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A Review On Ginger

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ABSTRACT –

More applications exist for ginger than any other spice. Published in two parts, this monograph covers production, commerce, processing, chemistry, and quality assessment in great detail. A brief review is given on botany, world varieties, agronomy, crop development, and potential, with a focus on the yield of functional components. The topics of processing for the market, global trade trends, and forces affecting them are covered. More detail is covered on derived goods including oleoresin, volatile oil, powdered ginger, and syruped ginger. The prospects for their production in developing nations are indicated by the expanding global demand for high-quality, added-value products like volatile oil and oleoresin. A critical examination is conducted of the chemistry of the constituents that give ginger its distinct scent and pungent taste.

Plants in the Zingiberaceae family include ginger (Zingiber officinale Roscoe). For ages, it has been used as part of traditional medical practices throughout Asia, India, Europe, and the Middle East to treat conditions including diabetes, menstrual irregularities, arthritis, upset stomachs, and asthma, to mention a few. There is evidence to suggest that ginger decreases inflammation and pain, and scientific support exists for its potential to ease the symptoms of nausea and vomiting that accompany pregnancy, surgery, cancer therapy, or motion sickness. Studies on cell cultures demonstrate the antioxidant qualities of ginger. It is unknown, therefore, if the antioxidant components of ginger are accessible to humans after consumption and whether they have any effect on oxidative stress markers in humans in vivo.

The rhizomes or subterranean stems of Zingiber officinale, a tropical herbaceous perennial in the Zingiberaceae family, are used to make spice ginger. The chapter starts out by describing the chemical makeup of the ginger plant and then moves on to talk about cultivars, varieties, and production. Details are provided on the various products made from ginger rhizomes, including dried ginger, powdered ginger, oil, oleoresin, fresh ginger, and preserved ginger. The chapter concludes with a look at quality requirements, organic ginger, and some biotechnology experiments. The primary uses and functional qualities of ginger, including culinary and medicinal (both traditional and modern) usage, are covered.

KEY WORDS – Ginger, Cancer therapy, Antibacterial, Arthritis

I. INTRODUCTION –

Over the past few years, there has been a noticeable increase in the usage of "natural" or alternative treatments. Growing numbers of older persons (baby boomers) are utilizing herbal medicines, nutritional supplements, and complementary and alternative medicine without consulting a doctor because they believe these medications will be helpful (Cohen, Ek, and Pan 2002).[1] This might not be a recommended or safe course of action, though. For instance, a recent survey found that at least half of the herbal remedies used by cancer patients

lacked research documentation indicating possible interactions with chemotherapy drugs. This indicates that there is a serious issue with herb-chemotherapeutic drug interactions in this patient population (Engdal, Klepp, and Nilsen 2009).[2]

More applications exist for ginger than any other spice. Published in two parts, this monograph covers production, commerce, processing, chemistry, and quality assessment in great detail. A brief review is given on botany, world varieties, agronomy, crop development, and potential, with a focus on the yield of functional components. The topics of processing for the market, global trade trends, and forces affecting them are covered. More detail is covered on derived goods including oleoresin, volatile oil, powdered ginger, and syruped ginger. The prospects for their production in developing nations are indicated by the expanding global demand for high-quality, added-value products like volatile oil and oleoresin. A critical examination is conducted of the chemistry of the constituents that give ginger its distinct scent and pungent taste.[3]

Zingiber officinale, or ginger, is one of the most popular herbal supplements. Despite being used in food preparation, many individuals take it to treat a range of illnesses. Ginger has been demonstrated to be useful in treating postoperative and pregnancy-induced nausea and vomiting. Its application for motion sickness and other forms of nausea and vomiting is less supported by research. In the few trials that have been done, using ginger to treat arthritic symptoms has had mixed outcomes.[4]

II. HISTORY AND ORIGIN –

Included in the same family of plants as cardamom and turmeric is ginger. The main source of its spicy scent is the presence of ketones, particularly gingerols, which seem to be the principal component of ginger that has been researched in most scientific study connected to health. The primary part of ginger that is eaten is the rhizome, which is the horizontal stem from which the roots grow. The modern word "ginger" is derived from the Middle English "gingivere," but the Sanskrit word "srngaveram," which means "horn root," is where the spice's origins can be traced back more than 3,000 years. It's interesting to note that ginger doesn't grow naturally and its exact origins are unknown.[5]

The hundreds of plants that make up the Zingiberaceae family originated primarily in Asia's tropical jungles. It might have been one of the earliest plants to be grown in a vegetative state. Certain members of the family are referred to as "wild ginger" and are mostly harvested from woods, despite the fact that their presence in the wild is uncertain.[6]

Cultivated ginger, Zingiber officinale Roscoe, has long been grown in China and India and can withstand a wide range of environmental factors. India is the biggest ginger producer in the world in terms of both area and tonnage. The plant was brought to the West Indies and Mexico by the Spaniards from China, India, and Southeast Asia.[7]

III. MORPHOLOGY –

This perennial herbaceous plant can reach a height of one meter. The leaves are lengthy and elongated in nature, and they grow in alternate directions. When it reaches maturity, the clusters of white and pink flower buds turn into yellow flowers. A spike that resembles a cone and is covered in overlapping green bracts holds the blooms.[8] The plant has monocotyledons. The altered underground stem develops into a widely used spice, rhizome. The rhizome produces leafy shoots and is palmately branched. With eight to twelve distichous leaves, the leafy shoots are a pseudostem made of leafy sheaths. The rhizome is the source of the inflorescence.[9]

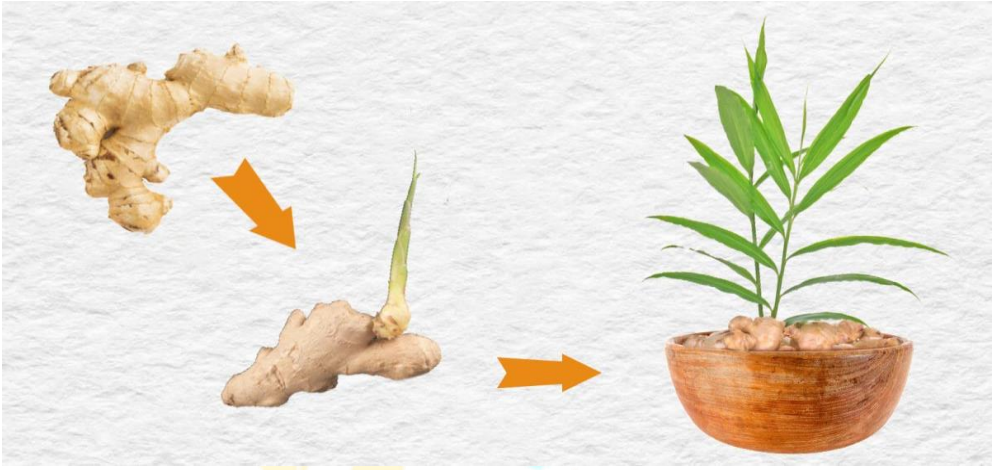
IV. TAXONOMY –

Domain	Eukarya
Phylum	Magnoliophyta
Class	Liliopsida
Order	Zingiberales
Family	Zingiberaceae
Genus	Zingiber Mill.
Species	Zingiber officinale

V. CHEMICAL CONSTITUENTS –

It is believed that the volatile oils that make up between one and three percent of the weight of ginger contain the active ingredients. The sesquiterpenes bisapolene, zingiberene, and zingiberol are the main active components of ginger oil. Growing conditions affect the concentrations of active compounds. The active components of ginger have a range of physiological effects. For instance, in vitro and in animals, gingerols exhibit analgesic, sedative, antipyretic, and antibacterial properties. Depending on type, area, and climate, ginger's composition can vary and include roughly 50% carbs, 9% protein and free amino acids, 6–8% fatty acids and triglycerides, 3-6% ash, and 3-6% crude fiber (on a dry matter basis) (Leung, 1984, Tang, 1992). Certain African ginger types have protein and lipid contents of 5.98 and 3.72 g/100, respectively (Shrin Adel, 2010). Ginger contains both soluble and insoluble fibers.[10] Essential micronutrients like potassium, magnesium, copper, manganese, and silicon can be found in good amounts in ginger. Potassium and manganese support the

development of disease resistance and safeguard the lining of the heart, blood vessels, and urinary tract. In addition to aiding in the absorption of calcium, silicon supports healthy skin, hair, teeth, and nails.[11]



VI. THERAPEUTIC USES –

1) Cardiovascular effect –

Cholinergic compounds are known to cause a fall in blood pressure by activation of muscarinic receptors located on the epithelium of blood vessels (Furchgott and Zawdski, 1980). Ginger also contains saponins, terpenoids, flavonoids, amino acids/peptides, secondary amines, and alkaloids. These compounds demonstrate hypotensive and vasodilator properties and could be the causative agents in the reduction in blood pressure.[12] 6 - Gingerol strengthens cellular antioxidant defense systems, which reduces amyloid-induced oxidative cell death. Amyloid has been shown to induce apoptosis in neurons through oxidative and/or nitrosative stress. It is also implicated in the development of senile plaques, the characteristic neuropathological hallmark for Alzheimer's disease (AD) (Tiraboschet al., 2004, Ohnishi and Takano, 2004).[13] Cytotoxicity and apoptotic cell death, such as DNA fragmentation, alteration of mitochondrial membrane potential, increased Bax/Bcl-2 ratio, and caspase-3 activation, can be prevented by gingerol pretreatment. 6-Gingerol has also been shown to replenish endogenous glutathione levels that have been depleted and to inhibit the intracellular build-up of reactive oxygen and/or nitrogen species.[14]

2) Anti – inflammatory action –

Ginger can help with rheumatism, discomfort, and inflammation. For millennia, people have recognized and appreciated ginger's anti-inflammatory qualities (Mascolo et al., 1989; Young et al., 2005). Regular consumption of ginger is thought to help individuals with osteoarthritis or rheumatoid arthritis feel less pain and move more freely.[15] Shogaol has demonstrated the strongest antioxidant and anti-inflammatory qualities, which can be related to the presence of its alpha,beta-unsaturated ketone moiety, even if no one component appears to be responsible for the anti-inflammatory actions of ginger. Ten-gingerol is the most potent of all the gingerols, and this is mostly due to the length of the carbon chain.[16]

3) Reduces anxiety –

Anxiety can also be lessened by ginger. Anxiety is linked to worse outcomes from migraine treatment and is often accompanied with migraines. By binding to a serotonin receptor, ginger fractions help mice feel less anxious. The bioactive components of ginger extract have considerable to moderate binding affinities (K(i)=3–20 microM) with the human serotonin 5-HT (1A) receptor.The 5-HT(1A) receptor is partially activated (20–60% of maximal activation) by 10-shogaol, 1-dehydro-6-gingerdione, and especially the entire lipophilic ginger extract (K(i)=11.6 microg/ml), according to S-GTP gamma S

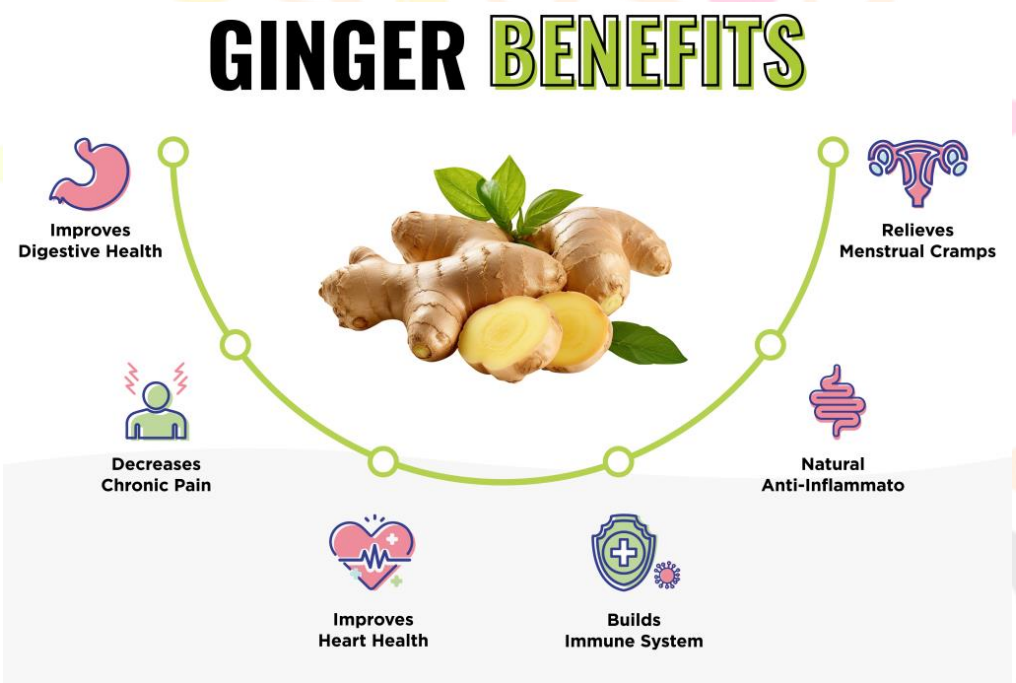
assays. Furthermore, gingerols and shugaols interact with P-glycoprotein during intestinal absorption, providing a good pharmacokinetic profile for the active chemicals in 5-HT (1A).[17]

4) Arthritis –

Research assessing ginger's efficacy in osteoarthritis sufferers has yielded inconsistent findings. While one study found that ginger extract significantly reduced knee osteoarthritis symptoms, another crossover trial found that ginger's effects on osteoarthritis were only significant during the initial phase of treatment (i.e., prior to crossover).[18]Thirteen In a retrospective case study, patients ingesting powdered ginger reported subjectively less pain and swelling. The patients included 28 individuals with rheumatoid arthritis, 18 with osteoarthritis, and 10 with muscle soreness.[19]

5) Motion sickness -

In one study, ginger was found to be more effective at treating motion sickness symptoms than placebo and dimenhydrinate (Dramamine). The subjective intensity of seasickness in naval cadets during high waves was found to be lessened by 1 g of ginger in a follow-up study, albeit the findings were not statistically significant.[20] Ginger did not lessen the amount of people experiencing dizziness. Ginger does not appear to help with motion sickness, according to other studies.[21]



6) Antibacterial -

Gram-positive and gram-negative bacteria, including Clostridium, Listeria, Enterococcus, Staphylococcus, Streptococcus, and Haemophilus species, are all susceptible to the antibacterial properties of ginger extracts. Ginger has a minimum inhibitory concentration of 0.0003–0.7 μg/mL and a minimum bactericidal concentration of 0.135–2.04 μg/mL species; however, cooking and other forms of heat can partially eliminate this action (Mascoloet al., 1989 and Chenet al., 1985). In vitro, gingerols showed antibacterial action against Escherichia coli and Bacillus subtilis.[22]

According to Sasidharan and Menon (2010), dry ginger oil was more active against Pseudomonas aeruginosa and less active against Bacillus subtilis. Fresh ginger oil was shown to be inert against Bacillus subtilis.[23]

7) Antiparasitic activity -

In animal trials, the infectivity of Schistosoma spp. (blood flukes) was entirely eliminated by gingerol (5.0 ppm) (Adewunmi et al 1990). Another bioactive substance that dissolves parasites and their eggs is zingibain. In vivo, gingerol and shaol shown strong molluscicidal effects.[24] Gingerol and shogaol have shown anti-nematode properties; 6.25 µg/mL In vitro, 6-shogaol killed Anisakis larvae in 16 hours, whereas pyrantelpamoate, an antinematodal drug, did not kill at 1 mg/mL.[25]

8) Cancer -

The components of ginger are thought to be chemo preventive dietary agents because they decrease the activities of lypoxygenase (LO) and cyclooxygenase (CO), induce apoptosis, and have antitumerogenic properties. Prostate cancer cells only eat 5-LO enzymes, which ginger blocks.[26] Without 5-LO enzyme, prostate cancer cells perish in one to two hours. Leukemia, skin, kidney, lung, and pancreatic cancer cells all die as a result of ginger. Several components, including 6-gingerol and 6-paradol, as well as other elements including zingerone and shagaols, are thought to provide ginger its anticancer qualities (Park et al., 2006). Consequently, using it for cancer therapy is safe. Gingerol is a potent anti-tumor agent in leukemia cells, inhibits the growth of pancreatic cells, and helps prevent cancer linked to constipation.[27]

VII. ADVERSE EFFECTS –

Ginger adverse effects are rare, although they can include moderate gastrointestinal symptoms like heartburn, diarrhea, and mouth irritation.[28] Patients on anticoagulants, such as war-farin (Coumadin), may want to be cautious when using ginger because it may have an impact on fibrinolytic activity.[29] When warfarin-using patients start taking large doses of ginger, doctors should think about keeping an eye on the patient's INR reaction. In addition to producing case reports of arrhythmia, ginger has been shown to have beneficial inotropic effects in animal models.[30] More research examining adverse reactions and possible drug interactions is necessary, even though there have been no reports of harmful consequences from ginger after human use.[31]

VIII. CONCLUSION –

In addition to being a very well-liked culinary condiment used to enhance meals, ginger has been used medicinally for thousands of years to cure a wide range of illnesses. Numerous chemicals and metabolites have been identified in ginger by chemical and metabolic investigations. The bioactive constituents that have been investigated the most include gingerols and shogaols, specifically 6-gingerol and 6-shogaol, respectively. Each component's content is obviously influenced by the ginger rhizome's treatment and source. Over the past several years, there has been a noticeable increase in the amount of research interest in understanding how natural substances can prevent disease.[32]

Rhizomatous in nature, ginger is cultivated throughout China, Southeast Asia, sections of Japan, Latin America, Jamaica, and Africa. In the Indian subcontinent, ginger has long been used as a spice and medicine. Its therapeutic benefits have long been recognized.It is the most popular flavoring, garnishing, and condiment. The herb is used to treat colic and dyspepsia and acts as a stimulant and carminative.

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