

**A REVIEW PAPER ON OCIMUM TENUIFLORUM****Shete S. Tanuja, Kurhade M. Nikita and Ashlesha B. Kale\***

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Article Received on  
08 November 2023,Revised on 29 Nov. 2023,  
Accepted on 19 Dec. 2023

DOI: 10.20959/wjpr20241-30161

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Pallavi Mam.**ABSTRACT**

Native to the Indian subcontinent, tulsi (*Ocimum sanctum* L.), sometimes known as holy basil, is highly valued for its restorative applications in Ayurvedic and Siddha clinical contexts. Numerous studies conducted on animals, in vitro, and in humans have shown that tulsi has a variety of restorative properties, including adaptogenic, antimicrobial, calming, cardioprotective, and immunomodulatory effects. However, there have been no comprehensive studies conducted on humans to determine tulsi's clinical efficacy and safety. In order to describe the clinical outcome following tulsi consumption, we oversaw a thorough writing audit of human examinations. We searched electronic databases like Cochrane Library, Google Scholar, Embase, Medline, PubMed, Science Direct, and Indian Medical databases for

studies that were published in books, theories, meeting protocols, and other written sources. A total of 24 examinations that reported beneficial outcomes were identified. for metabolic abnormalities, cardiovascular disease, resistance, and neurocognitive issues. Without any tests indicating any noteworthy hostile occurrences, all investigations revealed ideal clinical results. The analysed studies support traditional applications and suggest that tulsi is a potent remedy for lifestyle-related chronic diseases like diabetes, metabolic disorder, and high blood pressure. To examine the mechanisms of action, clarify the dose and portion structure, and identify the populations most suited to benefit from the beneficial effects of tulsi, more research is needed.

**KEYWORDS:** Antioxidant, Anti inflammatory, Anti bacterial, Cough and Cold, Tulsi.



## INORDUCTION

Modern living is stressful despite the numerous marvels of science and technology. While industrial agriculture has burdened us with increasing exposure to unhealthy processed and packaged food as well as an abundance of pesticides, food packaging materials, and other toxic industrial chemicals, mobile devices and the web have accelerated life to the point where many people feel as though they are drowning in an ever-expanding ocean of data. Additionally, urban residents must deal with growing income disparities, social isolation, excessive noise, air, water, and soil pollution, and a detachment from nature. The main causes of death and disease on the globe are now understood to be environmental factors, despite the fact that industrialization has resulted in longer lifespans and enormous population growth. are chronic diseases that can be prevented by a healthy lifestyle.<sup>[1]</sup> Lifestyle medicine and Ayurveda The world's oldest medical system and a science of life, Ayurveda emphasises healthy lifestyle practises as a means of maintaining and developing good health as well as preventing disease. Consuming fresh, minimally processed foods, using Rasayanas (formulas) to combat disease and ageing, cutting-edge detoxification techniques, and regular use of adaptogenic herbs are some of these practises. These practises also include consuming fresh, minimally processed foods on a regular basis.

With a range that is unmatched by any other medical system, Ayurveda's use of medicinal and culinary herbs relies on India's great biodiversity. However, among all the plants employed, neither tulsi nor holy basil (*Ocimum sanctum*) enjoys prestige comparable to either.



## Important of tulsi



The tulsi or holy basil is an important symbol in the Hindu religious tradition and is worshipped in the morning and evening by Hindus at large. The holy basil is also a herbal remedy for a lot of common ailments. Here're top fifteen medicinal uses of tulsi.

**Healing Power:** The tulsi plant has many medicinal properties. The leaves are a nerve tonic and also sharpen memory. They promote the removal of the catarrhal matter and phlegm from the bronchial tube. The leaves strengthen the stomach and induce copious perspiration. The seed of the plant are mucilaginous.

Telugu: A strong adaptogen

Tulsi is an aromatic plant that belongs to the Lamiaceae (tribe ocimeae) family of basil and is native to the tropics of the eastern continent. It is believed to have originated in north central India.<sup>[2]</sup> Tulsi is referred to as "The Incomparable One," "Mother Medicine of Nature," and "The Queen of Herbs" in Ayurveda and is regarded as a "elixir of life" that is unmatched for both its therapeutic and spiritual qualities.<sup>[3]</sup> Tulsi is used in India in a variety of spiritual rites and daily routines that offer a wide range of health advantages that modern science is only now beginning to prove. This new research on tulsi supports traditional Ayurvedic knowledge and reveals that it is a tonic for the body, mind, and spirit that provides relief. too many current health issues.

One of the best representations of Ayurveda's holistic lifestyle approach to health is arguably

tulsi. Tulsi is claimed to permeate deep tissues, dry tissue secretions, and normalise kapha and vata. It has a strong, bitter flavour. The regular ingestion of tulsi is thought to help people cope with daily stress, avoid disease, and increase overall health, happiness, and longevity. Tulsi is also attributed with enhancing beauty, intelligence, stamina, and a serene emotional state as well as providing the face lustre and the voice honey.<sup>[3,4,5,6]</sup> Tulsi is indicated as a treatment for a variety of ailments in addition to these health-promoting qualities, including anxiety, cough, asthma, diarrhoea, fever, dysentery, arthritis, eye disorders, otalgia, indigestion, hiccups, vomiting, gastric, cardiac, and back pain, skin conditions, ringworm, bug, snake, and scorpion stings, as well as malaria. Genitourinary illnesses.<sup>[3,5,6,7]</sup>

Tulasi is regarded as a powerful adaptogen with a rare combination of pharmacological effects that support resilience and well-being. Despite the fact that the term "adaptogen," or a herb that aids in stress adaption and the promotion of homeostasis, is not frequently used in Western medicine, Western science has discovered that tulsi does in fact have numerous pharmacological activities that serve this function.

Numerous scientific investigations, including in vitro, animal, and human trials, have examined the therapeutic effects of tulsi. These studies show that tulsi has a special set of properties, including: antimicrobial (including antibacterial, antiviral, antifungal, antiprotozoal, antimalarial, and anthelmintic); mosquito repellent; anti-oxidant; anti-inflammatory; hepato-protective; neuro-protective; cardio-protective; anti-diabetic; anti-hypercholesterolemia; anti-hypertensive; anti-carcinogenic Memory improvement, anti-asthmatic, anti-tussive, diaphoretic, anti-thyroid, anti-fertility, anti-ulcer, anti-emetic, anti-spasmodic, anti-arthritic, adaptogenic, anti-stress, anti-cataract, anti-leukodermal, and anticoagulant actions.<sup>[4,5,6,7]</sup> The physiological and psychological functions of the body and mind are restored as a result of these pharmacological effects, which also assist the body and mind in coping with a variety of chemical, physical, infectious, and emotional pressures.

### **Both defence and cleansing**

Tulsi's capacity to support the body's internal hygienic processes and safeguard against toxin-induced harm is responsible for many of its physiological advantages. These functions are frequently attributed to tulsi's high phenol content and anti-oxidant qualities; Krishna tulsi (the black/purple kind) has a higher phenol content and anti-oxidant capacity than white Vana (wild) tulsi.<sup>[8]</sup>

According to research conducted in laboratories, tulsi boosts the body's production of the antioxidant By scavenging harmful free radicals produced by oxygen deprivation<sup>[9]</sup> and other noxious substances, anti-oxidant compounds like glutathione and enzymes like superoxide dismutase and catalase protect cellular organelles and membranes.<sup>[10,11]</sup>

Tulsi also lessens DNA damage<sup>[12]</sup> and induces apoptosis in precancerous and cancerous cells, which slows the growth of experimental tumours and improves survival, in order to prevent malignancies brought on by hazardous substances.<sup>[13,14]</sup> Tulsi also helps the body more efficiently transform and eliminate harmful substances by boosting the activity of liver detoxification enzymes like the cytochrome P450 enzymes, which deactivate harmful substances and allow them to be safely excreted. This protects against the harm caused by toxic compounds.<sup>[15]</sup>

Although they are crucial for safeguarding against the wide range of pollutants, pesticides, pharmaceuticals, heavy metals, radiation, and other industrial toxicants produced by human activity in the modern era, they may be even more crucial for safeguarding against the natural toxins produced by the body, by animals, or by plants.

Chemicals, heavy metals, and radiation are examples of toxins.

Numerous experimental studies have shown that tulsi can shield the body from the harmful effects of various toxicants. These investigations confirm that tulsi has the capacity to prevent liver, kidney, and brain damage by defending against the genetic, immunological, and cellular damages brought on by pesticides, medications, and industrial toxins. The harmful effects of industrial compounds including butylparaben, carbon tetrachloride, copper sulphate, and others have thus been demonstrated to be protected against by tulsi.<sup>[16][17][18]</sup> and ethanol,<sup>[19][20][21]</sup> as well as typical pesticides like lindane,<sup>[22]</sup> endosulfan,<sup>[23]</sup> rogor,<sup>[24]</sup> chlorpyrifos,<sup>[25]</sup> and chlorpyrifos.<sup>[23]</sup> Tulsi has also been demonstrated to guard against the negative side effects of a variety of pharmaceutical treatments, including acetaminophen,<sup>[24]</sup> meloxicam,<sup>[25]</sup> paracetamol,<sup>[26]</sup> haloperidol,<sup>[27]</sup> and anti-tubercular medications.<sup>[28]</sup>

Tulsi has also been demonstrated to protect against the toxic effects of heavy metals like lead, arsenic, cadmium, chromium, and mercury as well as the harmful effects of radiation<sup>[29,30,31]</sup>.<sup>[32,33,34,35]</sup> Tulsi reduces the oxidative cellular and chromosomal damage brought on by radiation by scavenging free radicals and scavenging free radicals,<sup>[33,36,37,38]</sup> lowering organ damage and increasing postradiation survival in experimental animals.<sup>[39,40,41]</sup>



### Stress on the body

In addition to addressing the harmful effects of numerous physical agents such as radiation and chemicals, protective measure stressors. Homeostasis is disturbed by physiological and metabolic stress brought on by prolonged physical effort, physical restraint, exposure to cold, and loud noise. Damage to biochemical pathways, organ function, and general health results from maladaptation, which happens when the capacity to adapt to certain stresses is exceeded. Tulsi is one example of an adaptogenic herb that can prevent this harm by improving a variety of physiological and cellular adaptive capabilities.

Tulasi has been demonstrated to improve aerobic metabolism, increase swimming time, lessen oxidative tissue damage, and normalise a wide range of physiological and biochemical parameters induced by physical stressors in experimental animals employing forced-swimming, restraint, and cold-exposure stress. Similar to human studies, animal experiments have revealed that tulsi increases levels of neurotransmitters stress corticosteroid, immunologic, and ECG responses were also enhanced in certain brain areas while reducing the effects of acute and chronic noise-induced stress. corticosteroid, immunologic, and ECG responses were also enhanced in certain brain areas.<sup>[42,43,44,45]</sup>

### Glucose Stress

The "metabolic syndrome" is thought to afflict up to one-third of modern populations. Metabolic stress is caused by poor food, insufficient exercise, and psychological stress. The "deadly quartet" of centripetal obesity, hypertension, high cholesterol, and improper glucose control is known as metabolic syndrome, sometimes known as "prediabetes" or "Syndrome X," and it is linked to chronic inflammation as well as a higher risk of diabetes, heart disease, and stroke. While the precise reasons of metabolic syndrome are still up for debate, there is evidence that suggests tulsi can help with many of the symptoms and effects of metabolic syndrome.

Tulsi has been demonstrated to have anti-diabetic efficacy in numerous test tube, animal, and human research trials. Studies It has been demonstrated through the use of diabetic experimental animals that tulsi can lower blood glucose, rectify aberrant lipid profiles, and shield the liver and kidneys from the metabolic harm brought on by high glucose levels.<sup>[48]</sup> Additionally, studies using laboratory animals on high-fat diets have shown that tulsi can enhance lipid profiles,<sup>[49,50]</sup> reduce weight gain, hyperglycemia, hyperinsulinemia, hypertriglyceridemia, and insulin resistance,<sup>[51,52]</sup> as well as<sup>[49,53]</sup> shield organs and blood

vessels from atherosclerosis. Tulsi has also demonstrated in human clinical trials to lower blood glucose levels, enhance lipid and blood pressure profiles, and lessen several diabetic symptoms in individuals with type 2 diabetes.<sup>[57]</sup>

Tulsi has a variety of positive metabolic effects, including preventing free radical damage to the liver, kidneys, and pancreatic islet cells;<sup>[49]</sup> promoting the production of bile acids in the liver;<sup>[49]</sup> and decreasing the production of lipids in the liver;<sup>[52]</sup> and others.

improving insulin action and secretion<sup>[59]</sup>, lowering cortisol<sup>[60]</sup>, reducing inflammation<sup>[61]</sup>, and<sup>[59]</sup> <sup>[60]</sup> <sup>[59]</sup> levels. Because of its high eugenol and linoleic acid content and its ability to block both the cyclooxygenase and the lipoxygenase routes of arachidonic acid metabolism, tulsi is thought to have anti-inflammatory properties that have been shown in both acute and chronic inflammatory models in animals<sup>[62,63,64,65],[66,67]</sup> This enables tulsi to exert anti-inflammatory effects comparable to those of nonsteroidal anti-inflammatory medications such as phenylbutazone,<sup>[68]</sup> ibuprofen, naproxen, aspirin, and indomethacin.<sup>[70]</sup>

#### Anti-infection measures

According to recent studies, tulsi has anti-bacterial, anti-viral, and anti-fungal properties<sup>[71]</sup>, including activity against a variety of pathogens that cause illnesses in humans. Tulsi has also been demonstrated to strengthen immunological responses in both non-stressed and stressed animals, as well as healthy humans,<sup>[72,73,74,75,76,77],[78]</sup> Despite the absence of published human trials, there is experimental evidence that suggests tulsi may be effective in treating a number of bacterial infections in humans, including urinary tract infections, skin and wound infections, typhoid fever, cholera, tuberculosis, gonorrhoea, acne, herpes simplex, leishmaniasis, various pneumonias, fungal infections, and diseases spread by mosquitoes like dengue, malaria, and filariasis.<sup>[93,94,95]</sup>

Tulsi has also been demonstrated to be effective in reducing infection rates in cows,<sup>[96]</sup> poultry,<sup>[97]</sup> goats,<sup>[98]</sup> fish,<sup>[76,77]</sup> and silkworms through rearing.<sup>[99]</sup> The ability of tulsi to fight off water- and food-borne viruses further supports its potential use in food preservation<sup>[100,101,102]</sup>, herbal raw material<sup>[103]</sup>, water purification<sup>[82]</sup>, and hand sanitizer applications.<sup>[104]</sup>

Tulsi's broad-spectrum activity, which includes activity against *Streptococcus mutans*, the germ that causes tooth decay, further points to the possibility that it can be used as a herbal mouthwash to treat oral conditions such as mouth ulcers, gum disease, and bad breath.<sup>[105,106]</sup>

This has been proven in clinical studies that show using tulsi as a mouthwash to reduce the levels of *Streptococcus mutans* is just as efficient as using 0.2% Chlorhexidine and Listerine.<sup>[107]</sup> Additionally, a tulsi-containing herbal mouthwash is chosen for its flavour and effectiveness. ctive against a variety of animal diseases, leading to its usage in animal medicine. convenience.<sup>[108]</sup>

Tulsi is beneficial for healing wounds because to its special blend of antibacterial, antioxidant, anti-inflammatory, and analgesic properties.<sup>[109,110]</sup> Experimental data supporting this claim has demonstrated that tulsi can boost an animal model's ability to break open wounds and speed up wound healing.<sup>[110,111]</sup> Tulsi has also been shown to have anti-ulcer and ulcer-healing activity that has been observed in a variety of animal models, including those that induce ulceration through the use of aspirin, indomethacin, alcohol, histamine, reserpine, serotonin, acetic acid, meloxicam, cold restraint, pyloric ligation, and stress.<sup>[112,113,114]</sup> This anti-ulcer effect is attributed to a number of processes, including the inhibition of offensive factors like acid-pepsin production and lipid peroxidation and the stimulation of defensive mechanisms that protect the stomach, like mucin secretion, cellular mucus, and mucosal cell longevity.<sup>[114,115]</sup>

### **Mental Agitation**

Along with physical, toxic, andBecause of the numerous demands and quick speed of modern life, modern living is linked to increased levels of psychological stress. The toxic consequences of chemical pollutants are exacerbated by this tension, and the ongoing worry about dangerous chemicals being all around us can produce stress and anxiety that may be just as harmful as the chemicals that are generating it. The fact that people are exposed to chemicals on a daily basis cannot be denied, but regular tulsi use not only safeguards and detoxifies the body's cells and organs but also can help lessen toxic stress by calming the mind, reducing anxiety, and providing a variety of psychological advantages such as antidepressant activity and enhancements to memory and cognitive function.

Various animal species have been used to study the tulsi's psychotherapeutic effects. According to studies, tulsi possesses anti-anxiety and anti-depressant qualities,<sup>[116,117,118]</sup> with effects that are equivalent to those of diazepam and antidepressant medications.<sup>[119,120]</sup> Tulsi improves memory and cognitive function<sup>[121,122]</sup> and guards against age-related memory losses, according to additional animal studies.<sup>[123]</sup> Tulsi has also been shown to lessen stress, anxiety, and depression in human studies.<sup>[124]</sup> A 6-week, randomised, double-blind, placebo-



controlled study found that tulsi significantly reduced general stress scores, sexual and sleep problems, and symptoms like forgetfulness and exhaustion.<sup>[125]</sup>

While current scientific research suggests that tulsi is effective in treating a variety of stressful conditions, tulsi is more frequently recommended in Ayurveda as a preventive measure to improve one's capacity to adapt to both psychological and physical stress and thereby avoid the onset of diseases associated with stress. As a result.

### **Water Yoga**

Tulsi tea drinking on a regular basis can be compared to yoga practice on a regular basis, both of which are "adaptogenic" since they nourish the body, mind, and soul while promoting a sense of calm and wellbeing. Contrarily, frequent exercise, which promotes health through stimulation and activation, is comparable to the regular use of caffeinated beverages like black, green, and coffee (*Coffea arabica* L.), as well as tea (*Camellia sinensis* L.).

Tulsi, like yoga, has a soothing impact that promotes mental clarity as well as a more laid-back and serene demeanour. Because caffeine-containing drinks like coffee and tea heighten alertness and may result in physical and mental agitation, tulsi's cognitive and memory-enhancing qualities contrast with those of those beverages. Additionally, tulsi is safe to regularly use without the worry of withdrawal symptoms because it does not cause the same physical dependence as caffeine.

The ritualised consumption of tea and coffee has been ingrained in many cultures to direct social interactions, define social agendas, and evoke spiritual awareness. It has also become an essential element of modern life. The ritual of "afternoon tea" or "high tea," for instance, in the west emphasises the setting, the equipment, the manners, and the social circle, but sophisticated Asian tea ceremonies involve a full series of rituals, tools, and gestures that aim to transcend normal consciousness. Many individuals ritualize their morning cup of coffee in less formal settings and utilise the "meet-up for coffee" to plan their social agendas, while the "tea break" is frequently used to arrange social agendas. the daily labour regimen of the modern day. Although tea and coffee have adapted to modern life, they still do not enjoy the same standing as tulsi in traditional Indian culture.

### **Holy Tulsi**

Every component of the tulsi plant is venerated and regarded as sacred in Hinduism,

including the leaves, stem, flower, root, seeds, and oil. Tulsi is worshipped as a goddess. Even the local soil, which has lately been discovered to house advantageous endophytic fungi<sup>[126]</sup>, is regarded as a part of the divine. The tulsi plant, which is traditionally grown in an elaborate earthen pot and kept in a courtyard where it serves both practical and ceremonial purposes, is therefore considered necessary for all Hindi homes. For instance, tulsi has a distinct perfume resembling that of cloves due to the significant amount of eugenol it contains serves to ward off mosquitoes, flies, and other dangerous creatures while also tying the homeowner to the divine. Evening and morning rituals, as well as other spiritual and cleansing practises that may involve sipping tulsi tea or its leaves, further integrate tulsi into daily life.



Tulsi is used ceremonially in Hinduism and some Greek Orthodox Churches to make "holy water" in addition to sanctifying the home. Tulsi malas, which are beadstrings used to aid in mind concentration during meditation, chanting, and devotional practises and so ceremonially unite the mind, body, and spirit, are also made from tulsi wood or seeds. Thousands of tulsi plants have been grown all over the world as a result of the use of tulsi in cities to reduce air pollution.

### **Nature's nurturing**

Growing and honouring the tulsi plant at home not only fulfils specific religious requirements, but also directly connects the devotee with nature's creative force. The benefits

of being connected to nature are profoundly restorative and life-affirming, but they are only now beginning to be understood in the west, where a lack of connection to nature and "nature deficit" are widespread. According to a study of the scientific literature on the health advantages of being in touch with nature, "access to nature plays a vital role in human health, wellbeing, and development that has not been fully recognized,"<sup>[128]</sup> and there is now a global movement to promote this idea. Concerns over the nature deficit, sedentary behaviour, obesity, mental health problems, excessive media usage, environmental degradation, wildlife conservation, sustainability, and climate change have given rise to a movement to re-connect people with nature.<sup>[129]</sup>

It follows that placing a living tulsi plant in the middle of the home has relevance that extends beyond Hinduism. By embodying the healing power of nature and acting as a continual reminder of living nature, it may help solve contemporary challenges.

### **Identification and quality control**

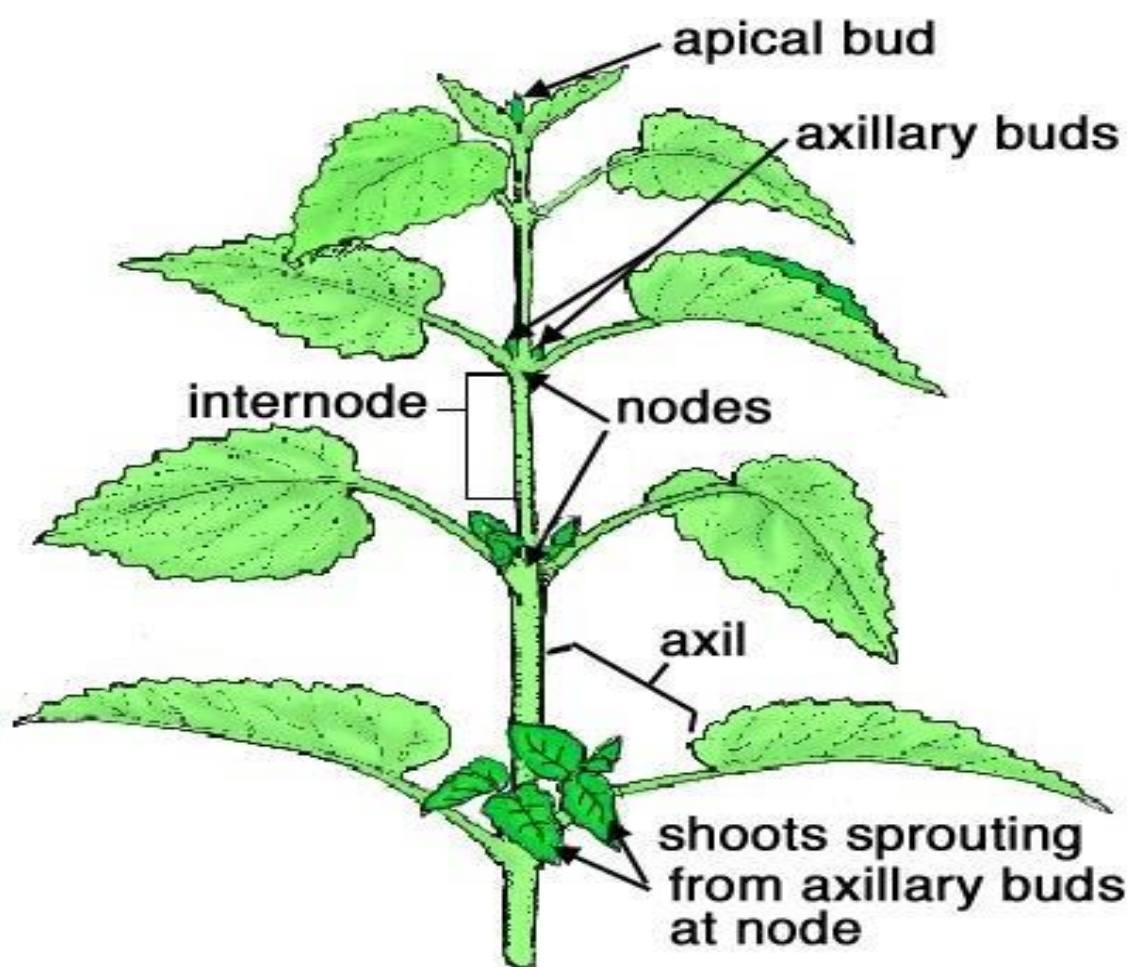
Tulsi's therapeutic worth must be preserved by the use of the best cultivation, harvesting, preservation, and storage practises, just like with any other medicinal plant. For instance, it is advised that pollution.<sup>[3]</sup> The discovery of hazardous components at almost twice the quantity in tulsi leaves grown in polluted areas compared to unpolluted ones supports this.<sup>[130]</sup>

Making ensuring the right herb is utilised and that manufacturers follow strict quality assurance procedures are also vital. There have been reports of a high incidence of substitution with substitute herbs like *Ocimum basilicum* L, which has raised questions about product quality in European "tulsi" goods.<sup>[131]</sup> To assure batch-to-batch quality, the safety and botanical integrity of standardised extracts, this can be addressed utilising high-performance liquid chromatography fingerprints and microscopic testing.<sup>[131,132]</sup>

### **Tulsi as a means of awakening**

The fact that tulsi is available worldwide is perhaps one of its biggest advantages in the modern world. tulsi be grown using organic methods in rural locations away from environmental on the use of organic, fair trade, ethical, and ecological farming methods in its production. Growing awareness indicates that agriculture needs to evolve from a "green revolution" to a "ecological intensification revolution" in order to address challenges with food security, rural poverty, hunger, environmental degradation, and climate change. This is emphasised in a recent United Nations report titled "Wake Up Before It's Too Late," which

urges the international community to support and promote local solutions to toxicity, food insecurity, and poverty, such as the use of organic and small-scale farming over the use of genetically modified organisms and monocultures.<sup>[133]</sup> Organic India Pvt.Ltd. has successfully used ecological farming techniques to cultivate tulsi, despite the fact that they are not specifically suited to the herb. This business, which was founded as a "vehicle of consciousness," collaborates with thousands of organic tulsi farmers in India to create a business ecosystem that gives rural Indian farmers their dignity and a healthy and sustainable livelihood while helping to care for the land they live on. They also produce a variety of teas that allow people all over the world to access the benefits of tulsi.



## CONCLUSION

Tulasi is a plant that can be worshipped, consumed, made into tea, and used for medicinal and spiritual purposes in daily life. Modern scientific research on tulsi shows the many psychological and physiological benefits from consuming tulsi and serves as a testament to the wisdom found in Hinduism and Ayurveda. The production of tulsi goes beyond providing

advantages for individuals and households and begins to address more significant social, economic, and environmental challenges by offering a focus for moral, ethical, and ecological agricultural practises that provide a living for thousands of farmers.

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