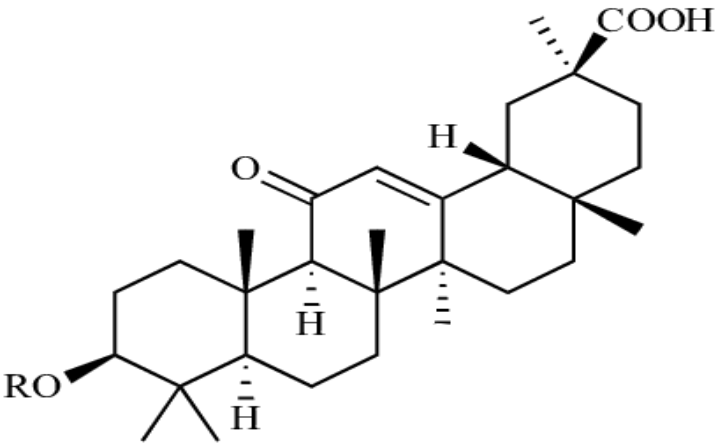

Fig. 6 R=glucosyl-glucosyl, Glycyrrhizin

Preparation: The roots are usually harvested after 3 to 4 years from its plantation when they mostly display enough growth. The rhizomes and roots are normally harvested in the month of October, particularly from all such plants that have not yet borne the fruits. Thereby ascertaining maximum sweetness of the sap. The rootlets and buds are removed manually and the drug is washed with running water. The drug is first dried under the sun and subsequently under the shade till it loses almost 50% of its initial weight. The large thick roots of the Russian Liquorice are usually peeled before drying .It is an usual practice in Turkey, Spain and Israel to extract a substantial quantity of the drug with water, the resulting liquid is filtered and evaporated under vacuo and the concentrated extract is molded either into sticks or other suitable forms.[12]

Cultivation cultivation And Collection: [12][13]
It is cultivated by planting rforms formulation es or stolons cutting in deep, loamy, fertile soil rich forest soils, acidic to slightly alkaline soils pH 5.5 to 8.2 The cuttings of the underground stem/root of 15-25 cm possessing 2-3 eye buds are planted directly in the field 6-8 cm deep in the soil at a

distance of 90x45 cm. in rows about 4 feet apart in March, addition of farmyard manure has favourable effect on the growth of the plant. Collection of the drug is carried out in autumn in the third or fourth year, by which time extensive development of subterranean part has taken place.

Rhizomes stolons and roots are dug out, buds and rootlets removed, washed, cut into pieces of usually 20 cm length and dried in sun in some cases drug is peeled before drying. Peeled drug is used for direct administration but in preparing for direct administration but in preparing tincture or liquid extracts unpeeled drug is used.[12]

Chemical constituents:[12][13]
A large number of components have been isolated from the liquorice roots. 40-50 percent of total dry material weight of Glycyrrhizaglabra is accounted by water-soluble, biologically active complex. Starches (30%), pectins, polysaccharides, simple sugars, gums, mucilage (Rhizome), amino acids, triterpenesaponin, flavonoids, mineral salts, bitters, essential oil, fat, asparagines, female hormone estrogen, tannins, glycosides, protein, resins, sterols, volatile oils and various other substances are components of this complex.[14]

The primary active ingredient, Glycyrrhizin (glycyrrhizic acid) constitutes 10–25% of liquorice root extract. It is a saponin compound it is 60 times sweeter than cane sugar comprised of a triterpenoidaglycone, glycyrrheticacid conjugated to a disaccharide of hglucuronic acid. Glycyrrhizin and glycyrrhetic acid can exist in the 18α and 18β stereoisomer forms.[13]

Glycyrrhizin is considered to be the most common of the Asiatic folk medicines to be used as an anti-inflammatory agent on neutrophil functions including ROSGlycyrrhizin is considered as quenching agent of free radicals and also as blocking agent of lipid peroxidation chain reactions. Glycyrrhizin showed chemopreventive, antioxidant, and antiproliferative activity when tested on animal modelmodel. In liquorice, it occurs naturally as calcium and potassium salts. The ammoniated salt of glycyrrhizin is manufactured from liquorice extracts. The specifications for this salt form have been established in the Food Chemicals Codex. This salt is used as a food flavoring agen. An analog of glycyrrhetic acid, Carbenoxolone (18-βglycyrrhetinic acid hydrogen succinate) is useful in the treatment of alimentary tract ulcerative conditions like peptic ulcers. Five new flavonoids-glucoliquiritinapioside, shinflavanone, shinpterocarpin, prenyllicoflavone A, and 1-methoxyphaseolin are isolated from dried roots. [12]

Glycyrrhizin[13]
The yellow color of liquorice is because of the flavonoid content of the plant. Flavonoids include liquiritin, a chalcone (isoliquiritin) and other compounds. Flavonoidrich fractions include liquirtin, isoliquertin, liquiritigenin and rhamnoliquirilin. Five new flavonoids-glucoliquiritinapioside, shinflavanone, shinpterocarpin, prenyllicoflavone A, and 1-methoxyphaseolin are isolated from dried roots. The isoflavonesglabridin and hispaglabridins A and B have considerable antioxidant activity. Both glabridin and glabrene have estrogen-like activity. Many volatile components are present in roots e.g. geraniol, pentanol, hexanol, terpinen-4-ol, α-terpineol. Isolation of various compounds like propionic acid, benzoic acid, furfuraldehyde, 2,3butanediol, furfurylformate, maltol, 1-methyl-2-formylpyrrole, trimethylpyrazine etc from the essential oil is also reported. The Indian variety of liquorice roots shows 2-methyliso – flavones and C liquocoumarin, 6 - acetyl- 5, hydroxy-4-methylcoumarin. Asparagine is also present. [12]

Reported Pharmacological Activities:[12]
Anti-tussive & expectorant activity: The liquorice powder and extract was found to be effective in treatment of sore throat, cough and bronchial catarrh. The specific mechanism of action is not known. Liquorice has been shown to work as efficiently as codeine in sore throat. It decreases irritation and produces expectorant effects. Carbenoxolone is a semi synthetic compound derived from Glycyrrhiza stimulates gastric mucus secretion. Likewise, liquorice extract may also be able to stimulate tracheal mucus secretions producing demulcent and expectorant effects.[14]
Glycyrrhizin is responsible for demulcent action of liquorice. Liquiritinapioside, an active compound present in the methanolic extract of liquorice which inhibits capsaicin induced cough.Ethanolic extract of G. glabra was found to be responsible for inhibition of 35.62% SO2 gas induced cough in experimental animals (mice)[4]

Antioxidant activity: High content of phenolic component in ethanolic extract of Liquorice (Glycyrrhizaglabra L) is responsible for its powerful antioxidant activity by means of significant free radical scavenging, hydrogen-donating, metal ion chelating, anti-lipid peroxidative and reducing abilities [25]. Liquoriceflavonoids have exceptionally strong antioxidant activity. Antioxidant activity of liquoriceflavonoids was found to be over 100 times stronger than that of antioxidant activity of vitamin E. A dose of 2.58 mg/ml liquoriceflavonoids can scavenge more free radicals than 258 mg/ml of vitamin. flavonoids from liquorice are currently the strongest natural antioxidants known Thus,

liquorice extract can be efficiently used to formulate cosmetic products for the protection of skin and hair against oxidative damage.[4]

Skin lightening and skin tightening activity: The extract of liquorice is reported to be an effective pigmentlightening agent. It is the safest pigment-lightening agent known with least side effects. Glabridin in the hydrophobic fraction of liquorice extract inhibits tyrosinase activity in cultured B16 murine melanoma cells. It does not affect DNA synthesis. Some other active compounds in liquorice extract like glabrene, Licochalcone A, Isoliquiritin are also responsible for inhibition of tyrosinase activity. Liquiritin present in liquorice extract disperse melanin, thereby inducing skin lightening. Also the antioxidants present in extract. [5]

Use: [4][5][12]
In traditional medicine, liquorice has been recommended as a prophylactic agent for gastric and duodenal ulcers. It is employed in dyspepsia as an anti-inflammatory agent during allergenic reactions. It is used as a contraceptive, laxative, anti-asthmatic, emmenagogue, galactagogue, antiviral agent in folk therapy .Glycyrrhizaroots are useful for treating cough because of its demulcent and expectorant property.[4] It is also effective against anemia, gout, sore throat, tonsillitis, flatulence, sexual debility, hyperdypsia, fever, skin diseases, swellings. Liquorice is effectively used in acidity, leucorrhoea, bleeding, jaundice, hiccough, hoarseness, bronchitis, vitiated conditions of Vatadosha, gastralgia, diarrhea, fever with delirium and anuria.

It is a vital ingredient in medicinal oils used for the treatment of rheumatism, hemorrhagic diseases, epilepsy and paralysis. It has been proved by several years of research that, glycyrrhizin breaks down in the gut and exerts anti-inflammatory action similar to hydrocortisone and other corticosteroid hormones. The effect is due to stimulation of hormone production by adrenal glands and reduction in the breakdown of steroids by the liver and kidneys. Effectiveness of glycyrrhizin in the treatment of chronic hepatitis and liver cirrhosis is proved .Glycyrrhizaglabra is considered as one of the best remedies for relieving pain and other symptoms such as discomfort caused by acrid matter in the stomach. It alleviates the irritating effects of acids in a better way than alkalies .[12] It is an excellent tonic and is also used as demulcent in catarrh of the genitourinary passages

Marketed Formulation
1.Himalaya Licorice Gastric Support -60 Caplets
2. Liquorice powder by Patanjali Aurvedic pvt limited. [13]

Shatavari -:
Asparagus racemosus is a climbing plant which grows in low forest areas throughout India. The name "Shatavari" translates to "a woman who possesses 100 husbands", referring to the Shatavar rejuvenation effect in female reproductive organs. A much branched spinus under-shrub with tuberous, short rootstock bearing numerous fusiform, succulent roots. In the Kashyap Samhita, has evidently stated that shatavari promotes maternal health and noted its meticulous use as a galactagogue (enhances breast milk secretion in lactating mothers). Shatavari actually literally means" having a 100 spouses" and ayurvedic texts accurately claim that shatavari strengthens a woman to the point where she is being capable of producing thousands of healthy ova. Ayurveda has called Shatavari the Queen of herbs and is the primary herb recommended for female health.

Asparagus racemosus Wild is commonly called Satavari, Satawar or Satmuli in Hindi; Satavari in Sanskrit; Shatamuli in Bengali; Shatavari or Shatmuli in Marathi; Toala-gaddalu or Pilli-gaddalu in Telegu; Shimaishadavari or Inli-chedi in Tamil; Chatavali in Malayalam; Majjigegadde or Aheruballi in Kannada; Kairuwa in Kumaon; Narbodh or atmooli in Madhya Pradesh; and Norkanto or Satawar in Rajasthan. The plant grows throughout the tropical and subtropical parts of India up to an altitude of 1500m. The plant is a spinous under-shrub, with tuberous, short rootstock bearing numerous succulent tuberous roots (30–100 cm long and 1–2 cm thick) that are silvery white or ash colored externally and white internally. These roots are the part that finds use in various medicinal preparations. The stem is woody, climbing, whitish grey or brown colored with small spines. The plant flowers during February–March leaving a mild fragrance in its surrounding and by the end of April, fruits can be seen with attractive red berries. Asparagus racemosus is a plant used in traditional Indian medicine. The root is used to make medicine.[5]

Family: Asparagaceae

Morphological Characteristics: [4][6][13]
The plant grows throughout the tropical and subtropical parts of India up to an altitude of 1500m. Theplant is a spinous under-shrub, with tuberous, short rootstock bearing numerous succulent tuberous roots, it is 30–100 cm long and 1–2 cm thick.

The branches are shiny green in colour, roots are silvery white or ash colored externally and white

internally. These roots are the part that finds use in various medicinal preparations. The stem is woody, climbing, whitish grey or brown colored with small spines. The plant flowers during February–March leaving a mild fragrance in its surrounding and by the end of April, fruits can be seen with attractive red berries. Asparagus racemosus is a plant used in traditional Indian medicine (Ayurveda). The root is used to make medicine.[5] The taste is bitter and some starch like ,Odour is faint,Aromatic.

Microscopy: Transverse section of the root is circular or elliptical; periderm is composed of 5-6 layers of compact cells, tangentially elongated thin walled phloem. About 2-3 peripheral layers of cork cells followed by a single layer of phelloderm. The phelloderm is followed by 6-7 layers of cortical cells. Vascular bundles are arranged in the center forming a circular ring. Protoxylems are arranged toward the center; while the metaxylem toward the outer side. There is a wide zone of secondary phloem composed of sieve tubes, companion cells and phloem parenchyma. A wide zone of secondary xylem, which is composed of vessels, tracheids and xylem parenchyma, follows secondary phloem. The

Geographical Source: In some of countries this plant is used as Medicinal plants occupy in India and in many countries of Asia, and Europe it is Cultivated. [5]

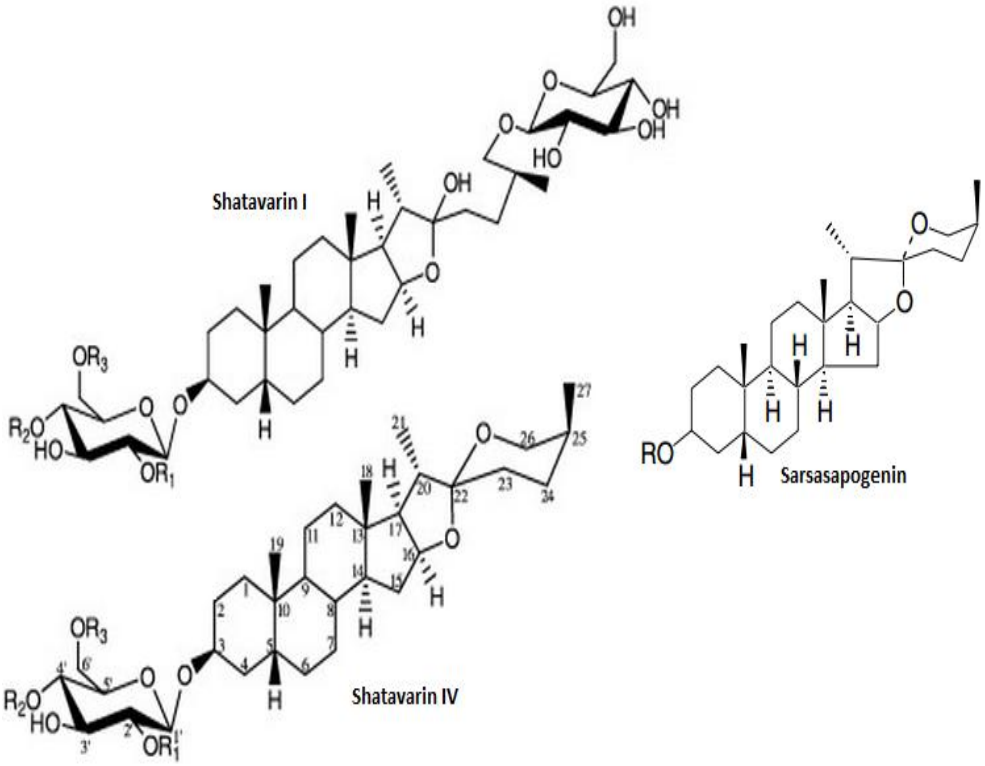

Fig. 7 Shatavarin-Shatavarin-IV [13]

Fig .8 Shatavari root

Cultivation And Collection-:[5][13]
Soil is important in case of cultivation of plants it prefers light (sandy), medium (loamy) and heavy (clay) soils and requires well-drained soil. Black, well drained and fertile soil is good for cultivation. Crop responses well to tropical and hot climate. Temperature required 25-40 0C Irrigation: The tamarind is adapted to semiarid regions of the tropics and can withstand drought conditions quite well. They require minimum irrigation so avoid over-watering over-watering to plants.[5]

Fertilization: oneploughing, three harrowing's and then apply 20-25 tonns of farm yard manure. Harvest: raised beds -1x3 m in the month of May or June Seed one kg for one hectare area. Apply 50 gram urea in the bed after 20-25 days. Seedlings become ready within 6-8 weeks for transplantation in the main field.

Transplanting: Size of pit-45x45x452) spacing-row to row-1.5m and plant to plant-1.0m Fill the pits with 20-30 gram lindane or carbaryl and 5 kgs of FYM at the time of transplanting. Generally shatavari crop does not affect with pest and diseases.

Harvesting*:* First harvesting1.5-2 years after transplanting, which continues for 10-15 years. Male and female plants must be grown if seed is required.[5]

Chemical Constituent: The major bioactive constituents of Asparagus are a group of 4 steroids saponin known as shatvarins. Shatvarin I to VI are present. Shatvarin is the major glycoside with 3-glucose and rhamnose moieties attached to sarsapogenin, whereas in sahatvarin –IV two glucose & one rhamnose moieties attached. This plant also contains vitamins A, B1, B2, C, E, Mg, P, Ca, Fe, and folic acid. Other primary chemical constituents of Asparagus racemosus are essential oils, asparagine, arginine, tyrosine, flavonoids like a kaempferol, quercetin, and rutin, resin, and tannin. [4][6]

Marketed Formulation: Shatavarikalpa, Erandapaka, ghrita, Phalaghrita, Narayanataila, Shatavaryadighrita, Garbhachintamani rasa, Vishnu taila Shatavarimodak. [13]

Use: [5][6]
Asparagus racemosus is mainly recommended in ayurveda for prevention and treatment of gastric ulcers, dyspepsia and as a galactogogue besides its action in nervous disorders, inflammation, liver diseases and certain infectious diseases. The methanol extract of its root exhibits anti-bacterial property against infectious diseases due topresence of the constituent 9, 10 dihydrophenanthrene. It is an important traditional digestive tonic for diarrhea, dysentery, dyspepsia and indigestion. Alcoholic and aqueous extracts of Asparagus racemosus root has various uses.

A significant increase in milk yield, after feeding lactate through increased growth of mammary glands, alveolar tissues and acini by galactogogue effect. Root is used in Diarrhea as well as in cases of chronic colic and dysentery. Alcoholic and aqueous extracts of Asparagus racemosus root has a significant increase in milk yield, after feeding lactate through increased growth of mammary glands, alveolar tissues and acini by galactogogue effect Root is used in Diarrhea as well as in cases of chronic colic and dysentery. Root boiled with some bland oil, is used in various skin diseases, root is boiled in milk and the milk is administered to Shatavari (this is an Indian world meaning a woman who has a hundred husbands) is the most important herb in ayurvedic medicine for dealing with problems connected women‟s fertility.

It is taken internally in the treatment of infertility, loss of libido, threatened miscarriage, menopausal problems, stomach ulcer, hyperacidity and bronchial infection. Externally it is used to treat stiffness in the joints. The whole plant is used in the treatment of rheumatism, diabetes and brain complaints. It is also used in management of behavioral disorder and minimal brain dysfunction. The rhizome is a soothing tonic that acts mainly on the circulatory, digestive, respiratory and female reproductive organs. The root is alterative, antispasmodic, aphrodisiac, demulcent, diuretic, galactogogue and refrigerants.[5]

GARLIC

Garlic (Alliumsativum) is a cultivated food highly regarded throughout the world. Originally from Central Asia, garlic is one of the earliest of cultivated plantmentions garlic as an effective remedy for a variety of ailments. Early men of medicine such as Hippocrates, Pliny and Aristotle espoused a number of therapeutic uses for this botanical. Almost 25 centuries ago, Hippocrates, the Father of Medicine, stated "let food be thy medicine and let medicine be thy food". Supporting this statement, Hippocrates prescribed garlic for a variety of conditions. Garlic was given as perhaps one of the earliest "performance enhancing" agents to the original Olympic athletes in Greece[2]

Family: Liliaceae

Morpholigical Character: [2][13]
Garlic plants grow about 60 cm tall. Depending on the variety, the long leaves typically arise from a short hard stem above the bulb or emerge from a

softer pseudostem made up of overlapping leaf sheaths. The bulb is covered with membranous skin and encloses up to 20 edible bulblets called cloves. The spherical flower cluster is initially enclosed in a pair of papery tapered bracts; the bracts split open when the green-white or pinkish flowers bloom. Flower stalks sometimes arise bearing tiny bulbils (tiny secondary bulbs that form in place of flowers) and sterile blossoms. Garlic is usually grown as an annual crop and is propagated by planting cloves or top bulbils, though seeds can be also be used.[2]

Cultivation and Collection

Soil Preparation: Garlic should be planted in a fertile, well-drained soil. A raised bed works very well. Remove stones from the top 6 inches of soil. Work several inches of compost or well-rotted manure into the bed, along with 10-10-10 fertilizer.

How To Plant Garlic: Planting garlic is relatively simple. Separate cloves. Space the cloves 4-6" apart. Rows should be spaced one foot apart. The cloves should be planted with the pointed end up and the blunt end down. Push each clove 1-2" into the ground, firm the soil around it, and water the bed if it is dry.

When To Plant Garlic: Fall Planting Plant cloves in mid-autumn in a sunny location with rich, well-drained soil. Set cloves root side down 4-6" apart in rows 1-1/2 to 2' apart, and cover with 1-2" of fine soil. In the North, put down 6" of mulch for winter protection. Garlic may begin growth late in fall or early in spring.

Spring Planting: Plant cloves as early in spring as soil can be worked, about the same time as onion sets. Spring planted garlic should be put in the ground in the same manner as in the fall.

Mulch: After planting, lay down a protective mulch of straw, chopped leaves or grass clippings. In cold-winter regions the mulch should be approximately 4 inches thick. Mulch will help to prevent the garlic roots from being heaved out of the ground by alternate freezing and thawing. A light application of mulch is useful in milder climates to control the growth of winter weeds.

Spring Care: When the leaves begin to grow, it is important to feed the garlic plants to encourage good growth. A teaspoon or two of a high-nitrogen fertilizer that decomposes slowly, such as blood meal or Osmocote should be gently worked into the soil near each plant. If the mulch has decomposed, add a layer to help retain moisture and keep weeds under control. In late spring some garlic varieties produce flower stalks that have small bulbils. Cut these stalks off. This will insure that all of the food the plant produces will go into the garlic bulb itself and not the clusters of bulbils. In the month of June the garlic plants stop producing new leaves and begin to form bulbs. At this time you will remove any remaining mulch and stop watering. The garlic will store better if you allow the soil around the bull dry out.[2]

When To Harvest Garlic And Proper Storage Methods:[2]

You will know when to harvest garlic when most of the leaves have turned brown. This usually occurs in mid-July to early August, depending on your climate. At this time you may dig the bulbs up, being careful not to bruise them. If the bulbs are left in the ground too long, they may separate and will not store well. Lay the garlic plants out to dry for 2 or 3 weeks in a shady area with good air circulation. Be sure to bring the garlic plants in if rain is forecasted for your area. When the roots feel brittle and dry, rub them off, along with any loose dirt. Do not get the bulbs wet or break them apart, or the plants won't last as long. Tie the garlic in bunches, braid the leaves, or cut the stem a few inches above the bulb. Hang the braids and bunches or store the loose bulbs on screens or slatted shelves in a cool, airy location. You may want to set aside some of the largest bulbs for replanting in the fall. During the winter months you should check your stored garlic bulbs often, and promptly use any that show signs of sprouting. Each set (bulb) is made up of several sections called cloves, held together by a thin, papery covering. Before planting, break cloves apart.

Harvesting and Storage: [2] In late summer, bend over tops to hasten yellowing and drying of tops. Then pull up the garlic plants and allow them to dry in sun a few hours. Spread out in a well-ventilated place until tops are thoroughly dry for 2-3 weeks. Cut tops off 1-2" above garlic bulbs, or braid tops together into strings. Store loose bulbs in a dry, cool, airy place in baskets; hang garlic strings. [2]

Chemical Constituents-:[2]

The name Alliumsativum is derived from the Celtic word "all", meaning burning or stinging, and the Latin "sativum" meaning planted or cultivated. The English word, garlic, is derived from the Anglo-Saxon "garleac" or spear plant, referring to its flowering stalk. Garlic contains at least 33 sulphur compounds, several enzymes, 17 amino acids, and minerals such as selenium. Of all the Allium species, garlic contains a higher concentration of sulphur compounds. Garlic's pungent odour and many of its medicinal effects are due to the sulphur compounds. Approximately 1% alliin (S-allylcysteinesulfoxide) is present in dried, powdered garlic. [2]

Allicin (diallyl disulfide), which is the most biologically active compound in garlic, does not exist until garlic is crushed or cut. Enzyme allinase, which is activated upon injuring the garlic bulb, metabolisesalliin to allicin. Allicin is subsequently metabolised to vinyldithiines. This process requires hours at room temperature and minutes during cooking. Allicin, which has antimicrobial effects against many viruses, bacteria, fungi and parasites, was first chemically isolated in the 1940's .Also contain compound known as Ajoene which has anticancer properties. Apart from compounds mentioned above, Alliumsativum contains flavonoids, Vitamin A, vitamin B1 and vitamin C, potassium, phosphorous and other compounds[2]

Fig.9 Garlic [13]

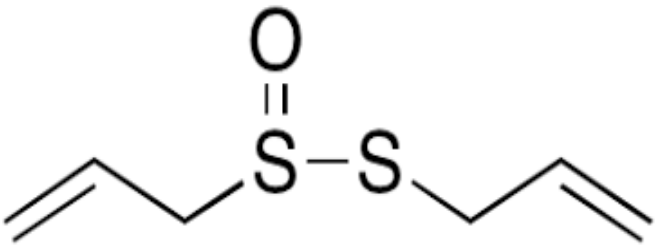

Fig. 10 Allicin[13]

Use: It has various distinctive functions such as expectorant,antibacterial, antibiotic, anticoagulant, antihistamine, antiparasitic, antifungal, antiprotozoan and antiviral properties, diaphoretic, alterative, antidiabetic, diuretic, stimulant, antispasmodic, promotes sweating, lowers blood sugar and blood cholesterol levels and lowers blood pressure. The derivatives of garlic compounds appear to be safe, cheap, and broadspectrum and immunostimulatory stimulate cellular immunity. It is also can be used for the treatment of insomnia and used as antioxidant .In the agricultural field, literature survey had mentioned that garlic tolerates neither excess water nor water stress as both could decrease bulb yield of up to 60 percent.[2]

GINGER

Its generic name Zingiber is derived from the Greek zingiberis, which comes from the Sanskrit name of the spice "singabera"And Inhindi it known as Adrak. The Latin name, Zingiber, means "shaped like a horn" and refers to the roots, which resemble a deer's antlers. Long cultivated by the ancient Chinese and Hindus, Ginger was one of the first oriental spices known in Europe. Throughout the early centuries, Ginger was thought to have medicinal powers. It was often used by pregnant women for morning sickness. The spice has a slightly biting taste and is used, usually dried and ground, to flavour breads, sauces, curry dishes, confections, pickles, and Ginger ale. Its fresh rhizome is used in cooking. It is most alkaline-promoting foods. It has a pH of 5.6 to 5.9, similar to that of figs, fennel, leeks, parsnips and romaine lettuce.

The alkalinity of foods depends on many variables, including growing conditions and processing.To make old and rotten ginger attractive, it is washed with acid to brighten them up because the customer chooses only those who look attractive. Sulphuric acid is added to ginger to make them appear shiny and almost double their weight. [7-8]

Family: Zingiberaceae

Morphological Characters: General appearance: Sympodial branching, horizontal rhizome having a

Size Length 5 to 15 cm, width 3 to 6 cm; thickness 0.5 to 1.5 cm. Shape: Laterally flattened on the upper side with short flattened oblique, obovate branches or fingers. Each branch is 1 to 3 cm long and at its apex shows a depressed scar of the stem.Surface: Longitudinally striated with occasional projecting fibers.Fracture is Short, starchy, fibrous,Fractured surface Shows a narrow bark, a well markedendodermis and a wide stele, showing numerous scattered grayish points (fibro-vascular bundles) and smaller yellowish points i.e secretion cells. colour is buff to yellow and Odour is Aromatic or strong taste is Pungent.

Geographical Source: [8][13] Ginger is a large tuberous perennial plant which is cultivated extensively in almost all tropical and subtropical countries like India, China, Africa, and Australia. India and China are the world's leading producers of Ginger4. The material of commerce is supplied in "completely scraped"peeled , "partially scraped," or "unpeeled" rhizomes. Peeled rhizomes also call white Ginger. are produced in Jamaica, while unpeeled rhizomes is black Ginger are mainly from China and Sierra Leone. Partially scraped rhizomes come from India, Nigeria, Australia, and Japan. Ginger became naturalized in the Caribbean and Central America early in the sixteenth century when Spaniards brought it from the East Indies and began to cultivate it on a large scale for export to Europe.[8]

Cultivation: [7][8] One of the major world producers of this plant. It is a root crop widely consumed in Nigeria either for culinary purposes or for manufacturing and other purposes. It has a short growth cycle of about 8 months or less, before harvesting. It can either be planted alone or inter-cropped with some other crops like yam. The crop can be planted during the early rains of April and May. Flowering of the root crop occurs about six months after planting, and as soon as the leaves have dried off, the crop is ready for harvesting. Mostly, the root is often grown on ridges for easier harvesting.Most farmers will normally clear and plant on new land planting of about 8cm deep on small ridges and mulching with a thick layer of leaves, immediately after planting. For optimum yield level, Ginger requires rich organic soil or valley clay that is well drained. Ultimately an annual rainfall level of about 1020 mm has been proven to be adequate for this crop to thrive well otherwise, an annual rainfall level of 760 mm with supplementary irrigation will be required.

The crop will thrive well at any altitude up to 1200 m above sea level. The stems of the plant grow about a meter high. The leaves are 6 to 12 inches long, elongate and the flowers are cone like spikes about 1 inch thick and 2 to 3 inch long composed of overlapping green bracts, which may be edged with yellow. Each bract encloses a single, small, yellow-green and purple flower. Growing Ginger requires a warm and moist climate with ample sunshine and heavy rainfall. The plant is propagated by dividing and planting the root-like structures called rhizomes. After about a full year of growth, the rhizomes are dug up, washed, and laid in the sun to dry for about eight days. Ginger is propagated by planting rootstalk cuttings. Its harvesting is done by lifting the rhizomes from the soil, clean them, and drying them in the sun.[7][8]

Collection: [7][8] It is done in the month of December or January when the plants wither after flowering period. Rhizomes are dug out and after that aerial stems, fibrous roots and buds are removed. They are washed to remove clay attached to them. Rhizome is peeled on flat surface as well as between the fingers and thoroughly washed in running water. It is then dried completely by keeping in the sun on mats. If moister is present, it may become mouldy and after drying it loses about 70% of its weight. Cochin Ginger: In South India, it is only partially peeled and bleached by dipping in to the milk of lime. It is thus coated and bleached. Jamaica Ginger: It is deprived of its cork and outer cortex that is coat and so it is called uncoated ginger. It is not bleached with calcium salts and so it is called unbleached ginger. African Ginger: It is darker and smaller than Cochin ginger. It is more pungent but lacks the aroma of Jamaica ginger.

Storage Requirement: Fresh Ginger rhizomes suffer from rapid post-harvest deterioration either as a result of poor handling or rot due to micro-organisms and physiological breakdown due to sprouting. Good quality Ginger roots should be big, firm and without defects of any kind like soft spots, peeled skin, cuts, bruises and scratches. The storage condition for fresh Ginger includes a temperature of 13 °C and at relative humidity of about 65%. Under this condition, Ginger could be stored for an average of 6 months. In the case of the storage of Ginger under room conditions, the crop shrivels and may sprout, thereby reducing the storage life to about 1 month. For dry Ginger, the recommended storage condition is room temperature of between 22 to 25 °C and with a relative humidity of 70% in order to maintain a shelf life of about 12 months.

Microscopy: Rootstock is Horizontal and tuberous. Leafy stem having an Elongated leaves; oblong-lanceolate, clasping the stem by their sheaths. Spikes are usually radical, rarely lateral or terminal on the Leafy stem peduncle short or long; bracts persistent, usually single. Calyx is Cylindric, shortly three-lobed. Corolla tube is a Cylindric;

segments lanceolate, upper concave Lateralstaminodes: Zero or adnate to obovate-cuneate lip; filament short; anther cell contiguous, crest narrow, as long as the cells. Ovary is Three celled; ovules many, superposed; style filiform; stigma small, subglobose.Capsule is Oblong, finally dehiscing. Seed is Large, globose, arillate. Rhizome having Stout tuberous with erect leafy stems 0.6 to 1.2 m high. Leaves are Narrow, distichous, subsessile on the sheaths, linear lanceolate 1 to 2 cm wide, glabrous. Flowers are Greenish with a small dark purple or purplish blacklip, in radical spikes 3.8 to 7.5 cm long and 2.5 cm diameter on peduncles15-30 cm long. Stamens is Dark purple, as long as the lip, rather shorter than the corolla.[7]

Chemical constituents: [7] Some of the major chemical constituents are Volatile oils (1 to 2%): bisabolene, gingerol, citral, citronellal, geranial, linalool, limonene, camphene, borneol, cineole, phelandrene, zingiberene. Bisabolene: It is a sesquiterpene. Zingiberene (6%): sesquiterpene hydrocarbon. Phenols:gingeol, zingerone. Gingerol is A yellow pungent oily liquid and yields a Gingerone, a ketone and aliphatic aldehyde.Oleo-resin: shogaol, zingiberole. Shogaol It is formed by loss of water from Gingerol. Zingiberole: sesquiterpene alcohol. Lipids (1to2%), free fatty acids, lecithins, phosphatidic acid, triglycerides. Vitamins: A, B3 (niacin), B6 (riboflavin), Vitamin C. Minerals are present in ginger are calcium, magnesium, phosphorus, potassium. The pungency of Ginger is due to alcoholic group of the oleoresin which is gingerol (5 to 8%).The aroma of ginger is due to volatile oils (1 to 2%) which are bisabolene, zingiberene and zingiberol.

Use: [7][8] It is a Great AntitussiveActivty, it also used in Arthritis: It reduces inflammatory eicosanoids without the side effects of other anti-inflammatory drugs and NSAIDS.Heart and circulatory problems: Ginger offers substantial protection from stroke and heart attack because of its ability to help prevent blood clotting. Studies have shown that it deactivates the harmful activity of the so-called "bad eicosanoids" hormones, which are responsible for blood clotting, constriction of the vessels, and inflammation. its antioxidant constituents strengthened the cardiac muscle and also lowers serum cholesterol levels by interfering with cholesterol biosynthesis. Fever reducer: It can assist in lowering a fever.

Its antibacterial/antiviral effects help to reduce the incidence of colds altogether. Digestive problems: It is commonly used for indigestion because it absorbs and neutralizes toxins in the stomach. It also improves the production and secretion of bile from the liver and gallbladder. Bile acids in the digestion of fats, which helps to lower cholesterol levels. It is sometimes recommended as an alternative to aspirin for people who cannot take aspirin because of its irritating effect on the gastrointestinal tract.[15]It is also used as Antioxidant, Antitoxic, Eicosanoid balance, Enzyme activity, Probiotic support, Serotonergic, Systemic stimulantIts demonstrated effects are Analgesic, Antibacterial, Antidiabetic, Antiemetic, Antifungal, Anthelmintic, Anti-inflammatory, Antithrombic, Antitumor, Antitussive, Antiulcer etcSome of thearket preparations containing Ginger i.e. Shunth .[7]

Fig. 11 Ginger[13]

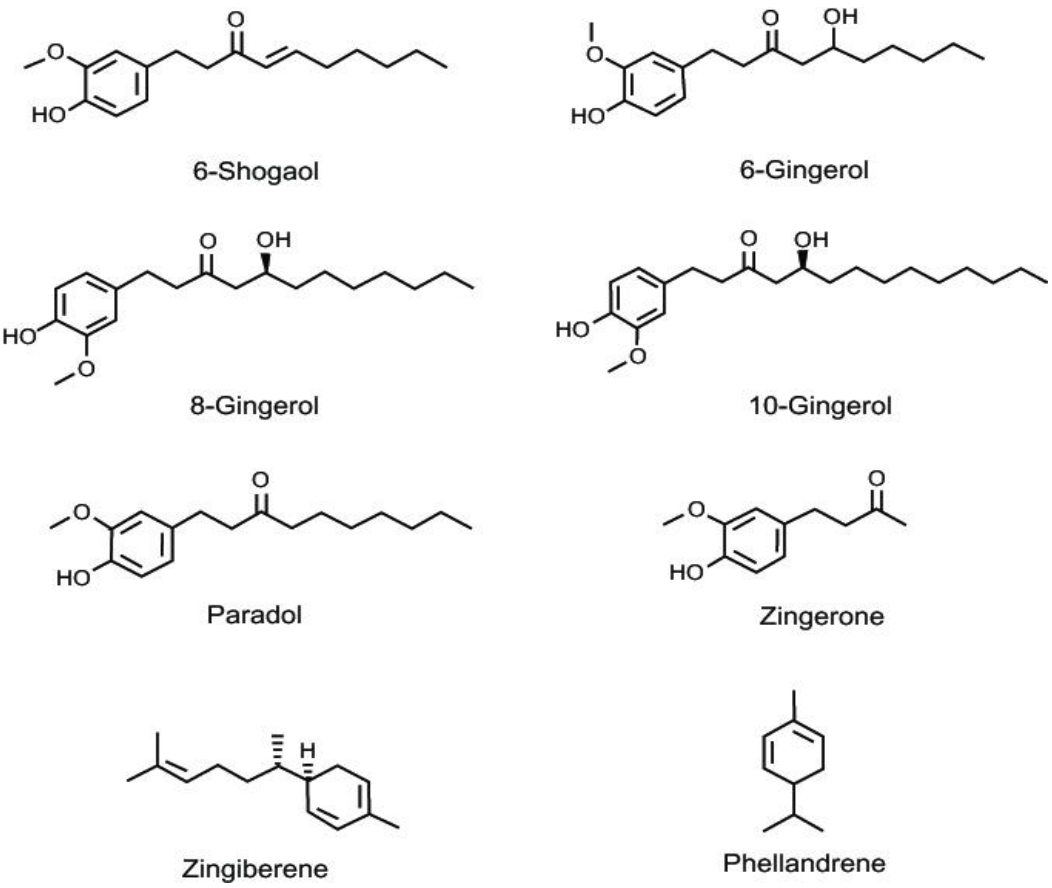

Fig.12 Chemical Constituent Of Ginger[13]

Marketed formulation:

Table 1: Herbal Plants having Antitussives and Expectorant activity. [13]

Herbal plant name	Biological source	Family	Chemical constituents	Part use	Use
Vasaka[1][3]	Adhathoda vasica	Acanthaceae	Vasicin, vasicinolone	Leave	Expectorant
Liquorice[12]	Glycyrrhiza glabra	Leguminosae	Glycyrrhizin	Root	Antitussive& Expectorant
Shatavari[5]	Asparagus racemous	Liliaceae	Shatavarin I&IV	Root	Expectorant
Garlic[2]	Allium sativum	Liliaceae	Allisin, Ajoene	Bulb	Expectorant
Ginger[7][8]	Zingiber offcinale	Zinginereaceae	Gingerol,shogal, zingiberen	Rhizome	Antitussive

CONCLUSION

Currently world-wide interest in traditional medicine has led to rapid development and studies of many remedies employed by various ethnic groups of the world. The Herbal plants having medicinal uses and gives Desired action,without any side effect as compare to the other drugs. Herbal drugs like Adhatodavasica which belongs family Acanthaceae, containing main chemical compounds like vasicinolone, vasicinolone which having expectorant effect. Liquorice belongs family Leguminosae, containing glycyrrhizin as main chemical constituent, having aAntitussive and expectorant effect. Shatavari belongs family liliaceae, contain shatavarin-I and shatavarin-IV as main chemical constituent, having expectorant activity. Garlic which belongs from family liliaceae, contain Allicin and ajoen as chemical constituent,having expectorant effect. Ginger from family zingiberaceae, contain gingerol, shagual,zingiberene as main chemical constituent having a Antitussive activity.

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