

# Therapeutic perspectives of plant crude drugs grow underneath the ground

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## Abstract

**Introduction:** The crude drugs are untreated substances derived from organic or inorganic sources such as plants, metal, mineral, and animal or their parts. This study is focused on plants sources obtained from underneath the ground chiefly roots and underground stems. Siddha system of medicine is an ancient system of indigenous medicine practiced in several parts of the world. **Materials and Methods:** The information is gathered through scientific research articles from the reputed website such as PubMed, Elsevier, and Web of Science. **Results and Discussion:** The roots are specially modified into underground stems for storage of starch and water. Rhizomes are also a type of swollen stem that grows underground, such as ginger and turmeric. Tubers with their lumpy, swollen, and starchy underground stem, potatoes are a very familiar example of tubers. Onions are a classic example of a bulb when sliced in half, they clearly display the concentric rings that are the telltale sign of a bulb. Elephant yam is a type of corm, swollen stem base that is modified into a mass of storage tissue. A corm does not have visible storage rings when cut into half. This distinguishes it from a true bulb. This review highlights the medicinal plant's roots and underground stems used in the traditional medicines. Electronic databases were utilized to analyze the ethnopharmacological effects of the roots and underground stems of the herbs. **Conclusion:** Plenty of phytochemical studies done in different analytical ways which revealed the potency of the roots and underground stems of these herbs. Moreover, this information has prompted to compile the list of roots and underground stems used in the traditional system of medicine to cure many health manifestations.

**Key words:** Phytochemical constituents, Crude drugs, Traditional medicine, Herbs, Root

## INTRODUCTION

Siddha medicine originated from the envisions and constant experimentation of sages on medicinal plants, metal, minerals, and animals products. It is a pathway to defeat death and live longer using medicinal herbs and their formulations, which subsequently evolved as one of the Indian traditional systems of medicine. Crude drugs are naturally occurring substance obtained from plant, animal or its parts, and some inorganic material such as metal and mineral which are untreated but possess some medicinal value. It is subjected to purify before used as simple remedy or one of the recipes of a drug.<sup>[1]</sup> The medicinal importance of the roots and underground stems are evidenced by siddhars' stanzas/poets as preventive and curative therapeutics. In this divine, medicine roots and leaves of the herbs are given as the first line treatment for the patients. Ancient siddhars classified the medicinal herb into root, stem, leaves, flower, and fruit as five components.<sup>[2]</sup>

The root system of the plant firmly rooted into the soil is known as “Moolam” (source). The Siddha term “Moolikai” (medicinal herb) was just originated from the word “Moolam.” Among five parts, the roots have high medicinal value properties since it does not exposure to the external environment. However, collection of roots depends on the different climates while they have high potent medicinal chemical components. Hence, root stocks are collected in autumn season from cold climate region and spring season from temperate climate regions. According to the Siddha medicine, there are 18 types of disease correlated with 18 roots that exist in the natural habitat such as *Kanchankorai*

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root (*Ocimum americanum*) and *Kaiyanthakarai* root (*Eclipta prostrata*).<sup>[3]</sup> Scientific investigations in the past have helped in uncovering many phytochemicals from plant roots, some of which are now in clinical use and many others are in various stages of preclinical and clinical studies.

The scientific work on different plants in the past ages has gained confidence among researchers worldwide. The global plant diversity holds the cure for many unresolved human ailments. The various parts of a plant such as leaves, roots, bark, fruit, seeds, and flowers contain different active ingredients within one plant. Among them, one part can have toxic where another part of the same plant may be non-toxic.<sup>[4]</sup> Roots are modified into underground stems. Roots and underground stems are the parts of the plant under the soil surface. A root anchor helps the plant fix firmly into the soil and thus absorbs water and minerals from the soil for the nourishment of the plant's growth. The underground stems are the storage tissues of food and nutrients. Despite of these functions, the roots and underground stem plays the vital role in treating many diseases. Rhizome is a horizontal underground stem also known as creeping root stock which is capable of producing the shoot and root systems of a new plant. Rhizomes have proteins and starches and enable plants to survive an annual unfavorable season (perennation) underground. In addition, those modified stems allow the parent plant to propagate asexually (vegetation).<sup>[5]</sup> The vast traditional knowledge that is practiced in different parts of the globe has contributed extensively in investigating many medicinal plants, using modern pharmacological tools. A large part of the bioactive plant-derived compounds used commercially has come into light through follow-up research to verify the authenticity of traditional knowledge.<sup>[6]</sup> Different parts of the plant or plant as a whole have served as the source of bioactive compounds for the purpose of investigation, as well as for commercial drug production. Roots are the ground anchoring part of the plant that possesses various bioactive molecules which exert therapeutic efficacy for ailments such as diabetes, ulcer, liver, and malignancy diseases.<sup>[7]</sup>

Several drugs from plant, mineral, and animal origin are described in the Siddha medicine for their wound healing properties. The roots and underground stems of the herbs were selected for this comprehensive study to analyze the medicinal benefits. Plants and their extracts have immense potential for the management and treatment of many diseases. These natural agents induce healing and regeneration by multiple mechanisms. However, there is a need for scientific validation such as characterization and standardization, clinical study including safety profile of plants of the traditional medicine before these could be recommended for ailments. Over the past three decades, there is an immense escalation which was noticed in the eco-friendly use of medicinal plants to overcome the ailments. Therefore, the review aims to expedite medicinal value of roots and underground stems commonly used in Siddha medicine through scientifically validated available data and

thus emphasize to have a proper documentation of medicinal plants and their potential for the improvement of health and hygiene through an eco-friendly system.

## METHODOLOGY

The study directly focuses on qualitative data-based descriptive review regards to underground medicinal root stock with their chemical compositions, pharmacological activities, and its traditional medical uses. An online database search was done on Google Scholar for recent past scientific publications. The content analysis was compiled with a data set of web pages of PubMed, Medline, Elsevier, Web of Science journals research articles reports, etc.

## OBSERVATION AND DISCUSSION

The secondary metabolites are responsible for the therapeutic properties of plants and the composition of these secondary metabolites varies from plant species. Medicinal plants are of paramount importance which expedite therapeutic outcome to an individual and communities. The medicinal value of these plants lies in some chemical active substances that produce a definite pharmacological action on the human body.<sup>[8]</sup> Some active compounds which are obtained from natural source play an important role for maintaining human health.<sup>[9]</sup> Natural products are very helpful drug developing programs in the pharmaceutical industry.<sup>[10]</sup>

There are several roots and underground stems of different herbs available in the traditional system of medicine such as Siddha, Ayurveda, and Unani. Most of the roots utilized for this purposes contain toxic substances which are purified in so many methods and used as medications to treat an array of diseases. In the traditional system of medicine, underground stems also considered to have culinary medicinal properties for the treatment and management of several health manifestations.<sup>[11]</sup> Stem tuber is a swollen stem that stores water and nutrients. This storage is used in unfavorable conditions such as drought or winter months. Stem tubers are modified near the soil surface. New plants are developed from the eye nodes of tubers which produces chlorophyll on exposure of sunlight. Root tubers are also the swollen roots known as root crops due to the storage of water and nutrients. It performs the functions of roots such as the absorption of water and minerals and anchoring the plant body to the soil. Some examples of root tubers are beet root, carrot, and dahlias.<sup>[12]</sup> Some of the significant roots and underground stems are discussed as follows.

### Roots as Medicine

#### *Anacyclus pyrethrum* L. (*Pellitory root*)

It is a perennial, procumbent herb, stems lie on the ground for part of their length, before rising erect. The root is almost

cylindrical, very slightly twisted and tapering and often crowned with a tuft of gray hairs which belongs to Asteraceae family. The roots are rich in alkaloids named as pellitorine, pyrethrin, and other constituents are tannins, flavonoids, essential oil, brown acrid resin, inulin, tannic acid, and lignin. The root of *A. pyrethrum* acts as sialagogue, carminative, expectorant, rubefacient, antimicrobial, anesthetic, neurological, and anti-depressant pharmacological activities. In traditional of medicine, root has the broad remedial scope for the treatment toothache, worms, diarrhea, fever, tonsillitis, sore throat and tongue paralysis, sciatica, arthritis, and epilepsy. It increases production and secretion of saliva. This can aid in digesting food and give relief from dry mouth and is frequently used for toothache.<sup>[13]</sup>

### ***Aristolochia indica* L. (Indian birthwort)**

It is one of the plants of Aristolochiaceae family, found in low rocky hill slopes and plains of tropical and subtropical countries. It was reported that the root consist with essential oils, aristolochin and allantoin (glycoside) aristolindiguinone, and aristololide. Aristolochic acid is the major active constituent present in the root will cause nephropathy, cancer, and a potent abortifacient if not purified properly. The roots of this plant are used widely in the traditional system of medicine to treat, fever, leprosy, menstrual problems, skin diseases, cholera and snake, and scorpion bites. It is effective for swellings due to poison, poisons bites, fever, skin disorders, snake bite, insects bites, hypertension, bronchial asthma, cough, acute and chronic rheumatism, indigestion, digestive disorders, diarrhea, leucoderma, skin diseases, scabies, heart disease, anemia, and dropsy.<sup>[14]</sup>

### ***Glycyrrhiza glabra* L. (Liquorice)**

It is known as Liquorice which belongs to the family of Fabaceae. These roots are sweet in taste and wrinkled brown in color. The phytochemicals are glycyrrhizin, tannins, essential oils, malic acid, inorganic compounds, and acid resin. This herb's roots have potential medicinal benefits to treat several diseases in traditional system of medicine such as excessive thirst, eye disorders, mental disorders, leucoderma, and bone disorders, dysuria, dry cough and jaundice, coma, poisoning, chronic wounds, fever, anal fissure and also considered as a rejuvenating herb. The root has anti-inflammatory, laxative, emollient, demulcent, carminative, anti-viral, expectorant, anti-diuretic, anti-mutagenic, antipyretic, and antioxidant pharmacological activities.<sup>[15]</sup>

### ***Indigofera aspalathoides* DC. (valerian root)**

The plant *I. aspalathoides* is a under shrub with terete spreading branches which belongs to Fabaceae family. Root extracts of this herb contained with several phytochemicals such as glycosides, alkaloids, phlobatannins, leucoanthocyanin, saponins, flavonoids, triterpenes, and tannin. It acts as stimulant, coolant, and demulcent. It is used to treat the illnesses in traditional medicine such as diabetes,

leprosy, skin disorders psoriasis, epilepsy, nervous disorders, fever, stomach disorder, and liver and kidney disorders. Root extracts of *I. aspalathoides* have very good antimicrobial activity such as antibacterial and antifungal activity.<sup>[16]</sup>

### ***Nardostachys jatamansi* DC. (spikenard muskroot)**

This herb is a small, hairy, rhizomatous, perennial, and dwarf herbaceous plant which belongs to the family of Valerianaceae. The phytochemical analysis of the rhizome indicates Sesquiterpene is the major component of *N. jatamansi* which is volatile constituent responsible for its therapeutic activity and also it has jatamansone, nardostachone and coumarins, lignans, neolignans. The roots act as brain tonic, rejuvenating, hepatoprotective, diuretic, analgesic and cardiogenic, tranquillizing activity, antihypertensive, hypolipidemic, hepatoprotective, neuroprotective, anti-ischemic, anti-arrhythmic and anticonvulsant, stimulant, expectorant, antispasmodic, diuretic tonic, laxative, and antiepileptic. Conventionally, it is used in the treatment of hypertension, bronchial asthma, cough, diarrhea, internal fever, chronic wound, eye diseases, scorpion poison, and skin diseases and also has been used to treat hysteria, syncope epilepsy, and mental weakness, and promotes hair growth and sleep.<sup>[17]</sup>

### ***Piper longum* L. (long pepper)**

This is a shrub which has large wood roots which belongs to Piperaceae family. This root contains steroids, carbohydrates, tannins and volatile oils, piperine, piperlongumine or pipartine, and dihydro-stigmasterol.

The research reports suggested the root of long pepper is used as sedative, cholagogue, emmenagogue, abortifacient, anthelmintic, antioxidant, anti-inflammatory, anticancer, hepatoprotective, immune modulator, antimicrobial analgesic, and antidepressant.<sup>[18]</sup>

### ***Plectranthus vettiveroides* KC. Jacob. (fibrous root)**

*P. vettiveroides* belongs to the family Lamiaceae which is an aromatic herbaceous plant. Its deep straw-colored fibrous bunch of roots is strongly aromatic. Phytochemical screening of methanolic extract showed presence of triterpenoids, phenolic compound, proteins, flavonoids, alkaloids, and tannins. The major compounds are androstan-17-one 3-ethyl-3-hydroxy- (5 $\alpha$ ) and spathulenol. The root has bitter taste, cool potency, and sweet post-digestive effect (vipakam), and thus, it acts as antipyretic, diuretic, antibacterial, deodorant, and cooling agent. Conventionally, it is used to cure head ache, fainting, coma, diarrhea, rheumatism, fever, intrinsic hemorrhage, psychiatric conditions, strangury, skin diseases, giddiness, edema, insanity and quenching thirst, antioxidant, and anticancer.<sup>[19]</sup>

### ***Vetiveria zizanioides* L. (Khas-Khas)**

It belongs to Poaceae family. It is a tall, perennial, scented grass, with a straight stem, long narrow leaves and abundant

lacework root system. The phytochemicals are benzoic acid, furfural, vetivene, vetivenyl vetenate, terpinen-4-ol, 5-epiprezizane, Khusimene,  $\alpha$ -muurolene, Khusimone, Calacorene,  $\beta$ -humulene,  $\alpha$ -longipinene, d-selinene, d-cadinene, valencene, Calarene, gurjunene,  $\alpha$ -amorphene, Epizizanal, 3-epizizanol, Khusimol, Iso-khusimol, Valerenol,  $\beta$ -vetivone,  $\alpha$ -vetivone, and vetivazulene. The root acts as stimulant, antispasmodic, diaphoretic, diuretic, emmenagogue, and febrifuge. In traditional medicine, the root is used for thirst, jaundice, hypertension, giddiness, headache, loss of libido, psychiatric condition, conjunctivitis, and burns.<sup>[20]</sup>

### ***Plumbago zeylanica* (L.) Nash. (Ceylon Lead-wort)**

It is a perennial under shrub, 1.5–2.0 m tall, with rambling branches which belongs to Plumbaginaceae family. Root enriched with alkaloids,  $\beta$ -asarone, ethyl, plumbagin, p-methoxycinnamate, and n-hexadecanoic acid. It acts as periodic and diaphoretic. It is used for urinary calculi, piles, trauma, fistula, cancer, and scabies. It acts as bitter rejuvenator tonic, chronic coryza, cough, viral warts, and chronic diseases of nervous system. Root bark also considered for obesity, digestive disorders piles, worms, colitis, ascites, and hepatosplenomegaly, as laxative, expectorant, tonic, abortifacient, good appetizer, and also reported to be beneficial for the treatment of rheumatism.<sup>[21]</sup>

### ***Rauvolfia serpentina* (L.) Benth. (Indian snake root)**

It is an evergreen shrub that is a member of the Apocynaceae family. The major alkaloid is present in roots, stem, and leaves of the plant is reserpine. It is also reported many phytochemicals including flavonoids, alkaloids, tannins, phenols and other alkaloids are present in its roots including ajmalicine, ajmaline, isoajmaline, ajmalinine, chandrine, rauwolfinine, renoxidine, rescin-namine, reserpiline, reserpine, reserpinine, sarpagine, serpentine, and serpentinine. Most of them are present in root bark. It is medicinally used for fever, malaria, eye diseases, pneumonia, antipsychotic, insomnia, cancer, neurological disorder, asthma, headache skin disease, and spleen disorder of intestinal disorders, such as diarrhea and dysentery. It is commonly used for the treatment of hypertension.<sup>[22]</sup>

### ***Sida cordifolia* L. (country mallow)**

It is a small downy shrub, leaves are ovate and roots are 5–15 cm long. It belongs to the family of Malvaceae. It has many phytochemical constituents such as alkaloids, methyltryptophan, quinazoline, sidasterone,  $\beta$ -phenethylamin,  $\beta$ -sitosterol, and hypaphorine. The roots are used in traditional medicine for chronic dysentery, gonorrhea, and asthma. The root bark is exploited as stomachic, demulcent, tonic, astringent, bitter, diuretic, aromatic, and as antiviral agent. According to traditional medicine, the root is used as tonic, astringent, emollient, diuretic aphrodisiac, and useful in treatment of respiratory disorder and also in blood

disorder, throat, urinary tract disorders, piles, phthisis, fever, obesity, gastrointestinal complications, asthma, and nervous disorders.<sup>[23]</sup>

### ***Stereospermum suaveolens* (Roxb.) (Messenger of spring)**

It is a tree, belongs to the family Bignoniaceae, the root surface is rough and firm due to scaling off of longitudinal striation and inner side of root is soft. It has characteristic odor and bitter in taste. Its roots are enriched with lapachol, dehydrotectol, ceryl alcohol, oleic acid, stearic, flavonoids, alkaloids, and palmitic acid. The previous scientific studies evidenced that plant possesses diuretic, febrifuge, anti-inflammatory, anticancer, hepatoprotective, hypoglycemic, and antioxidant activities. Root is used for the management of many diseases in traditional medicine such as diabetes mellitus, diabetic abscess, skin disorders, deep wounds, piles, skin itching, scabies, burning eye, ear, and extremities.<sup>[24]</sup>

### ***Trianthema decandra* L. (black pig weed)**

Plants are glabrous or papillose, thickened, and flattened at the nodes with taproot system that reaches up to the height of 30–50 cm which belongs to the family of Aizoaceae. Phytochemical components are trianthemol, trianthemine, eicosane, hexadecane, tetracosane, dotricontane, and nonacosane. The pharmacological actions are diuretic, laxative, and expectorant. In the traditional system of medicine, the root is often used to treat asthma, cough is kapha diseases, urticaria, pityriasis versicolor, peptic ulcer, pain scabies leukorrhea, hepatitis, and amenorrhea.<sup>[25]</sup>

## **Root Tuber as Medicine**

### ***Aconitum heterophyllum* Wall. (Indian Atees)**

It belongs to Ranunculaceae family. It is reported to have the medicinal uses of treating diseases such as fever, vomiting, diarrhea, inflammation, bleeding piles, and urinary tract infections. The root tuber consists of alkaloids, carbohydrates, amino acids, saponins, tannins, steroids, quinones, and flavonoids, with non-toxic substances such as atisine, dihydroatisine, heteratisine, and hetisine. Six different types of alkaloids present in the root such as mesaconitine, hypaconitine, aconitine, benzylhypaconine, benzoylmesaconine, and benzoylaconine. The seeds and roots also have diuretic property and used to treat dysuria and also an efficient hepatoprotective medicine.<sup>[26]</sup>

### ***Aconitum ferox* Wall. (Indian aconite)**

It belongs to Ranunculaceae family. This herb is known as the queen of all poisons. However, it is processed and purified well in traditional system of medicine to treat the patients. The aconite root contains two root tubers. Its tap root is later changed as the primary tuber. The root tubers consist with toxic substances such as psuedoacotinine and some nontoxic



alkaloids such as aconite, aconine, and picroaconine which are pharmacologically active but highly toxic. If purified well through hydrolysis of poisonous analogues or by transforming into non-poisonous analogs can be used for drug preparations. It is specially recommended for fever, cephalalgia, affections of throat, dyspepsia, asthma, cough, indigestion, and rheumatism. The root is used for cold, neuralgia, and inflammatory condition of throat. It acts as local anodyne in sciatica and neuralgia, especially in ordinary facial or trigeminal neuralgia. Aconite has been used as valuable therapeutic agent in the acute stages of cerebrospinal meningitis and as a cardiac sedative in aneurism.<sup>[27]</sup>

### ***Asparagus racemosus* Willd. (butter milk tuber)**

It is a shrub with tuberous root 30–100 cm long. Its root tubers consist of saccharine and mucilage which belongs to the family of Liliaceae. The phytochemical study indicates the root of *A. racemosus* contains flavonoids, alkaloids, steroids, terpenoids, glycosides, tannins, terpenoids, and saponins. This root has various pharmacological activities such as galactagog, antidyspepsia, antidiabetic, antimicrobial, anti-inflammatory, and antitussive. It is used in the traditional system of medicine for the treatment and management of epilepsy, chronic fevers, stomach ulcers, excessive heat, kidney disorders, and liver cancer and also to increase lactation in nursing mothers.<sup>[28]</sup>

### ***Corallocarpus epigaeus* (Rottler) (Redfruit creeper)**

This root tuber poisonous is a monoecious climber plant which is found in tropical countries. It belongs to Cucurbitaceae family. This plant root tuber contains Bryonin. The qualitative phytochemical analysis also indicated the presence of saponins, flavonoids, phenol, alkaloids, tannins, and steroids. This root is used for the nourishment of the human body. It acts as alterative and nutritive. In traditional medicine, the root tuber is used for leprosy, goiter, anemia, abdominal pain, skin disorders, and as an antidote for poisoning.<sup>[29]</sup>

### ***Cyperus rotundus* L. (Nut sedge)**

It is a perennial plant. It is widely spread in the tropical and subtropical areas which belong to Cyperaceae family and known as purple nut sedge, nut grass, and red nut sledge. Its root tubers consist of starch, carbohydrate, cineole, sesquiterpenes, and essential oils. Furthermore, it contains glycerol, linolenic acid, linoleic acid, and oleic acid. These root tubers are used widely in siddha system of medicine for the treatment and management of excessive thirst, hypertension, fever, diarrhea, vomiting, and tuberculosis as well.<sup>[30]</sup>

### ***Saussurea lappa* (Falc.) (Kust)**

It is a strong perennial tall shrub which belongs to family Asteraceae. The root tuber extract consists with the wide variety phytoconstituents such as alkaloids, tannins, amino acids, glycosides, saponins, flavonoids, lignans, and anthraquinones. The root of *S. lappa* is used in traditional

system of medicine to treat ulcer, convulsion, arthritis, jaundice, and fever. The roots of *S. lappa* have a strong and sweet aromatic odor with a bitter taste. It acts as stomachic, diaphoretic, expectorant, stimulant, and tonic and is used in controlling fever, piles, flatulence, snake bite, bronchial asthma, and as an antiseptic. Preparations made from this species are also reported to cure various diseases and conditions including scalp dermatitis, acne, piles, psychiatric diseases, cough, paralysis, asthma, deaf, tridosha, hysteria, and headache.<sup>[31]</sup>

### ***Withania somnifera* (L.) Dunal (Indian Ginseng)**

It is an important perennial plant species, roots are stout, long tuberous, fleshy, whitish-brown which belongs to the family of Solanaceae. Phytochemicals are withanolides withanine, withanolide D, withaferin A, and coumarins. Flavonoids, phenols, reducing sugars, tannins, glycosides, and terpenoids are available. The root acts as febrifuge, diuretic, stomachic, alterative, aphrodisiac, and tonic sedative and also it is used in traditional medicine to treat arthritis, fever, edema, skin disorders, tuberculosis, severe pain, anemia cancer, sexually transmitted diseases, and tuberculosis.<sup>[32]</sup>

## **Rhizome as Medicine**

### ***Alpinia galanga* (L.) Wild. (Greater Galangal)**

It grows from rhizome underneath the ground which belongs to the family of Zingiberaceae. The phytochemical analysis of its rhizomes indicates that it consist with campheride, galangin, Alpinin, 1, 8-cineol,  $\alpha$ -fenchyl acetate,  $\beta$ -bisabolene,  $\beta$ -Sitosteroldi glucoside, and p-hydroxycinnamaldehyde. It has many pharmacological activities such as stomachic, carminative, aromatic, febrifuge, antidiabetic, anti-inflammatory, antioxidant, antimicrobial, and anti-tumor activities. In the traditional medicine, it is widely used to treat eczema, bronchitis, cough, sinusitis, scalp dermatitis, spasmic convulsion, hypertension, gastritis, ulcers, pityriasis versicolor, and cholera.<sup>[33]</sup>

### ***Alpinia officinarum* Hance. (Lesser Galangal)**

The rhizome is very prominent and aromatic it is reddish brown in white externally but internally reddish in white. It belongs to the Zingiberaceae family. In a liquid chromatography–mass spectrometry analysis of the extract revealed that it consists with oxyphyllacinol, apigenin, hannokinol, pinocembrin, and hexahydrocurcumin, the pharmacological actions of this plant are antidiabetic, anti-oxidant, antiulcer, antidiarrheal, anti-inflammatory, anticoagulant, and analgesic effect. The rhizomes are often utilized for the treatment of cold, ulcers, diarrhea, and stomach aches in traditional medicine.<sup>[34]</sup>

### ***Acorus calamus* L. (Sweet flag)**

It is also known as sweet flag which belongs to the family of Acoraceae. The extract has many phytochemical constituents

such as acorin, acoretin, calamine, cisisoelemicine,  $\beta$ asarone, calamen, calamenol, calamendiol, -deca4, 7dienol, Pcymentene, 2, 4, 5trimethoxy benzaldehyde, and  $\beta$ asarone. This rhizome exerts the pharmacological actions are stimulant, stomachic, anti-periodic, carminative, nauseant, emetic, disinfectant, and germicide, and also it is used in traditional system of medicine to treat inflamed joints, swelling, pain, and digestive ailments such as abdominal pain and flatulence.<sup>[35]</sup>

### ***Curcuma aromatica* Salisb. (Wild turmeric)**

*C. aromatica* has an aromatic yellow rhizome with many sessile tubers which belongs to the family Zingiberaceae. Phytochemical analysis of the study revealed that *C. aromatica* contained with 1,8-cineole, germacrone, isoborneol, camphene, and camphor. It has many pharmacological actions such as antidiabetic, antimicrobial, antihepatic, carminative, antiproliferative, antioxidant, antidiarrheal, and anti-inflammatory properties. In traditional medicine, it is used to treat bronchial complaints, pneumonia, dysentery, infectious wounds, diarrhea, and insect bites.<sup>[36]</sup>

### ***Curcuma longa* L. (Turmeric)**

This is an herbaceous, perennial plant belongs to the family Zingiberaceae. The phytochemical analysis of rhizome indicates the constituents such as digalloyl-hexoside, coumaric acid, isorhamnetin, disdemethoxy curcumin, caffeic acid, sinapic acid, and demethoxy curcumin. It has a wide range of pharmacological actions such as antioxidant, aromatic, carminative, stimulant, hepatic tonic, anti-inflammatory, antimicrobial, anticancerous, and anti-clotting actions. Conventionally, it is used for the treatment of inflammation, infection, hepatic disorders, wound, edema, insect bite, acute coryza, leukorrhea, sinusitis, gastric disorders, and blood-related disorders.<sup>[37]</sup>

### ***Curcuma zedoaria* Rosc. (White turmeric)**

It is a rhizomatous herb belongs to the Zingiberaceae family. *C. zedoaria* is a rich source of essential oils, starch, curcumin, arabin, gums, furanodien, furanodienone, zedorone, curzerenone, curzeone, germacrone, 13-hydroxygermacrone, dihydrocurdione, curcumenone, and zedoarone diol. Rhizome acts as rubefacient, carminative, digestive, expectorant, demulcent, diuretic, and stimulant properties. It is used traditionally for the treatment of menstrual disorders, dyspepsia, flatulence, dyspepsia, cold, cough, rheumatism, deep wound, jaundice, halitosis, liver diseases, peptic ulcer, and fever.<sup>[38]</sup>

### **Bulb as Medicine**

#### ***Allium cepa* L. (Onion)**

It is widely grown vegetable crop belongs to the family Alliaceae used for daily human consumption all over the world which is one of the most important vegetables

spice and main ingredient of many foods. *A. cepa* contains thiosulfinate which has an efficient antimicrobial activity against a wide range of microorganisms. The bulb also contained with essential oils, sulfides, catechol, and protocatechoic acid. The HPLC analysis of *A. cepa* indicates five major phytochemical constituents of it such as ferulic acid, gallic acid, protocatechoic, quercetin, kaempferol, flavonoid, and glycosides. These phytochemical constituents have many pharmacological activities such as antispasmodic, expectorant, carminative, hypoglycemic, and diuretic. It is used in the treatment and prevention of many diseases such as arteriosclerosis, diabetes, and acute coryza.<sup>[39]</sup>

#### ***Allium sativum* L. (Garlic)**

*A. sativum* is a perennial erect flowering stem plant growing from a bulb, is an important vegetable, for its culinary and medicinal properties. It belongs to the family of Alliaceae. Majority of the scientific literature suggests that most of the medicinal benefits of the bulb of garlic due to its phytochemical constituents such as Allinin, S-allyl-mercapto cysteine, diallyl disulfide, cysteine sulfoxide, diallyl trisulfide, and vinyl dithiols. Bulb of *A. sativum* has many therapeutic and pharmacological activities such as antifungal, antibacterial, antiviral, antioxidant, anti-atherosclerotic, and anti-cancerous activities. Garlic has many therapeutic benefits such as regulation of blood pressure, lowering blood glucose level, antimicrobial action, enhancer of immunity, and regulation of cholesterol levels. In the traditional system of medicine, it is utilized for the treatment of all types of arthritis, rhinitis, allergies, whooping cough, fever, headache, pre-eclampsia, infections, gout, and ulcer.<sup>[40]</sup>

#### ***Urginea indica* (Kunth.) (Indian squill)**

It belongs to Liliaceae family, is a perennial herbaceous flowering plant which grows from bulb. Phytochemical constituents are flavonoids, carbohydrates, glycoproteins, coumarins, steroids, alkaloids, tannins, and saponins but chiefly glycosides, scillarin-A, and scillarin-B. The pharmacological actions attributed to *U. indica* are anthelmintic, cardiostimulant in heart insufficiency, deobstruent, digestive, expectorant, stomachic, diuretic, emmenagogue, and purgative. Its bulbs are excellent source of medicine with pharmaceutical and therapeutic applications chiefly used in chronic bronchitis, asthma, calculous, paralytic affections, rheumatism, leprosy, skin diseases, scabies, cancer, expectorant, cardiac stimulant, hypertension, dyspepsia, arteriosclerosis, edema, dropsy, allergies, gout, and wound healing.<sup>[41]</sup>

### **Corm as Medicine**

#### ***Amorphophallus paeoniifolius* (Dennst.) (Elephant foot Yam)**

*A. paeoniifolius* is deciduous herbaceous aroid shrub with no apparent stem above ground which belongs to Araceae family. Chemical constituents are alkaloids, flavonoids,

phenolics, tannins, and sterols which play a key role to boost up body defensive mechanism in human beings. Proximate composition reveals the presence of carbohydrate, lipid, protein, contains thiamine, niacin, carotene, folic acid, sterols and  $\beta$ -sitosterol crude fiber, and Vitamin C. Sodium, potassium, calcium, and iron are the minerals found in the various parts of this plant. Culinary and medicinal purpose the corm of the plant is used. *A. paeoniifolius* are cooked as vegetables and frequently prescribed to the patient suffering from hemorrhoids, rheumatism, constipation, trauma, injury, and wound healing activity. Root is traditionally used for the treatment of skin eruption, gastric ulcer, asthma, headache, swelling, excessive expectoration, lymph tuberculosis, chronic bronchitis, vomiting, cough, pyogenic sore throat, abscess, diarrhea, dysentery, and menstrual disturbances.<sup>[42]</sup>

## CONCLUSION

Many medicinal herbs have been reported the highest potential to heal health-related illnesses. From the above systematic review, the crude drugs obtained from underneath the soil surface are highly therapeutic value storage root stock. These are natural resources used to regain mal functioning of the body which was imbalanced by any harmful agents. The available literature regarding the chemical constituents and pharmacological properties of these root stock are really awesome. Hence, it is concluded that this review will enrich knowledge regarding the phytochemical composition as well as the therapeutic value and pharmacological aspects of different types of root stock used in traditional system of medicine. It is very much evident in this research analysis, there are plenty of phytochemical constituents present in root stock used in traditional medicine which have highest therapeutic effects.

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