

Ethanobotanical Knowledge of Liliaceae Family: A Review

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Abstract:

The purpose of this review is to discuss pharmacological and traditional therapeutic properties on *Aloe bardadensis*, *Allium cepa*, *Allium sativum*, *Asparagus officinalis* and *Allium porrum* contribute to many folk and ancient medicaments because of its properties of anti-diabetic, antipyretic, anti-inflammatory, anti-oxidant, wound healing, anti-scar, anticancer, antiparasitic, analgesic effects. Now a days aloe vera gel is used to treat sunburns. Onion shampoos are a rich source of antioxidants. Their antimicrobial nature treats dandruff, irritation, and other scalp problems. The sulfur in the onion helps maintain thick hair, reduce hair loss, and boost hair development. This review article discusses the importance of the medicinal plants of Liliaceae in therapeutics, such as the use of the plant's crude extract to treat a variety of diseases, morphology, growth constraints, biochemical composition, biological activities, research work done, project sanctioned to this plant species, and the prospects of this important neglected plant species for research in the field of plant tissue culture and natural products.

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I. Introduction:

Herbs have been used for medicinal and health purposes for over a thousand years. Herbal preparations are often used to provide first-line and basic health products [1]. However, interest in and consumption of herbal medicines are rapidly increasing in regions where modern medicine has been popularized recently [2]. Herbal products of traditional and modern medicine are generally accepted by the general public as being well tolerated and free of serious side effects. On the other hand, like all medicines, herbal products must be of the proper quality, safe and effective. Herbs are as old as mankind. The link between finding drugs in humans and in nature has a long history. Vigilance against medicinal plant prescriptions is the result of years of struggle with disease as man has learned to pour medicine from different parts of fruiting bodies, vegetables and seeds or herbs. In fact, herbal preparations have grown popularity in the recent years and are now used by a diverse population [3]. Herbal preparations are complex mixtures of various organic substances obtained from the raw or processed parts of herbs, consisting of stems, flowers, roots, leaves, and seeds. Under the current law, medicinal plants are recognized as food supplements that require safety like pharmaceuticals, while plants are often considered 'natural', so they are safe but have many side effects. Found due to active ingredients, contaminants, or some drug interactions [4]. The family Liliaceae contains 610 species and 15 families of flowering plants in the order Liliales [5]. They are perennial, herbaceous, and frequently bulbous monocotyledonous ground plants. Despite their genetic resemblance, this family of plants has experienced significant phenotypic diversification. Large flowers that are divided into three sections are typical features. A superior ovary, six stamens, and two whorls of six coloured or patterned perianth petals are all present. Linear in shape, the veins on the stem are typically found singly or alternately along the margins of the leaves. Despite some having rhizomes, most species grow from bulbs. About 68 million years ago, during the late Cretaceous to early Paleogene epoch, this family began to emerge. Insects pollinate the blooms of the lilac family, which is extensively dispersed, primarily in the temperate zones of the northern hemisphere. Numerous Liliaceae are significant ornamental plants that are widely grown for their lovely flowers and used in extensive floriculture for dry bulbs and cut flowers. Some species are poisonous when consumed and can harm both humans and animals' health. There are many species of the Liliaceae family that are commonly planted in both public and private settings. Particularly valuable as ornamental and symbolic elements, lilies and tulips frequently show in decorative arts and paintings. It is also a significant commercial item. In some areas, wild and domesticated deer pose a large herbivore threat to most of the genus, particularly lilies [6].

II. Review of Literature:

Aloe Baradensis: The plant has many seed-bearing fruits, golden tubular flowers, and triangular fleshy leaves with serrated margins. Three layers of her make up each leaf. A transparent inner gel with 99% moisture that is balanced in terms of glucomannan, amino acids, lipids, sterols, and vitamins. Anthraquinones and glycosides can be found in the bitter yellow sap that makes up the central layer of latex. The cortex is a thick layer of 15–20 cells that serves as a protective barrier and produces proteins and carbohydrates. Vascular bundles located within the epidermis are in charge of moving materials like water (xylem) and starch(phloem) [7]. It consist some active components such as vitamins, minerals enzymes, Anthraquinones, Fatty Acids, and Hormones [8]. Following topical and oral administration of *aloe barbadensis*, glucomannan, a high mannose polysaccharide, and gibberellin, a growth hormone, engage with growth factor receptors on fibroblasts to stimulate fibroblast activity and proliferation [9]. It not only increased the amount of collagen in the wound, but also changed the composition of the collagen and raised the level of collagen cross linking, sped up the healing process and improved the scar tissue's fracture resistance [10]. After receiving oral or topically applied treatment, it has been noted that the granulation tissue of healing wounds produces more hyaluronic acid and dermatan sulfate. [11]. According to some reports, *Aloe bardadensis* can prevent skin harm from radiation [12]. Although the precise function of *aloe bardadensis* gel is unknown, it causes the skin to create the antioxidant protein metallothionein, which eliminates hydroxyl radicals and prevents the inhibition of glutathione peroxidase and superoxide dismutase in the skin. To avoid the suppression of delayed-type hypersensitivity by ultraviolet rays, it decreases the production and release of immunosuppressive cytokines generated from skin keratinocytes, such as interleukins [13]. By blocking the cyclooxygenase pathway, *Aloe barbadensis* lowers the amount of prostaglandin E2 produced from arachidonic acid. Recently, a novel anti-inflammatory compound known as c-glucosyl chromone was discovered in a gel extract. It has anti-inflammatory properties due to the anthraquinones present. [14]. Six antimicrobial compounds, such as sulfur, urea nitrogen, salicylic acid, cinnamic acid, phenol, and lupeol are present in *aloe barbadensis*. They all have an inhibitory impact on viruses, bacteria, and fungi. It includes natural anthraquinones, which have shown to inhibit *Bacillus subtilis* and *Mycobacterium tuberculosis* in vitro [15]. Mucopolysaccharides aid in the skin's ability to retain hydration. Aloe increases skin elasticity and minimizes wrinkles by stimulating fibroblasts to create collagen and elastin fibers. Additionally, zinc works as an astringent to close pores, while amino acids ease brittle skin cells. Gel mitts have enhanced skin elasticity and diminished fine lines and erythema. They also aid in acne prevention [16].

EP0919220A2, discloses about the hair treatment formulations, hydrogen peroxide, an ingredient chosen from silica gel, silicic anhydride, and mixtures thereof, as well as a negligibly small quantity of *aloe vera* gel, are used as colouring, conditioning, bleaching, and conditioning components. To dissolve the *aloe vera* plant's active component, soak one or more leaves in the mixture for at least 12 hours prior to use. Remove any undissolved residue. 20 volumes of hydrogen peroxide and an equal volume of water make up a favoured formulation. The mixture is also used to cure eczema and other skin conditions like rashes. Similar mixtures can also be mixed with one or more herbs to create a skin-applied remedy that promotes health [17]. Along with **US7033620B2**, discloses about the compound and procedure for preserving *aloe vera* gel are made known. The method involves heating the *aloe vera* gel quickly to a temperature between 35 and 80 degrees Celsius, adding one or more stabilizing antioxidants to the heated gel, and then quickly cooling the heated gel. Heat the *aloe vera* juice to a temperature between 20 and 30 degrees Celsius. Examples of stabilizing antioxidants include rosmarinic acid, polyphenols, a tocotrienol/tocopherol blend, or any combination of these [18]. Moreover **CN1067861C**, The current invention discloses a food (food made from aloe flour) and a method of producing it. The ingredients used to create flour pastries, such as bread and biscuits, in the current creation include bread flour, eggs, black sesame, desiccated coconut, cassia pulp, jujube and wolfberry fruits, sugar, table salt, cream or edible vegetable oil, and fresh fruit juice. Aloe leaves older than three years are also added, along with fresh liquid that has just been squeezed from them. After being regularly consumed, the aloe flour food of the current invention has effects on health care, disease prevention, treatment, etc. to human bodies and has the functions of facial beautification, stomach reinforcement, ageing prevention, increase in body immunity, and resistance to various diseases [19]. Additionally **CN103432021A**, discloses about the invention reveals an *aloe vera* skin cream. 0.3-0.7 parts *aloe vera* oil, 0.4-0.6 parts lanonol, 8-12 parts isopropyl lauroyl sarcosinate, 6-10 parts glycerin, 2-3 parts C22H41N2O5, and 50-80 parts water make up the *aloe vera* skin lotion by weight. The skin can be successfully nourished by the *aloe vera* skin cream unveiled by the invention because it has antimicrobial, moisturizing, whitening, and anti-aging properties [20]. Along with **US20030217416A1**, discloses about the glove, garment, slipper, or shoe made of leather that has been re-tanned using *aloe vera*. The leather contains fiber-matrix-filled tanned leather. During the retanning process, an *A. vera* powder of *A. vera* particles in a gel carrier is infused into the tanned leather so that the *aloe vera* particles in the gel carrier enter the internal fiber matrix and are momentarily trapped there. The *A. vera* particles in the tanned leather eventually release through the leather's inside surface contact, lubricate and treat the skin of a wearer of the glove, garment, sandals and shoes [21].

Allium Cepa: One adaptable ingredient that is frequently used in Indian cuisine is onion. It has significant health repercussions and has long been eaten for its purported nutritional and health benefits [22]. It is a widely used, easily absorbed aromatic plant. It is known as Pyaj in Hindi and also goes by the titles Bulbus, white Onion, Garden Onion and Common Onion. It is the *Allium* variety that is most commonly grown. Onions are produced for food both annually and biennially. The plant has flattened fan-shaped bands on its yellow-green leaves and grows to a height of 15–45 centimeters (6–18 inches). The onion plant's inflorescence is spherical in form and has white flowers with six petals. The cross-section of the seeds is triangular and they are shiny black [23]. Various components are present in *allium cepa* such as Protein, Vitamin c, Calcium, Iron, Magnesium, and Phosphorus [24]. Diabetes and its consequences are treated with onions [25]. In obese Zucker diabetic rats, it has anti-obesity benefits [26]. Consuming uncooked red onions frequently helps women lose weight and dissolves fat [27]. Onion soup is used in the management of type 2 diabetes and other lifestyle disorders. [28]. Red onion *A. cepa* can cause hypoglycemia in people with type 1 and type 2 diabetes. [29]. Ayurvedic remedies for healing wounds frequently call for onions [30]. Additionally, it has been demonstrated to be biologically efficient in preventing median sternal wounds in individuals under the age of 18 [31, 32]. Its extract is used to treat keloids because it has demonstrated therapeutic effectiveness on human skin fibroblast cell line [33]. The biological effectiveness of onion skin extract in preventing keloid and hypertrophic scars was demonstrated [34]. Additionally demonstrated to prevent presternal hypertrophic fibrosis is onion extract gel [35]. Additionally, it is utilized in topical modalities for the surgical management of keloids [36] as well as for the therapy and prevention of post-operative hypertrophic scars. Hypertrophic skin lesions can be healed with *A. cepa* allantoin-pentaglycan gel [37]. Postoperative scars and burn scars can look better cosmetically thanks to it [38]. For tattoo eradication, allantoin gel, heparin, and onion extract are used [39]. Onion extract is applied topically as a therapy for postoperative scars [40]. Scars from burns become more elastic when treated with onion salve. In rabbit ear models, *cepan* cream is used to heal burn scars and hypertrophic scars [41]. Both *In vivo* and *In vitro*, quercetin and onion extract stimulate MMP1. [40]. Six different tumour cells are unable to proliferate due to organosulfur chemicals present in *A. cepa* [42]. Allium contains the flavonoid quercetin, which is recognized as a powerful anti cancer compound. It contains the power to prevent the proliferation of different cancer causing cells. Intake of allium vegetables, like garlic, has been reason to an increased risk of having prostate cancer [43]. Quercetin, the primary flavonoid present in onions, has a number of medicinal advantages, including an anticancer effect. Quercetin stops the invasion and spread of human SAS oral cancer cells by inhibiting the MMP2 and NFKB signaling pathways [44]. The flavonoid family member Quercetin, has been discovered to possess a number of antitumor characteristics. It results in the planned death of many individuals with invasive pleural mesothelioma in humans [45]. By delaying cell cycle progression and/or inducing apoptosis, onion constituents such as, S-allylmercaptocysteine, and ajoene can inhibit the proliferation of a broad range of cancer cells [46]. In mice infected with *Cryptosporidium parvum* schistosomiasis, onion oil has been found to be efficacious. The effectiveness of *A. cepa* oil in preventing bug infestations has been demonstrated. The nematode, a tiny parasitic soil worm that results in swollen, deformed leaves, is successfully fought off by onions [47]. By blocking tear factor synthase, onions are used as antidepressants [48]. In a rat behavioral model of melancholy, onion powder has effects that are similar to those of antidepressants [49]. Fresh onion juice has a stronger impact on inflammation and can reduce both acute and chronic pain and inflammation [50]. The customary Indian spices that have a significant positive impact on health include onion. Antioxidant activity of an aqueous preparation of *A. cepa* [49]. Red and white *A. cepa* strains demonstrated antioxidant activity [51]. Antioxidant properties of quercetin-3'-O-beta-D-glucoside extracted from *A. cepa* [52]. Onion peel and flesh both boost the antioxidant state of old rats [53]. In comparison to conventional medications, S-methyl cysteine sulfoxide isolated from onions had anti-diabetic and antioxidant effects in rodents with alloxan diabetes [54]. In diabetic rats caused by streptozotocin, raw onion has antithrombotic effects. Human cells with diabetes are shielded from DNA oxidation by dietary flavonols [55].

US7588784B2, discloses about the both potent platelet inhibitors and coagulation regulators can be found in onions. Clinical, *In vivo*, and *In vitro* studies have shown that the effectiveness of routinely consumed onions far outperforms the effectiveness of all other currently available modalities in terms of impacts on coagulation and platelet function. Also, as will be discussed further in this application, onion chemicals have particular impacts. As a result, the use of onion extract is advised for the prevention and treatment of acute and chronic cardiac and vascular complications, as well as the effects of those complications, for the prevention and treatment of thrombosis, embolism, and a variety of heart diseases and arrhythmias, for the treatment and to dissolve hematomas [56]. Along with **2WO2004069262AB**, discloses about the patch of the present invention has a layer composition that includes a backing liner, a matrix layer made of onion extract, acrylate-based polymer, or thermoplastic hot melt adhesive, and a release liner. The matrix layer is sandwiched between the backing liner and the release liner so that the backing liner and the release liner contact the matrix layer on opposite sides of the patch [57]. Moreover **WO2012131730A3**, discloses about the herbal mixture made up of garlic, onion, and *Peucedanum grande*. The mixture is effective in treating coccidiosis and enhancing the wellbeing of chickens. It has positive effects on the digestive system, according to research. Here, composition-making processes are also

discussed. The method for making the poultry supplement and medicine is also a part of the invention [58]. Along with **US5885581A**, discloses about the ointment to reduce the presence of scars. Which contains polyethylene glycol, preservatives, sorbic acid, allantoin, xanthan gum, and liquid onion extract (*Allium Cepa*). Which is dermatologically acceptable aqueous [59]. Moreover **US9700576B2**, discloses about the current invention pertains to fibre compositions that contain soluble fibre and fibre derived from onions. The invention also pertains to food items that contain said fibre compositions. Another element of the innovation deals with the techniques for obtaining the fibre compositions as well as the cosmetic and therapeutic applications of those compositions for the management and prevention of metabolic disorders, colon cancer, and bowel inflammation [60].

Allium Sativum: Garlic, is one of the earliest cultivated vegetables. It is the most extensively studied medicinal plant and has been used as a spice, food, and traditional medicine for more than 4000 years [61]. Garlic is mentioned in several therapeutic formulas as a successful treatment for a range of illnesses, including heart issues, headaches, worms, and tumors [62]. Lung and digestive conditions were treated with garlic consumption [63]. Garlic has a long history of use in India as an antiseptic lotion for treating cuts and ulcers. Garlic was applied to troops' wounds during World War II [64]. Human rhinovirus type 1 and type 2 as well as coxsackievirus species, herpes simplex types 1 and 2, influenza B, para-influenza virus type 3, vaccinia virus, and vesicular stomatitis virus have all been shown to be susceptible to the antiviral effects of garlic and its sulfur-containing compounds. Ajoene, allicin, allyl methyl thiosulfinate, and methyl allyl thiosulfinate were the chemicals in garlic that showed the greatest virucidal activity, while alliin, diallyl disulfide, and diallyl trisulfide showed no activity. Garlic is an effective therapy for both the influenza B virus and the herpes simplex virus, according to several laboratory studies. Garlic has been shown to be able to shield living things from the influenza virus, according to two separate studies conducted in Japan and Romania [65]. Many herbalists around the world recommend garlic as a treatment for intestinal parasites. In some cultures, children with helminth infestations are managed with crushed garlic enemas. One of the traditional Chinese medical treatments for intestinal ailments is an alcoholic extract of crushed garlic cloves. The anti-parasitic properties of allicin are effective against major human gut parasites like *Entamoeba histolytica*, *Ascaris lumbricoides*, and *Giardia lamblia* [66]. Allicin is highly toxic to the human intestinal protozoan parasite *Entamoeba histolytica*, as only 30 g/ml of allicin totally stops amoeba cultures from growing. Allicin was also found to suppress 90% of the virulence of *E. histolytica* trophozoites at lower concentrations, which was demonstrated by their inability to in vitro destroy mono-layers of tissue-cultured mammalian cells [67]. Garlic inhibit the *Trypanosoma brucei* trypanothione reductase irreversibly and it decrease the mitochondrial membrane potential in trypanosomes. The use of garlic extracts to prevent the growth of cancerous cells in the human stomach, liver, and other organs is thought to be effective in the presence of recognized tumor promoters and sulfurous components found in garlic [68]. The organosulfur compounds in garlic have an anticancer impact and work by inducing phase II detoxification enzymes. It's conceivable that diallyl disulfide and diallyl trisulfide play a significant role in garlic's ability to fight cancer [69]. Studies have shown a wide range of antioxidant and radioprotective effects of garlic extract and its different constituents. They have been demonstrated to shield liver cells from lipid peroxidation, arterial endothelial cells from oxidant injury, and white blood cells from radiation damage. They have also been shown to strengthen cellular antioxidative enzyme systems. They have been demonstrated to remove hydrogen peroxide, prevent the development of TBA-RS, safeguard the heart from cardiotoxic effects of the anticancer medication doxorubicin, and shield the kidneys from the antibiotic gentamicin. [70]. Natural antioxidants found in garlic have been shown to be able to decrease lipid peroxides, reactive oxygen species (ROS), and low-density lipoprotein (LDL) oxidation. [71]. For those seeking to improve their cardiovascular health, garlic is a popular supplement that is widely regarded as a healthy option. 30% of cardiovascular patients who use herbal supplements and 4% of all cardiovascular disease patients both consume garlic [72]. Inflammation, high cholesterol, high homocysteine, high blood pressure, diabetes, and dementia, including its most prevalent version, Alzheimer's disease, are all recognized risk factors for cardiovascular disease. In fact, numerous studies dating back to the 1920s and 1930s have shown the positive impacts on the cardiovascular system. It is well known that garlic can scavenge free radicals, boost levels of superoxide dismutase, catalase, glutathione peroxidase, and glutathione, prevent lipid peroxidation, and reduce inflammatory prostaglandins. [73].

WO2008004121A2, discloses about the current invention relates to compositions and methods for the prevention, treatment, or management of osteoporosis or a condition marked by increased bone resorption. One such method involves giving a mammal in need of such treatment an extract from the garlic plant, which has both prophylactic and therapeutic benefits. The composition is a single extract or a combination of extracts, and the mammal is ideally a human. The invention also pertains to isolated extracts of garlic plants, their preparation, medications containing such extracts, and the use of such extracts and other ingredients in the manufacture of pharmaceuticals. The method of making garlic plant extracts is another aspect of the innovation [74]. Along with **WO2004069262A8**, discloses about the treatment and prevention of hypercholesterolemia, atherosclerosis, hyperlipidemia, and hypertension in mammals, the current invention pertains to a herbal composition. A

synergistic combination of three plant extracts *Commiphora mukul*, garlic, and *Curcuma longa* make up the composition [75]. Moreover **WO2010098649A1**, discloses about the current invention pertains to a botanical insect repellent composition that contains 8 to 25% humic acids and diluents, as well as 75 to 92% garlic extract (*Allium sativum*). The composition should ideally comprise 13% humic acids and water, and 87% aqueous garlic extract. These percentages provide greater than 70% control efficacy for adults, greater than 60% control effectiveness for pupae, and greater than 60% control effectiveness for eggs of whiteflies (*Bemisia tabaci*) in pumpkins (*Cucurbita pepo*). An adequate proportion in terms of the ability to effectively control pest insects that harm crops is provided by the aqueous garlic extract concentration of 87%, which is obtained through maceration [76]. Along with **US20050112393A1**, discloses about the stabilized garlic extracts are used as a wood treatment technique and solution to slow or stop the development of common fungi on wood products. Workers, customers, and the environment are all secure from harm from the garlic extracts used to treat the wood. Garlic extracts are also thought to be effective at preventing the growth of mould and mildew on nonporous domestic surfaces and other organic substrates [77]. Moreover **CN103027158A**, discloses about the preparation technique for garlic coffee beverages and a byproduct thereof are the subject of the invention. The stages in the method are as follows: chopping up garlic, adding it to freshly made coffee, blending, and evenly stirring. The final product not only has the typical properties, effects, and flavors of coffee but also has a distinct flavor of garlic; crushed garlic is added to coffee that has been brewed with boiling water to create a distinctive fragrance. According to experimental findings, a large number of people are happy to consume garlic coffee, and the conventional wisdom that garlic has an unpleasant odour that interferes with social relations and the like has been disproved. Off-flavor compositions in the garlic are transformed to an acceptable state by the mixture of coffee compositions and the appropriate temperature [78].

Asparagus officinalis: *Asparagus* is primarily grown for sustenance, and only the spear-shaped, extremely young shoots are consumed. It has also been, and continues to be, used as a source of therapeutic bioactives, along with other species that are linked to it. The crop has a long and varied history because it has been harvested and grown from thousands of years by numerous historical civilizations, including ancient Greeks, Egyptians, and Romans. Although it is unclear whether the plant was used at the time as food or medicine, its offering appearance is first sign of its use which is depicted on an ancient Egyptian frieze. There are numerous allusions to its use as food and medicine in ancient Greece and Rome. Although it is known for been cultivated in The French monasteries in middle of the fifteenth century, it didn't appear in Germany and England until a century later. In the middle of the nineteenth century, introduced much later to North America. It is now widely consumed all over the globe. Additionally, Traditional Chinese Medicine practices still acknowledge its possible healing abilities [79]. In the past, the roots have been used to treat non-specific inflammatory diseases of the efferent urinary tract as well as to prevent dropsy, kidney and bladder stones, rheumatic illnesses, bronchial asthma, liver disease, and gout. The root was additionally employed in Chinese medicine to treat constipation, dry mouth and tongue, bloody coughing, and irritable cough [80]. *Asparagus officinalis* also contained amino acids, fructans, ferulic acid, flavonoids, and acrid steroid saponins like asparagoides A, B, D, F, G, H, and I. According to dry weight, asparagus had the highest antioxidant activity out of 23 frequently consumed vegetables [81]. Rutin, which made up 60–80% of the overall phenolic content of the purple and green asparagus extracts, is the most prevalent known flavonoid in asparagus [82]. According to the "5 a day" campaign being run in the United States, the United Kingdom, and other European nations, a substantial daily fruit and vegetable consumption is thought to be necessary for a healthy diet. In addition to nutritionists and medical experts, a growing number of people are becoming increasingly interested in the properties and potential health benefits of foods, particularly the fruits and vegetables which are consumed and the way they are prepared. Consuming *A. officinalis* spears contributes greatly to a healthy diet because they are low in calories, high in fiber, and abundant in vitamins, antioxidants (see above) [83]. Additionally, given the potassium concentration of asparagus, its mineral content makes it useful for certain patient type, like those with the hypertension [84]. The flavor of the asparagus can be contentious; some people adore its subtle variety of bitter flavors, while others find its sometimes strange vegetal tang repulsive. The flavor of typical asparagus is crucial to its marketing. As opposed to its green cousin, white asparagus is typically thought to have more delicate and milder flavor [85]. When in the season (April end to mid of June in Europe), asparagus, which is regarded as a elegance of the vegetable world, serves as the primary component in a number of dishes, in traditional food and haute cuisine dishes both. ingredients used in a variety of dishes, including both conventional and haute cuisine dishes. Unoaked Sauvignon Blanc like grassy white wines like have been compared to asparagus in reports of its fragrance [86].

US6994874B2, discloses about the, skin lightening formula contains an extract of asparagus that was made by exposing the vegetable to two or more solvents with varying solvent concentrations in succession. To acquire the extract, separate use of the asparagus root and shoot is possible. The mixture may also contain one or more ingredients that are suitable for use in cosmetic products and can be applied topically to human flesh. A topical application of a composition containing an asparagus extract obtained by sequentially subjecting asparagus to two

or more solvents of varying solvent strengths to the skin is one way to inhibit the production of melanin [87]. Along with **CN104222340A**, discloses about the method of treating the off-putting scent of asparagus tea. The following processing stages are a part of the processing process: Taking the female stalks of green *asparagus* that have been growing for 21–23 days and selecting them, then washing the picked *asparagus* in a washing machine to eliminate impurities like soil. the asparagus's surface; drain, or allow the *asparagus* to dry naturally in a cool place; slice the asparagus into pieces with a thickness of 1 mm to 3 mm; perform fixation; cool, or immediately place the fixed asparagus slices in a temperature range of -8 °C to -2 °C, until the asparagus slices are cooled to 0 °C; ferment, or ferment in a fermentation box at -5 °C to -8 °C for 10 days [88]. Moreover **CN104365314A**, discloses about the current innovation pertains to a technique for determining asparagus's thrips resistance and falls under the technical category of determining plant insect resistance. The process starts with the identification of the basic materials for asparagus, followed by the acquisition of insect grafting cages, a source of thrips, and then the fourth steps of artificial insect inoculation, observation, and statistics. The technique can represent the thrips resistance of examined asparagus materials in a subjective, thorough, and accurate manner. The approach is simple to use, workable, affordable, highly operable, and exceptionally practicable. Lay the groundwork for integrating the management of asparagus thrips and insect resistance, and simultaneously screen asparagus reproductive material and insect resistance [89]. Along with **CN105613620A**, discloses about the following components, listed in weight order, are used to make a pure plant extraction organic pesticide, according to the present invention a bamboo vinegar liquid, wood vinegar liquid, tobacco stem extraction liquid, *tagetes patula* extract, *ageratum conyzoides* extract, *cephalotaxus fortunei* extract, *asparagus officinalis* extract, rotenone, pesticide emulsifier, and alcohol are included. The preparation process is straightforward, the raw materials used are simple to acquire, pollution-free, and safe for both people and plants, according to the current invention [90]. Moreover **US8895075B2**, discloses about the current invention describes a herbomineral composition for the treatment of sickle cell disease. In order to achieve synergistic anti-sickling action, the herbo mineral composition combines herbal ingredients like Pippali, Dadima, Jivanti, Guduchi, Haritaki, Shatavari, Sunthi, and Jaiphal, with therapeutic minerals like Loha Bhasma and Abrakha Bhasma in the proper concentrations. At different concentrations, the composition showed anti-sickling action on RBCs *In vitro*. Most of the serious symptoms of sickle cell disease and sickle cell anemia were relieved in patients treated with this medication, and their quality of life significantly improved [91].

Allium Porrum: Since prehistoric times, allium vegetables have been used as folk medicine. Onions are the most popular variety of the 500 or so species in the *Allium* genus. These species have been used These plants have been used for their medicinal benefits as well as their pungency and flavoring value for millennia.[92] *Allium* plants are known for being abundant sources of secondary compounds with intriguing biological properties. Leeks taste mildly fragrant and oniony [93]. The plant contained betacyanins, anthocyanins, flavonoids, quinine, glycoside, cardiac glycoside, phenols, terpenoids, steroids, coumarins, alkaloids, saponins and tannin according to a phytochemical analysis. The greatest positive reaction is shown by ethanol and acetone leaf extract, which is followed by other solvents like chloroform, petroleum ether, and aqueous extract [94]. The phenolic compounds were extracted from a homogenised plant substance using an ethanol/water (70/30) solvent. (10.0 g). The cleaning process took place in a Branson B-220 Ultrasonic Bath and lasted an hour at room temperature. The extraction yield was calculated using 5 mL of the liquid extract following filtration. The solvent was eliminated using a rotary evaporator and a vacuum, after which it was dried at 60°C to a constant bulk. To avoid oxidative damage, dry extracts were kept in glass vials at 4°C until analysis [95]. The overall antioxidant activity of the vegetable extracts was evaluated using the phosphomolybdenum method. The assay is based on the formation of a green phosphate/Mo (V) complex at pH levels below 7 and the following reduction of Mo (VI) to Mo (V) by antioxidant compounds. 0.3 mL of the sample extract and 3 mL of the reagent solution were mixed altogether. (0.6 sulfuric acid, 28 mM sodium phosphate and 4 mM ammonium molybdate). The reaction solution-filled containers underwent a 90-minute incubation period at 95°C [96]. Flavonoids, particularly kaempferol, are abundant in leeks. Flavonoids may have anti-inflammatory, anti-diabetic, and anti-cancer properties in addition to being antioxidants. These leek health advantages will need to be supported by further human study. Leeks contain a lot of vitamin K, which may reduce the risk of osteoporosis. Increased vitamin K consumption has been linked in some studies to stronger bones and a decreased risk of hip fractures. In some regions of the world, health officials have approved the use of vitamin K for osteoporosis [97]. The onions contain the flavonoid kaempferol. The linings of the blood arteries are shielded from harm, especially from some free radicals and active oxygen species. Nitric oxide, a substance that acts as a natural dilator and aids in the relaxation of the blood vessels as a result of which it enables blood vessels to dilate, may also be produced more abundantly by an individual's body as a result of leek consumption. (high blood pressure). It reduces cholesterol levels and guards against arteriosclerosis, cardiac failure, and stroke in the blood vessels [98]. By using the microdilution technique in 96 multi-well microtiter plates. The extract and cirsimarin were shown to have a minimum inhibitory concentration against the test bacteria. Aside from the yeast, which was examined in Sabouraud dextrose broth, the experiments were conducted in Muller-Hinton broth (MHB) [99].

WO2011115486A1, discloses about the dominant male sterile leek plants that are nuclear encoded in the current invention. In the F1, there is a segregation for male infertility of about 50%. Additionally, genetic indicators connected to dominant male infertility caused by nuclear encoding are discovered. The current invention also relates to techniques for creating nuclear encoded dominant male sterile leeks, techniques for creating hybrids from these leeks, hybrid leeks, and seeds and plant parts from nuclear encoded dominant male sterile leeks and the hybrids therefrom. A method is also given for using the genetic markers connected to the nuclear-encoded dominant male sterile leek plants [100]. Along with **US8987558B2**, discloses about the present invention pertains to leek (*Allium ampeloprasum*) plants that contain cytoplasmically encoded male sterility derived from the garlic plant (*Allium sativum* L), and that the deposit number for this invention is NCIMB 41563. The invention also pertains to a method for delivering it. The invention also pertains to using garlic and the plant that is provided to induce cytoplasmic encoded male sterility [101]. Moreover **CN103501762A**, discloses about the method of cosmetic care includes applying an effective amount of a plant extract chosen from the group consisting of litchi, glasswort, peach, soja seed, sweet basil, cucumber, chanterelle, leek, kiwi fruit, rhubarb, grapefruit, wheat, raspberry, plum, and mixtures thereof to at least one skin zone that needs it in order to activate caspase-14 expression in said skin [102]. Along with **US8703223B2**, discloses about the use of specific flavor-enhancing substances obtained from an *Allium* species is the subject of the current innovation. In one embodiment, seeds from chives, leeks, ramson, and other onions are used to give food items strong kokumi flavor enhancing effects without giving them an off flavor that tastes like onion or garlic. These flavor-improving ingredients, which are also used to prepare kokumi products, are helpful in the production of Amadori products [103]. Along with **CN103828646A**, discloses about the fresh *euphorbia lunulata*, also known as cat's eye and *calystegia hederacea*, and water are the main ingredients of a technique for preventing leek maggots. The proportion of the two ingredients is 6–10% euphorbia lunulata to 90–94% water. After the seedlings are gathered, a soak solution is poured into the cut stubbles or roots of leeks, and the *euphorbia lunulata* is arranged in the water for 24-72 hours depending on the proportion. The method for preventing the leek maggots addresses the issue that pesticide is reserved when a chemical method is used for preventing the leek maggots, and is appropriate for non-toxic and pollution-free production use of leeks [104].

III. Discussion and Conclusion:

Finally, scientific study on Liliaceae family reveals that this plant has enormous biological potential. It is frequently used in Ayurvedic medicine to treat a variety of diseases. It is firmly thought that the extensive information on biological and microbiological characteristics of the extracts reported in this study will offer detailed proof for the usage of this plant in various treatments. *Aloe bardadensis*, *Allium cepa*, *Allium sativum*, *Asparagus officinalis* and *Allium porrum* is a plant that contains Alkaloids, steroids, glycosides, vitamins and other bioactive chemicals. In this study we focus on the anti-diabetic activity, antioxidant activity, antimicrobial activity, antibacterial activity, hypolipidemic effect, anticancer, antiparasitic, antitoxic effects, wound healing. The future dose for many immune related chronic illnesses might be determined based on these findings. Future research trials incorporating *In vitro* and *In vivo* pharmacokinetics, bioavailability, and toxicological investigations, as well as following clinical trials to verify efficacy, will be able to do this. Furthermore, future possibilities necessitate extensive and in-depth research into plant tissue culture employing cutting-edge biotechnological technologies such as genomes and proteomics, allowing for effective disease targeting. Moreover, the said plants have also used in the preparation of several formulations, which are mentioned in various national and international patent applications. Such as *Aloe Barbadosensis* it is used as hair treatment formulations, food made from aloe flour are used to make flour pastries, bread and biscuits, *aloe vera*-lubricated leather is used in gloves, garments, sandals, or shoes, and it's also used in skin whitening creams, moisturizers and anti-aging creams. *Allium cepa* it contains powerful coagulation, helps in constipation, prevent scars, and it is useful for treating coccidiosis disease & promoting poultry health, and also prevent the metabolic disease. *Allium sativum* used as treatment and prevention of hypercholesterolemia, atherosclerosis, hyperlipidemia, hypertension, and osteoporosis or a condition marked by increased bone resorption. It is prevent the growth of fungi on wood products and *allium sativum* is also used in preparation of garlic coffee beverage it gives specific flavor. *Asparagus officinalis* used in skin lightening and organic pesticides formulations and also used as treatment and prevention of sickle cell disease. *Allium porrum* is used as preventing and treatment of leek maggot, used in cosmetic products and also enhancing the flavor in food items. The plant is a valuable resource that has a lot to give the research in terms of medicine as a result, effective awareness and conservation efforts are required.

References:

- [1]. Jain R, Rao B. Critical analysis of India's National Mission on Medicinal Plants (NMMP) in providing access to quality botanical drugs to improve public health. *J Ayurveda Integer Med.* 2015;6:198-207.
- [2]. Damjanovic I, Kitic D, Stefanovic N, Zlatkovic Guberinic S, Catic-Djordjevic A, Velickovic Radovanovic R. Herbal self medication use in patients with diabetes mellitus type 2. *Turk J Med Sci.* 2015;45:964-71.

- [3]. Ghosh N, Ali A, Ghosh R, Das S, Mandal SC, Pal M. Chronic inflammatory diseases: progress and prospect with herbal medicine. *Curr Pharm Des.* 2015;22:247-64. *Journal of Enology and Viticulture* 16, 144-158, 1965.
- [4]. Kibiti CM, Afolayan AJ. Herbal therapy: A review of emerging pharmacological tools in the management of diabetes mellitus in Africa. *Pharmacogn Mag.* 2015;11:S258-74.
- [5]. Stevens, P.F. "Liliaceae". *Angiosperm Phylogeny Website*. Version 12, September 28, 2013. Archived from the original on 3 January 2014. Retrieved 2 January 2014.
- [6]. Simpson, Michael G. (2011). *Plant Systematics*. Academic Press. ISBN 978-0-08-051404-8. Retrieved 6 January 2014.
- [7]. Tyler V. *The honest herbal: A sensible guide to the use of herbs and related remedies*. 3rd ed. Binghamton, New York: Pharmaceutical Products Press; 1993.
- [8]. Hegggers J, Kucukcelebi A, Listengarten D, Stabenau J, Ko F, Broemeling LD, et al. Beneficial effect of aloe on wound healing in an excisional wound model. *J Altern Complement Med.* 1996;2:271-7.
- [9]. Chithra R Sajithlal GB, Chandrakasan G. Influence of aloe vera on collagen characteristics in healing dermal wounds in rats. *Mol Cell Biochem.* 1998;181:71-6
- [10]. Hegggers J, Kucukcelebi A, Listengarten D, Stabenau J, Ko F, Broemeling LD, et al. Beneficial effect of aloe on wound healing in an excisional wound model. *J Altern Complement Med.* 1996;2:271-7.
- [11]. Chithra P, Sajithlal G, Chandrakasan G. Influence of aloe vera on the glycosaminoglycans in the matrix of healing dermal wounds in rats. *J Ethnopharmacol.* 1998;59:179-86
- [12]. Roberts DB, Travis EL. Acemannan-containing wound dressing gel reduces radiation-induced skin reactions in C3H mice. *Int J Radiat Oncol Biol Phys.* 1995;32:1047-52.
- [13]. Byeon S, Pelley R, Ullrich SE, Waller TA, Bucana CD, Strickland FM. Aloe barbadensis extracts reduce the production of interleukin-10 after exposure to ultraviolet radiation. *J Invest Dermatol.* 1988;110:811-7.
- [14]. Hutter JA, Salmon M, Stavinoha WB, Satsangi N, Williams RF, Streeper RT, et al. Anti-inflammatory C-glucosyl chromone from Aloe barbadensis. *J Nat Prod.* 1996;59:541-3.
- [15]. Agarry OO, Olaleye MT, Bello-Michael CO. Comparative antimicrobial activities of Aloe vera gel and leaf. *Afr J Biotechnol.* 2005;4:1413-4. Floruta CV. Dietary choices of people with ostomies *J Wound Ostomy Continence Nurs* 2001;28:28-31.
- [16]. Kadan S, Saad B, Sasson Y, Zaid H. In vitro evaluations of cytotoxicity of eight antidiabetic medicinal plants and their effect on GLUT4 translocation. *Evid Based Complement Alternat Med* 2013;2013:549345.
- [17]. <https://patents.google.com/patent/EP0919220A2/en?q=EP0919220A2> [Accessed March 18, 2023].
- [18]. <https://patents.google.com/patent/US7033620B2/en?q=US7033620B2> [Accessed March 18, 2023].
- [19]. <https://patents.google.com/patent/CN1067861C/en?q=CN1067861c> [Accessed March 19, 2023].
- [20]. <https://patents.google.com/patent/CN103432021A/en?q=CN103432021A> [Accessed March 19, 2023].
- [21]. <https://patents.google.com/patent/US20030217416A1/en?q=US20030217416A1> [Accessed March 19, 2023].
- [22]. Mootoosamy A, Fawzi Mahomoodally M. Ethnomedicinal application of native remedies used against diabetes and related complications in Mauritius. *J Ethnopharmacol* 2014;151:413-44.
- [23]. Yoshinari O, Shioima Y, Igarashi K. Anti-obesity effects of onion extract in Zucker diabetic fatty rats. *Nutrients* 2012;4:1518-26.
- [24]. Bhanot A, Shri R. A comparative profile of methanol extracts of Allium cepa and Allium sativum in diabetic neuropathy in mice. *Pharmacognosy Res* 2010;2:374-84.
- [25]. Abdel-Maksouda G, El-Aminb AR. A review on the materials used during the mummification process in ancient Egypt (PDF). *Med Archaeol Archaeometry* 2011;11:129-50.
- [26]. Perez OA, Viera MH, Patel JK, Konda S, Amini S, Huo R, et al. A comparative study evaluating the tolerability and efficacy of two topical therapies for the treatment of keloids and hypertrophic scars. *J Drugs Dermatol* 2010;9:514-8.
- [27]. Wananukul S, Chatpreodprai S, Peongsujarit D, Lertsapcharoen P. A prospective placebo-controlled study on the efficacy of onion extract in silicone derivative gel for the prevention of hypertrophic scar and keloid in median sternotomy wound in pediatric patients. *J Med Assoc Thai* 2013;96:1428-33
- [28]. Ebrahimi-Mamaghani M, Saghafi-Asl M, Pirouzpanah S, Asghari-Jafarabadi M. Effects
- [29]. West DP, Zhu YF. Evaluation of aloe vera gel gloves in the treatment of dry skin associated with occupational exposure. *Am J Infect Control.* 2003;31:40-2.
- [30]. Krishnaswamy K. Traditional Indian spices and their health significance. *Asia Pac J Clin Nutr* 2008;17 Suppl 1:265-8.
- [31]. Brickell C, editor. *The Royal Horticultural Society Encyclopedia of Gardening*. New York: Dorling Kindersley; 1992. p. 345
- [32]. Ministry of Agriculture, Fisheries and Food. *Home Preservation of Fruit and Vegetables*. London: HMSO; 1968. p. 107
- [33]. Jaber R. Respiratory and allergic diseases: From upper respiratory tract infections to asthma. *Prim Care* 2002;29:231-61.
- [34]. Pikula M, Zebrowska ME, Poblocka-Olech L, Krauze-Baranowska M, Sznitowska M, Trzonkowski P. Effect of enoxaparin and onion extract on human skin fibroblast cell line - therapeutic implications for the treatment of keloids. *Pharm Biol* 2014;52:262-7.
- [35]. Zurada JM, Kriegel D, Davis IC. Topical treatments for hypertrophic scars. *J Am Acad Dermatol* 2006;55:1024-31.
- [36]. Gangopadhyay KS, Khan M, Pandit S, Chakrabarti S, Mondal TK, Biswas TK. Pharmacological evaluation and chemical standardization of an ayurvedic formulation for wound healing activity. *Int J Low Extrem Wounds* 2014;13:41-9.
- [37]. Foo CW, Tristani-Firouzi P. Topical modalities for treatment and prevention of postsurgical hypertrophic scars. *Facial Plast Surg Clin North Am* 2011;19:551-7
- [38]. Shockman S, Paghdal KV, Cohen G. Medical and surgical management of keloids: A review. *J Drugs Dermatol* 2010;9:1249-57.
- [39]. Campanati A, Savelli A, Sandroni L, Marconi B, Giuliano A, Giuliadori K, et al. Effect of Allium cepa allantoin-pentaglycan gel on skin hypertrophic scars: Clinical and video-capillaroscopic results of an openlabel, controlled, nonrandomized clinical trial. *Dermatol Surg* 2010;36:1439-44.
- [40]. Draelos ZD. The ability of onion extract gel to improve the cosmetic appearance of postsurgical scars. *J Cosmet Dermatol* 2008;7:101-4.
- [41]. Jackson BA, Shelton AJ. Pilot study evaluating topical onion extract as treatment for postsurgical scars. *Dermatol Surg* 1999;25:267-9
- [42]. Jackson BA, Shelton AJ. Pilot study evaluating topical onion extract as treatment for postsurgical scars. *Dermatol Surg* 1999;25:267-9.
- [43]. Saulis AS, Mogford JH, Mustoe TA. Effect of mederma on hypertrophic scarring in the rabbit ear model. *Plast Reconstr Surg* 2002;110:177-83.
- [44]. Cho JW, Cho SY, Lee SR, Lee KS. Onion extract and quercetin induce matrix metalloproteinase-1 in vitro and in vivo. *Int J Mol Med* 2010;25:347-52
- [45]. Lai WW, Hsu SC, Chueh FS, Chen YY, Yang JS, Lin JP, et al. Quercetin inhibits migration and invasion of SAS human oral cancer cells through inhibition of NF- κ B and matrix metalloproteinase-2/-9 signaling pathways. *Anticancer Res* 2013;33:1941-50.

- [46]. Zeng YW, Yang JZ, Pu XY, Du J, Yang T, Yang SM, et al. Strategies of functional food for cancer prevention in human beings. *Asian Pac J Cancer Prev* 2013;14:1585-92.
- [47]. Yu CS, Lai KC, Yang JS, Chiang JH, Lu CC, Wu CL, et al. Quercetin inhibited murine leukemia WEHI-3 cells in vivo and promoted immune response. *Phytother Res* 2010;24:163-8.
- [48]. Antony ML, Singh SV. Molecular mechanisms and targets of cancer chemoprevention by garlic-derived bioactive compound diallyl trisulfide. *Indian journal of experimental biology*. 2011;49:805-16.
- [49]. Syed DN, Adhami VM, Khan MI, Mukhtar H. Inhibition of Akt/mTOR signaling by the dietary flavonoid fisetin. *Anticancer Agents Med Chem* 2013;13:995-1001.
- [50]. Mantawy MM, Ali HF, Rizk MZ. Therapeutic effects of *Allium sativum* and *Allium cepa* in *Schistosoma mansoni* experimental infection. *Rev Inst Med Trop Sao Paulo* 2011;53:155-63.
- [51]. Peron AP, Mariucci RG, de Almeida IV, Düsman E, Mantovani MS, Vicentini VE. Evaluation of the cytotoxicity, mutagenicity and antimutagenicity of a natural antidepressant, *Hypericum perforatum* L. (St. John's wort), on vegetal and animal test systems. *BMC Complement Altern Med* 2013;13:97.
- [52]. Sakakibara H, Yoshino S, Kawai Y, Terao J. Antidepressant-like effect of onion (*Allium cepa* L.) powder in a rat behavioral model of depression. *Biosci Biotechnol Biochem* 2008;72:94-100.
- [53]. Nasri S, Anoush M. Evaluation of analgesic and antiinflammatory effects of fresh onion juice in experimental animals. *Afr J Pharm Pharmacol* 2012;6:1679-84.
- [54]. Kumar KE, Harsha KN, Sudheer V, Nelli GB. In vitro antioxidant activity and in vivo hepatoprotective activity of aqueous extract of *Allium cepa* bulb in ethanol induced liver damage in Wistar rats. *Food Sci Hum Wellness* 2013;2:132-8.
- [55]. Benmalek Y, Yahia OA, Belkebir A, Fardeau ML. Antimicrobial and anti-oxidant activities of *Illicium verum*, *Crataegus oxyacantha* ssp monogyna and *Allium cepa* red and white varieties. *Bioengineered* 2013;4:244-8.
- [56]. <https://patents.google.com/patent/US7588784B2/en?q=US7588784B2> [Accessed March 19, 2023].
- [57]. <https://patents.google.com/patent/WO2004069262A1/en?q=WO2004069262A1> [Accessed March 23, 2023].
- [58]. <https://patents.google.com/patent/WO2012131730A3/en?q=WO2012131730A3> [Accessed March 20, 2023].
- [59]. <https://patents.google.com/patent/US5885581A/en?q=US5885581A> [Accessed March 20, 2023].
- [60]. <https://patents.google.com/patent/US9700576B2/en?q=US9700576B2> [Accessed March 20, 2023].
- [61]. Di Renzo L, Di Pierro D, Bigioni M, Sodi V, Galvano F, Cianci R, et al. Is antioxidant plasma status in humans a consequence of the antioxidant food content influence? *Eur Rev Med Pharmacol Sci* 2007;11:185-92.
- [62]. Kumari K, Augusti KT. Antidiabetic and antioxidant effects of S-methyl cysteine sulfoxide isolated from onions (*Allium cepa* Linn) as compared to standard drugs in alloxan diabetic rats. *Indian J Exp Biol* 2002;40:1005-9.
- [63]. Lean ME, Noroozi M, Kelly I, Burns J, Talwar D, Sattar N, et al. Dietary flavonols protect diabetic human lymphocytes against oxidative damage to DNA. *Diabetes* 1999;48:176-81.
- [64]. Milner J. A. Garlic: its Anticarcinogenic and Antitumor Properties. *Nutr. Rev.* 1996; 54:S82-86
- [65]. Block E. The Chemistry of Garlic and Onions. *Sci. Amer.* 1985; 252:114-119.
- [66]. Farbman KS, Barnett ED, Bolduc GR, Klein JO. Antibacterial Activity of Garlic and Onions; A Historical Perspective. *Pediatr. Infect. Dis. J.* 1993; 12:613-614.
- [67]. Essman E. J. The Medicinal Uses of Herbs. *Filoterapia.* 1984; 55:279-289.
- [68]. Saleheen D., Ali S.A., Yasinzai M.M. Antileishmanial activity of aqueous onion extract In Vitro. *Fitoterapia* . 2004;75:9-13. doi: 10.1016/j.fitote. 2003.07.010.
- [69]. <https://pubmed.ncbi.nlm.nih.gov/21521157/#:~:text=There%20are%20some%20percent%20reports,for%20apoptosis%20in%20malignant%20neuroblastoma.> [Accessed on 16 Nov 2022].
- [70]. Saravanan G, Prakash J. Effect of garlic (*Allium sativum*) on lipid peroxidation in experimental myocardial infarction in rats. *J Ethnopharmacol.* 2004;94(1):155-158. doi: 10.1016/j.jep.2004.04.029.
- [71]. Tsai Y, Cole LL, Davis LE, Lockwood SJ, Simmons V, Wild GC. Antiviral properties of garlic: in vitro effects on influenza B, herpes simplex and coxsackie viruses. *Planta Med.* 1985; 8:460-461.
- [72]. Kalyesa R. Screening of indigenous plants for antihelminthic action against human *Ascaris lumbricoides*. *Indian J. Physiol. Pharmacol.* 1975; 19:47-49.
- [73]. Ankri S, Miron T, Rabinkov A, Wilchek M, Mirelman D. Allicin from garlic strongly inhibits cysteine proteinases and cytopathic effects of *Entamoeba histolytica*. *Antimicrob. Agents Chemother.* 1997; 10:2286-2288.
- [74]. <https://patents.google.com/patent/WO2008004121A2/en?q=WO2008004121A2> [Accessed March 20, 2023]
- [75]. <https://patents.google.com/patent/WO2004069262A8/en?q=WO2004069262A8> [Accessed March 20, 2023]
- [76]. <https://patents.google.com/patent/WO2010098649A1/en?q=WO2010098649A1> [Accessed March 21, 2023]
- [77]. <https://patents.google.com/patent/US20050112393A1/en?q=US20050112393A1> [Accessed March 21, 2023]
- [78]. <https://patents.google.com/patent/CN103027158A/en?q=CN103027158A>[Accessed March 21, 2023]
- [79]. Pendbhaje IS, Amit P, Shahin M, Pathan S, Raotole A, Pattewar SV. *Ethnopharmacology, Pharmacogony and Phytochemical Profile of Allium Sativum L. A Review.* *Pharmacology online.* 2000; 2:845-85.
- [80]. Oshiba S, Sawai H, Tamada T. Inhibitory effect of orally administered inclusion complex of garlic oil on platelet aggregation in man. *Igaku no Ayuma.* 1990; 155(3):199-200.
- [81]. Yeh YY, Yeh SM. Homocysteine-lowering action is another potential cardiovascular protective factor of aged garlic extract. *Yeh YY.* 2006; 136(3 Suppl):745S-749S.
- [82]. Sclesinger K. Knoublauch (*allium sativum*) als Helimittel bei Artiosklerose Wein Ned Wochenschr. 1926; 76:1076- 77.
- [83]. Winter, R. A Consumer's Dictionary of Cosmetic Ingredients. 7th Edition: Complete Information About the Harmful and Desirable Ingredients Found in Cosmetics and Cosmeceuticals; Three Rivers Press: New York, NY, USA, 2009.
- [84]. Nature Gate, *Asparagus officinalis*, www.luontoportti.com/suom/en/kukkakasvit/asparagus [22 Jul 2013].
- [85]. Tsushida T, Suzuki M and Kurogi M. Evaluation of antioxidant activity of vegetable extracts and determination of some active compounds. *J Jap Soc Food Sci Technol*, 41, 1994, 611-618.
- [86]. Maeda T, Kakuta H, Sonoda S, Ueno R, Suzuki T and Oosawa K. Antioxidation capacities of extracts from green, purple, and white asparagus spears related to polyphenol concentration. *Hortic Sci*, 40, 2005, 1221-1224.
- [87]. <https://patents.google.com/patent/US6994874B2/en?q=US6994874B2> [Accessed March 21, 2023]
- [88]. <https://patents.google.com/patent/CN104222340A/en?q=CN104222340A> [Accessed March 21, 2023]
- [89]. <https://patents.google.com/patent/CN104365314A/en?q=CN104365314A> [Accessed March 21, 2023]
- [90]. <https://patents.google.com/patent/CN105613620A/en?q=CN105613620A> [Accessed March 21, 2023]
- [91]. <https://patents.google.com/patent/US8895075B2/en?q=US8895075B2> [Accessed March 23, 2023]

- [92]. Staruschenko, A. Beneficial effects of high potassium: Contribution of renal basolateral K⁺ channels. *Hypertension* **2018**, 71, 1015–1022.
- [93]. Aroma of the Week: Wine Aroma Kit: Asparagus. Available online: <https://www.aroma-academy.co.uk/blogs/news/aroma-of-the-week-wine-aroma-kit-asparagus>
- [94]. Sengupta A, Ghosh S, Bhattacharjee S. Allium vegetables in cancer prevention: an overview. *Asian Pac J Cancer Prev APJCP*. 2004 Sep; 5(3): 237–45.
- [95]. Comparative study of Qualitative Phytochemical screening and antioxidant activity of *Mentha arvensis*, *Elettaria cardamomum* and *Allium porrum* [Internet]. [cited 2017 Nov 28]. Available from: <http://www.iajpr.com/archive/volume-4/may-2014/14may34.html>.
- [96]. Mladenović, J., Mišković, P., Pavlović, R., Radovanović, B., Ačamović, G. and Cvijović, M. Antioxidant activity of ultrasonic extracts of leek *Allium porrum* L. *Hemijaska Industrija* 65, 473-477, 2011.
- [97]. Singleton, V. L. and Rossi, J. Colorimetry of total phenolics with phosphor-molybdic-phosphotungstic acid reagents, *American Journal of Enology and Viticulture* 16, 144-158, 1965.
- [98]. <https://www.ayurtimes.com/health-benefits-of-leeks-and-leek-soup/#:~:text=It%20lowers%20the%20cholesterol%20levels,on%20heart%20and%20cardiovascular%20system.&text=Leeks%20are%20good%20source%20of%20folic%20acid%20and%20iron.> [Accessed on 2022 Nov 18].
- [99]. Singleton, V. L. and Rossi, J. Colorimetry of total phenolics with phosphor-molybdic-phosphotungstic acid reagents, *American Journal of Enology and Viticulture* 16, 144-158, 1965.
- [100]. <https://patents.google.com/patent/WO2011115486A1/en?q=WO2011115486A1> [Accessed March 23, 2023]
- [101]. <https://patents.google.com/patent/US8987558B2/en?q=US8987558B2> [Accessed March 23, 2023]
- [102]. <https://patents.google.com/patent/CN103501762A/en?q=CN103501762A> [Accessed March 23, 2023]
- [103]. <https://patents.google.com/patent/US8703223B2/en?q=US8703223B2> [Accessed March 23, 2023]
- [104]. <https://patents.google.com/patent/CN103828646A/en?q=CN103828646A> [Accessed March 23, 2023]