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# Review Article on Immunity Boosting Plant's in Satpuda Region

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**Abstract**
The immune system is a complex biological defense network that protects the human body from pathogenic microorganisms and malignant cells. In recent years, the global emphasis on natural immunoboosters has increased due to their safety, accessibility, and therapeutic potential. This review focuses on the immunomodulatory properties of various herbal plants found in the Satpuda region, including Ocimum sanctum (Tulsi), Trigonella foenum-graecum (Fenugreek), Moringa oleifera (Moringa), Murraya koenigii (Curry leaves), Bambusa spp. (Bamboo shoots), Colocasia esculenta (Colocasia leaves), Amaranthus spp. (Amaranth leaves), Emblica officinalis (Amla), and Tinospora cordifolia (Giloy). Each of these plants contains bioactive compounds such as flavonoids, alkaloids, saponins, tannins, and essential vitamins that play a crucial role in modulating immune responses. Their mechanisms of action include stimulation of phagocytic activity, regulation of cytokine production, enhancement of antibody formation, and antioxidant defense. Lifestyle factors—such as nutrition, sleep, and exercise—further complement the efficacy of these herbal immunoboosters. Collectively, these findings highlight the pharmacological and preventive potential of Satpuda's traditional flora in promoting immune health and combating infections through natural and sustainable means.

**Keywords:** Immunoboosters, Herbal plants, Satpuda region, Immunomodulation, Phytoconstituents, Natural medicine, Antioxidant activity.

## Introduction:

The body is protected from harmful cells and pathogens like bacteria, viruses, and fungi by the immune system, a complex network of specialized cells, organs, proteins, and chemicals. [1] It includes both adaptive (specific) and innate (non-specific) immunity. [2,3] This system's malfunction makes people more vulnerable to infections and illnesses like allergies, inflammatory bowel disease, and rheumatoid arthritis. [4–6] Bioactive compounds that boost immunity may be present in plant-based functional foods, which are prepared from natural or unprocessed plants. [7] The immune system defends critical organs from infections, cancerous cells, bacteria, and poisons, including the skin, gastrointestinal tract, and respiratory system. [8] The body's first non-specific line of defense against infections is innate immunity, which takes effect quickly after exposure. [9] Even though adaptive immunity is memoryless, repeated exposure allows it to produce pathogen-specific responses that are easier to recall when exposed again. [10] Innate and adaptive systems work in tandem, and changes to one can impact the responses of the host. [11–13] The body is shielded from illnesses and infections by the intricate immune system. [14] It recognizes and separates

dangerous pathogens from healthy cells and tissues, including bacteria, viruses, and parasites. White blood cells, antibodies, and cytokines are essential elements that cooperate to eradicate infections and stop their spread. [15] The immune system uses white blood cells, or leukocytes, to identify and combat pathogens when they enter the body. [16] These include phagocytes, which take up and eliminate pathogens, and lymphocytes, which generate antibodies to target infections. Pathogens are specifically recognized by antibodies, which allows for their elimination. By directing cells to infection sites, cytokines—chemical messengers made by immune cells—control and guide immune responses. [17]

Even though the immune system successfully guards against illnesses, a number of things can impair it, making the body more susceptible to infections. These consist of a poor diet, sedentary lifestyles, long-term stress, and exposure to pollutants in the environment. [18] "Immunoboosters" are products or techniques that are thought to improve immune function. These include probiotics, vitamins, minerals, herbal supplements, and healthy lifestyle choices like stress reduction and exercise. They seek to improve immune responses against infections and fortify the body's defenses. [19]

## TYPES OF IMMUNO-BOOSTERS [20]


**1. Natural materials:** Herbs, minerals, and vitamins all support healthy immune function as natural immunoboosters. Zinc helps white blood cells fight off dangerous bacteria and viruses, while vitamin C encourages the production of white blood cells. Herbs with antiviral and antibacterial qualities, such as garlic and echinacea, help the body fight off infections.

**2. Vaccines:** In order to increase the production of antibodies, vaccines, which are immunoboosters, introduce a tiny quantity of a pathogen. This primes the immune system to identify and fight the illness later on. Infectious diseases like measles, polio, and COVID-19 have been effectively prevented by them.

**3. Medications: "**Immune modulators" are medications that control the immune system and are used to treat cancer, chronic infections, and autoimmune diseases. For example, interleukins aid in the treatment of autoimmune diseases such as rheumatoid arthritis, while interferon strengthens the immune response against specific malignancies and viral infections.

**4.Changes in lifestyle:** Immune system strength can be achieved through healthy lifestyle choices. The most important things are stress management, regular exercise, a healthy diet, and enough sleep. A diet high in fruits, vegetables, and whole grains supplies vital nutrients for immune function; stress management prevents immune suppression; exercise enhances circulation and lowers inflammation; and sleep promotes cell repair.

## HOW IMMUNE BOOSTERS FUNCTION :- [21]

**Minerals and Vitamins:** Minerals and vitamins are essential for immune system support. While vitamin E boosts immune cell activity, vitamin C helps produce white blood cells. By encouraging the growth and activity of immune cells, minerals like iron, zinc, and selenium also strengthen the immune system.

**Probiotics:** Probiotics are helpful microbes that help the body fight infections by boosting the production of antibodies and improving the activity of immune cells like T cells and natural killer cells.

Medicinal herbs: The immune system is strengthened by some medicinal herbs. Herbs like astragalus,

ginseng, and turmeric improve immune cell function, while echinacea increases white blood cell production and immune activity.

**Workout:** By enhancing blood flow, lowering inflammation, and reducing stress, exercise increases immunity. Frequent exercise helps the body produce more white blood cells and antibodies, which improves its ability to fight infections.

**Slumber:** Immune system function depends on getting enough sleep. The body releases anti-inflammatory and anti-infection cytokines while you sleep. Lack of sleep impairs immunity and increases the chance of getting sick.

**Vaccines:** By encouraging the body to produce particular antibodies against a pathogen, vaccines increase immunity. A tiny, safe dose of the pathogen teaches the immune system to identify and combat the infection in the future.

**Immunomodulators:** Immunomodulators control immune responses, boosting or inhibiting them as necessary. They can lower immune activity in autoimmune disorders or increase immunity in cancer patients undergoing chemotherapy.

## IMMUNE SYSTEM FUNCTIONS AND LIFESTYLE FACTORS [22]

**Sleep:** The body can heal and repair itself when it gets enough sleep. The immune system releases cytokines while you sleep, which aid in the fight against inflammation and infection.

**Diet:** Strong immunity requires a balanced diet full of fruits, vegetables, whole grains, lean meats, and healthy fats. Immune system function is significantly influenced by minerals like zinc and selenium as well as vitamins A, C, D, and E.

**Exercise:** Frequent exercise increases the production of white blood cells and antibodies, improves circulation, and lowers inflammation, all of which strengthen immunity.

**Management of stress:** Prolonged stress impairs immunity, increasing susceptibility to infections. Deep breathing, yoga, and mindfulness are some techniques that help boost the immune system and lower stress. Avoiding bad habits: Smoking and binge drinking can weaken the immune system and raise the risk of infection.

## IMMUNOBOOSTERS AS A PREVENTION OF ILLNESS :-

Immunoboosters improve the body's resistance to infections, thereby preventing diseases like the flu and colds. A healthy diet, consistent exercise, getting enough sleep, and taking supplements like zinc and vitamins C and D are all ways to boost immunity. Eating a lot of fruits and vegetables, which are high in antioxidants that shield cells from harm and lower inflammation, is another efficient strategy for enhancing immune function. [23]

## IMMUNO BOOSTING HERBAL PLANT IN SATPUDA REGION

**1.Tulsi**

**Synonyms:**

**English - Holy basil, Sacred basil, Indian basil**
**Sanskrit - Tulasi, Nagamata, Surasah**
**Hindi - Tulsi**
**Marathi - Tulshi**

**Biological source:** Tulsi is an aromatic perennial plant of Ocimum sanctum .

**Family:** Lamiaceae.

**Figure No 1: Tulsi plant**

**Description: -**

Holy basil is native to the Indian subcontinent and flourishes across Southeast Asia. Hinduism holds the plant in high regard, and both traditional and conventional medicine regularly employ it as a herbal tea to treat a variety of ailments. Because of its strong taste, which intensifies when cooked, it is also used as a culinary herb. It tastes hot and peppery, like mint, cloves, and Italian basil (Ocimum basilicum). It is considered an agricultural weed and an invasive plant in certain places that are far from its natural range. [24–29]

**Active constituents: -**

Carvacrol, β-elemene, β-caryophyllene, ursolic acid, rosmarinic acid, eugenol, and germacrene are only a few of the many compounds found in the herb Ocimum sanctum. Ocimum holy is said to have diuretic and stimulating properties. [24-29]

**Mechanism of action: -**

Tulsi's multifaceted antimicrobial qualities, which include antibacterial, antiviral, antifungal, antimalarial, and antiparasitic effects, make it effective against a wide range of bacteria. Additionally, it has immunomodulatory, hepatoprotective, cardioprotective, neuroprotective, anti-inflammatory, and antioxidant properties. These characteristics aid in the restoration of general health by assisting the body in managing stressors that are chemical, physical, viral, and emotional. Phytonutrients, antioxidants, vitamins, minerals, chlorophyll, and eugenol—a substance with antibacterial and stress-relieving properties—are abundant in tulsi leaves. It may be helpful to eat four to five fresh leaves a day, either in tea or right after washing. [24–29]

**2. Fenugreek**

**Synonyms: Hindi** Methi (मेथी)

**Tamil** Ventayam (வெந்தயம்)

**Gujarati** Methi (મેથી)

**Bengali** Methi shak (মেথি)

**Punjabi** Methi (ਮੈਲਾ)

**Biological source:** Fenugreek consists of leaves of Trigonella foenumgraecum.

**Family**: Fabaceae

**Figure No 2: Fenugreek plant**

**Description: -**

Fenugreek is grown as a crop in India and the Mediterranean region during the chilly months with both rainfall and irrigation. It grows on a range of soil types that typically drain well and have a pH between 5.3 and 8.2. Fenugreek grows naturally in semi-highland and mountainous areas, arid meadows, valleys, and areas with an underdeveloped surface. [30–32]

**Active constituent:**

Nitrogen compounds that belong to the non-volatile and volatile ingredient groups, together with carbohydrates, proteins, lipids, alkaloids, flavonoids, fibers, saponins, and steroids, are the primary constituents of fenugreek seeds.[30-32]

**Mechanism of action: -**

There are many health advantages to fenugreek. Its seeds aid in the treatment of stomach ulcers, skin hydration, and body purification through blood and lymphatic system cleansing. It is used as a galactagogue to encourage breastfeeding and to treat sinus infections and hay fever. Fenugreek also helps people with smallpox by cooling them down, promoting heart health, and acting as an aphrodisiac. It boosts immunity and is regarded as a natural antioxidant in Ayurveda. Fenugreek is used as a vegetable, herb, or spice. Because it contains vitamin E, it also serves as a preservative and enhances the flavor of a variety of foods. A traditional remedy for fever is a concoction of fenugreek, honey, and lemon. [30–32]

**3. Moringa (Drumstick Tree - Moringa oleifera)** [33]

**Synonym :- English** Drumstick tree, Horseradish tree

**Hindi** Sahijan, Saguna, Sainjna

**Tamil** Murungai

**Marathi** Shevga

**Punjabi** Sainjna, Soanjna, Surjana

**Gujarati** Suragavo, Saragyo

**B.S:-** Moringa (Moringa oleifera), a small deciduous tree of the Moringaceae family,

**Family:-** Moringaceae

**Figure No 3: Moringa plant**

**Description:** Moringa trees have black, corky bark and can reach a height of around nine meters (30 ft). The leaves feature oval-shaped leaflets with noticeable swellings (pulvini) at the join section and are bi- or tripinnately compound. The pointed, dagger-like fruits are explosively dehiscent and can occasionally reach a length of 18 inches (45 cm). Its different portions have unique pharmacological and biological capabilities and are high in proteins, nutrients, and minerals.

**Active constituent**: The chemical constituents of M. oleifera stems, leaves, flowers, Pods and seeds are analyzed for the purpose of bioactive compounds, demonstrating the predominance of secondary metabolites, like phenolic acids, acid, ellagic acid, chlorogenic acid, ferulic acid, glucosinolates, flavonoids, quercetin, vanillin and kaempferol, which have nutritional, pharmaceutical and/or antimicrobial properties. However, the amount of these metabolites in M. oleifera extracts varies consistent with geographic location, soil, sun exposure and climate.[33]

**Mechanism of action**: Neurogenesis, synaptic plasticity, memory, and learning are all impacted by flavonoids' effects on neuronal signaling and gene expression in the brain. [34] Hesperidin and naringenin are examples of citrus flavonoids that function as antioxidants that can penetrate the blood-brain barrier and aid in the treatment of neurodegenerative illnesses. [35] They shield plants from UV rays, parasites, and viruses while controlling metabolic enzymes. [34] Studies on hesperidin in different nerve cell models demonstrate its function in preventing neurodegeneration, while hesperetin offers neuroprotection. [36] By scavenging free radicals, boosting endogenous antioxidants, and lowering ROS formation, flavonoids shield cells. [37] Additionally, they affect disease prevention by modifying immune function. [38] Flavonoids' immunomodulatory properties help prevent atherosclerosis and the spread of cancer by regulating immune responses, reducing LDL oxidation, and inhibiting eosinophilic inflammation. [37] [39] [40]

**4. Curry Leaves - Murraya koenigii**

**Synonym :-** Tamil:-Karivempu,
Bengali:-Barsunga,
Hindi:-Kurrypatte ,
Marathi :- Kalipatta

**Genus:-** Murraya J. Koenig ex L.

**Species:-** Murraya koenigii (L.)Spreng

**Family:-** Rutaceae

**Figure No 4: Curry Leaves**

**Description :-** The fastest-growing variety of Murraya koenigii is the standard variety, which has attractive, dark green leaves. The dwarf variety grows as a shrub with spread branches that give it a bushy appearance. Its light green leaves are somewhat higher than those of the ordinary variety, and it has a

distinct scent. The brown variety, which is dark brown in color and has the thickest, smallest leaf structure, is the most aromatic. [41]

**Active constituent**:- Mature curry leaves contain 63.2% moisture, 1.15% protein, 14.6% carbohydrates, and 13.06% ash. Oxalic acid, resin, carbazole alkaloids, and bioactive substances like koenigin, cyclomahanimbicine, bicyclomahanimbicine, murrayastine, coumarine, koenidine, and pypayafoline are abundant in them. The pharmacological and volatile oil characteristics of the plant are influenced by carbazole and its derivatives, particularly bicyclomahanim bicine and mahanimbicine. [42] In addition to proteins, carbohydrates, fiber, minerals, carotene, vitamin C, and nicotinic acid, curry leaves also contain alkaloids such as koenimbine, mahanine, isomahanine, bismahanine, andmurrayacine. [43,44] Furocoumarins like xanthotoxin and byakangelicol, as well as bioactive carbazole alkaloids like kurryam, koenimbine, and koenine, are found in *Murraya koenigii* seeds. Indicolactone and 2,3-epoxyindicolactone, the first furocoumarin with a monoterpenoid lactone chain identified in the genus Murraya, are among their special compounds. [43, 44]

**Mechanism of action :-**

M. koenigii was shown to have immunomodulatory and anti-inflammatory effects based on the expression of interleukin (IL)-2, 4, 10, and tumor necrosis factor-alpha (TNF-α) [45] . Its aqueous extract offers immunomodulation through antioxidant and immunosuppressive mechanisms, which are crucial in treating ethanol-induced liver injury, according to an animal study [46] . M. koenigii decreased inflammatory pain in albino rats [47] . The potential of methanol leaf extracts to support humoral immunity and phagocytic function as an immunomodulatory agent is demonstrated by their increased antibody titres against ovalbumin, protection against cyclophosphamide-induced myelosuppression, and enhanced phagocytic activity [48] .

**5. Bamboo Shoots - Bambusa spp.**

**Synonym :-**

English:- (Bamboo, Bamboo manna, Giant Thorny Bamboo);
Hindi:- (Bans- lochana, Banskapur, Vanoo, Banz);
Marathi:- (Bansa, Baambii, Bansamitha);
Gujarati :- (Toncor, Wans, Vanskapur, Vas-numitha);

**B.S:-**

**Family** : Poaceae
**Subfamily :** Bambusoideae
**Supertribe :** Bambusodae

**Figure no 5: Bamboo shoot**

**Description:-** There are 23 genera and 136 species of bamboo in India [49]. Although some can withstand temperatures as low as 20°C, most bamboos grow best in warm, humid climates with rich soil. Plains, hills, high-altitude regions, and most soil types—aside from alkaline soils, deserts, and marshes—are

among their habitats [50] . Rhizomes (subterranean stems) and culms (above-ground stems) make up bamboo, which grows to full height and diameter in a single season of three to four months. The majority of culms are cylindrical, hollow, 0.25–12 inches in diameter, and 1–120 feet tall [51] .Bamboo can grow up to 250 cm (98 in) per day, making it a high-yield, fast-growing renewable resource. With 40–50 stems per clump, 10–20 culms are added each year, reaching full height in 4–6 months. Depending on the species, the culms mature in 2–6 years [52]

**Active constituent:** Cellulose, hemicellulose, and lignin make up more than 90% of the mass of bamboo culms. Resins, tannins, waxes, and inorganic salts are the minor components of bamboo. However, bamboo has more silica, ash, and alkaline extractives than wood [53] . In addition to cellulose and lignin, bamboo also includes additional organic materials. It has around 2-6% starch, 2% deoxidized saccharide, 2-4% fat, and 0.8-6% protein [54]

**Mechanism of action:**

1. Context of medicine and digestion: Because of their high dietary fiber content, bamboo shoots have a mechanical effect that physically cleans the intestinal lining, increases stool volume, and promotes intestinal movement (peristalsis). Their main action is laxative or bowel-regulating due to insoluble fiber.
2. Context of food processing and texture: Bamboo shoots have a mechanical mouthfeel due to their crisp, fibrous texture. Because fibrous bundles' cell walls are primarily made of cellulose and lignin, they resist chewing and provide textural contrast.
3. Context of mechanics and structure (biomaterial): Excellent tensile strength and flexibility are displayed by young bamboo culms. Their fibrous arrangement creates a robust, lightweight natural composite that stimulates research into green composites and bio-based materials.

6. **Colocasia Leaves (Arbi or Aloo Leaves - Colocasia esculenta)**

**Synonym :-** Hindi Arbi (अरबी), Kachalu (कचालू), Ghuyya, Arvi
Marathi Alu (अळू), Alukanda
Gujarati Arbi, Dakku, Alavu
Sanskrit Alupam, Aalukee

**B.S :-** Colocasia esculenta

**Family :-** Araceae family [55]

**Figure No 6: Colocasia leaves**

**Description :-**Large peltate leaves and thick, starch-rich subterranean corms are its primary storage organs. Six Since this method is more dependable than seed propagation, the plant is frequently reproduced

vegetatively using corms, cormels, or stolons. [56] According to botany, there are two main varieties of taro: the eddoe-type, which produces many side-corms, and the dasheen-type, which has a bigger core corm and few side-corms, indicating variations in physiology and use. [56,57] Additionally, taro exhibits a significant degree of morphological plasticity, varying greatly among cultivars. [57]

**Chemical constituent :-**Vicenin-2, isovitexin, iso-vitexin 3'-O-glucoside, vitexin X'-O-glucoside, iso-orientin, orientin, orientin 7-O-glucoside, and luteolin 7-O-glucoside are among the active flavonoids and triterpenoids found in colocasia leaf extracts. In addition, the leaves contain fiber, calcium oxalate, vitamins A, B, and C, minerals, and carbohydrates [58] . According to phytochemical analyses, the leaves of *C. esculenta* contain flavones, luteolin, apigenin, and anthocyanins [59] . With substantial carbohydrates and total amino acids ranging from 1,380 to 2,397 mg/100 g, taro tubers are high in globulins (more than 80% of total proteins), small granules, and 70–80% starch (dry weight) [60]

**Mechanism of action :** It has long been demonstrated that taro components improve immunity, which may lower the risk of cancer or slow the growth of tumors. In mice, tarin stimulates the growth of the spleen and bone marrow cells while shielding bone marrow progenitor cells. While tarin-sensitized splenocytes produced important anticancer cytokines like IL-2, IL-1β, TNF-α, and IFN-γ, intraperitoneal taro extract (1 mg/animal) stimulated granulocytic cells and B lymphocytes. Because tarin is found in C. esculenta, regular consumption may help immunocompromised patients, such as chemotherapy recipients, recover from leukopenia or increase immunity in healthy individuals [61,62]

**7. Amaranth Leaves - Amaranthus spp. (Rajgira)**

**Synonym :-Sanskrit:** Marisarakta, aramasitalika

**Marathi:** Mash

**Hindi:** Lal Marsa Kannada: Dantu, Harave Soppu, Dantina Soppu, Chikkarive

**B.S of whole plant of Amaranthus tricolor**

A. gangeticus Linn., A. melancholicus Linn., A. polygamous Linn. Hook. f. A. tristis Linn.

**Family:-**Amaranthaceae

**Description :-**Roots with The tap root is cylindrical, yellow, and has rootlets. The stem is cylindrical, purplish pink, fractured, and has longitudinal ridges and furrows. Simple, rhomboid, ovate, lanceolate, obtuse apex, petiolate, membranous, and purple pink leaves that are 5–12 cm long and 2.5–7 cm broad. Clustered spike flowers with a bracteole, lanceolate shape, membrane perianth, three pinkish-white sepals, three stamens, and dorsifixed anthers. The seed is smooth, lustrous black, biconvex, and has a diameter of 1.5 mm. [63]

**Figure No 7: Amaranthus spp.**

**Chemical constituent:** tricolor leaf extract was made by cold maceration with methanol. Carbohydrates, amino acids, proteins, steroids, alkaloids, glycosides, flavonoids, and tannins were found in the initial phytochemical screening. [64]

**Mechanism of action:**

**Antioxidants protect immune cells** **Mechanism:** Flavonoids and phenolics neutralize reactive oxygen species (ROS), preventing oxidative damage to T-cells, macrophages, and NK cells.

**Impact:** Strengthens immunity by maintaining immune cell integrity and function in the face of stress or infection.

The body's first line of defense against infections, innate immunity, is strengthened by amaranthus polysaccharides and peptides, which also activate macrophages and improve phagocytosis, aiding in the engulfment of pathogens and debris.

IL-2, IL-6, IFN-γ, and TNF-α are immune-signaling molecules that are regulated by compounds like betacyanins.

**Impact:** Encourages balanced immune responses, effectively combating infections and avoiding chronic inflammation [64]

**8. Amla**

**Synonym :-** [65]

**English:** Emblic myrobalan ,

**Indian:** Goose berry

**Sanskrit:** Aamalaki

**Hindi:** Amla

**Kannada:** Nelli Kayi

**Marathi:** Amla

**B.S:-** [65]

**Family:** Euphorbiaceae

**Genus:** Emblica

**Species:** officinalis Geartn.

**Figure No 8: Amla**

**Description :-** The tree is a medium-sized deciduous species that can reach a height of 8 to 18 meters. Its light gray bark exfoliates in tiny, irregular flakes. It has simple, subsessile, light green leaves resembling pinnates, closely spaced along the branchlets [65]. The fruits have slight conic depressions at both apexes and are approximately spherical, measuring 15–20 mm in length and 18–25 mm in width. The endocarp matures to a yellowish-brown color, while the mesocarp remains yellow. Fresh fruits weigh between 60

and 70 grams on average, are pale green, and ripen to light brown. Four to six smooth, dark brown seeds that are up to 12 mm thick and shine grayish-brown or grayish are found inside each fruit [66]

**Chemical constituents:** Fruits of *Emblica officinalis* are rich in tannins, which make up 28% of the tannin content of the plant. Emicanin A and B, hydrolyzable tannins found in the fruits, hydrolyze to produce glucose, gallic acid, and ellagic acid. Phyllemblin is also present. Leucodelphinidin occurs in the bark, while ellagic acid and lupeol are found in the roots. Rich in linolenic (8.8%), linoleic (44%), oleic (28.4%), stearic (2.15%), palmitic (3%), and myristic (1%) acids, the seeds yield 16% stable brownish-yellow oil [67,68] Compared to apples, the fruit contains more minerals and amino acids, such as copper, zinc, and chromium. The alkaloids phyllantine and phyllantidine, along with fixed oil, phosphatides, and minor essential oil, are found in leaves along with gallic, chebulic, ellagic, chebulinic, chebulagic, and amlic acids [66].

**Mechanism of action :-**

raises white blood cell numbers and other indicators of improved human immunity [69]

**9.Giloy :-**

**Synonym :-**Sanskrit Guduchi, Amrita, Amritavalli
Hindi Giloy, Guduchi, Amrita
English Heart-leaved moonseed, Indian Tinospora
Marathi Guduchi, Amrita, Gulvel

**B.S :-** Tinospora cordifolia **FAMILY :-** Menispermaceae [70]

**Figure No 9: Giloy**

**Description :-** The large, smooth, perennial climbing shrub *Tinospora cordifolia* has weak, juicy, fleshy stems that eventually develop papery bark with deep furrows and turn woody. Its leaves are 5–10 cm long, alternate, petiolate, and heart-shaped, with a noticeable palmate veining [71] Small unisexual flowers are produced by the plant in axillary racemes or spikes; male flowers typically form clusters, while female flowers are solitary. The shrub produces small, pea-sized drupes with a single twisted seed inside that mature to a bright scarlet [72]

**Chemical constituents:** Tinospora cordifolia (Giloy) has a nutritional value of 292.54 kcal per 100 mg and is high in fiber (15.8%), proteins (4.5–11.5%), carbohydrates (61.66%), and low in fat (3.1%) [73] Additionally, it supplies vital minerals like iron (0.28%), chromium (0.006%), potassium (0.845%), and calcium (0.131%) [74] . Alkaloids, diterpenoids, lactones, glycosides, aliphatic compounds, polysaccharides, and steroids like tinosporine, tinosporide, tinosporaside, cordifol heptacosanol, and tinosporidine are among the phytochemicals found in the plant [75] .

**Mechanism of action :** By boosting macrophage activity, fresh giloy juice improves immunity and promotes an early recovery [76]. Compounds like 11-hydroxy muskatone, N-methyl-2-pyrrolidone, N-formylannanain, cordifolioside, A. magnoflorine, tinocordioside, and syringin function as immunomodulators with cytotoxic effects [77], and it fortifies the body's defenses [78] .

**Marketed Preparation :-**


**Figure No 10: Bamboo**

**Figure No 11: Giloy**


**Figure No 12: Tulsi**


**Figure No 13: Methi**


**Figure No 14: Curry Leaves**

**Conclusion:**

The present review emphasizes the significant role of herbal plants from the Satpuda region as potent natural immunoboosters. Plants such as Tulsi, Fenugreek, Moringa, Curry leaves, Bamboo, Colocasia, Amaranth, Amla, and Giloy exhibit diverse bioactive constituents that collectively enhance immune function and provide protection against various diseases. Their mechanisms involve stimulation of white blood cell production, modulation of cytokines, antioxidant defense, and regulation of inflammatory responses. In addition to their immunological effects, these herbs also contribute to improved general health, reduced oxidative stress, and prevention of chronic disorders. Integrating these medicinal plants into daily dietary or therapeutic practices could strengthen host defense naturally, with minimal side effects. Moreover, scientific validation and standardization of traditional herbal formulations from the Satpuda region could lead to the development of novel, plant-based immunotherapeutic agents. Therefore, exploring and conserving these indigenous plants is essential for sustainable health management and for advancing herbal immunopharmacology.

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