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# Pharmacological Effects and Safety Research Progress of the Ten Gui Herbs of Guangxi

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**ABSTRACT**
The "Ten Gui Herbs" represent the core group of authentic medicinal materials from Guangxi, comprising ten characteristic Lingnan herbs: Cinnamomi Cortex (Rougui), Siraitiae Fructus (Luohanguo), Anisi Stellati Fructus (Bajiaohuixiang), Curcumae Kwangsiensis Rhizoma (Guangxi Ezhu), Longan Arillus (Longyanrou), Sophorae Tonkinensis Radix et Rhizoma (Shandougen), Spatholobi Caulis (Jixueteng), Abri Cantoniensis Herba (Jigucao), Zanthoxyli Nitidi Radix (Liangmianzhen), and Pheretima (Guang Dilong). This study systematically reviews the current research status on the chemical composition, pharmacological effects, and safety of the "Ten Gui Herbs," providing a scientific basis for their rational clinical use, new drug development, and dietary therapy promotion. Research indicates that the "Ten Gui Herbs" possess a rich and diverse array of chemical components, including volatile oils, flavonoids, triterpenoids, alkaloids, and other active substances. Their pharmacological effects are extensive, covering cardiovascular protection, immune regulation, anti-inflammatory and anti-tumor activities, metabolic regulation, and other fields, demonstrating broad application prospects. However, safety studies remain unbalanced, with insufficient research on the toxic mechanisms and clinical risk assessment for some herbs. Future efforts should strengthen in-depth research on the pharmacodynamic material basis, mechanisms of action, and safety evaluations to promote the standardized application and industrial development of the "Ten Gui Herbs."

**KEYWORDS**
Authentic Medicinal Materials; Ten Gui Herbs; Chemical Composition; Pharmacological Effects; Safety

## 1 Introduction

Authentic medicinal materials are a crucial guarantee for the clinical efficacy and safety of traditional Chinese medicine (TCM), embodying the ecological advantages and medicinal traditions of specific regions. Guangxi, located in Lingnan, features a warm, humid climate and diverse soil types, nurturing abundant medicinal plant resources. The "Ten Gui Herbs" are a representative combination of high-quality medicinal materials validated through long-term clinical practice. These herbs are not only widely used in TCM clinics but are also integrated into folk dietary culture, becoming a core emblem of Guangxi's TCM industry. In recent years, with the advancement of TCM modernization research, the chemical composition and pharmacological effects of the "Ten Gui Herbs" have been gradually revealed. However, systematic summarization and organization are still lacking, and safety research presents significant gaps. Based on existing research literature, this paper provides a comprehensive review of the chemical composition, pharmacological effects, and safety of the "Ten Gui Herbs," offering a reference for their further development and utilization.

## 2 Pharmacological Effects of Ten Gui Herbs

### 2.1 Cinnamomi Cortex (Rougui)

Cinnamomi Cortex is the dried bark of *Cinnamomum cassia* Presl (Lauraceae) [1], primarily produced in Fangcheng, Pingnan, Guiping, etc. It thrives in warm, humid environments, tolerates no waterlogging, and is vulnerable to frost. Its chemical constituents are predominantly volatile oils, including cinnamaldehyde, cinnamic acid, cinnamyl acetate, cinnzeylanol, cinnzeylanine, as well as polysaccharides, cinnamoside, coumarin, and other components[2]. Pharmacologically [2-3], Cinnamomi Cortex promotes sympathetic nerve terminal release of catecholamines, exerting cardiotonic effects, dilating coronary arteries, improving myocardial blood supply, relaxing peripheral vessels, and lowering blood pressure, while also inhibiting platelet aggregation and enhancing hemorheology. It activates adrenocortical function, modulates hormone levels, and ameliorates Yang deficiency states and sexual dysfunction. In the gastrointestinal tract, it regulates peristalsis, alleviates diarrhea, stimulates bile secretion, relieves spasm, and exerts anti-ulcer effects via gastric mucosal protection and suppression of gastric acid and pepsin. Cinnamaldehyde modulates inflammation-related pathways and immune responses, exerting anti-inflammatory and analgesic effects. Multiple active constituents inhibit tumor cell proliferation and invasion and induce apoptosis. Additionally, Cinnamomi Cortex exhibits sedative, anticonvulsant, anti-aging, antimicrobial, antiviral, hypoglycemic, lipid-lowering, immunomodulatory, anti-hypoxic, and anti-arrhythmic activities [2].

### 2.2 Siraitiae Fructus (Luohanguo)

Siraitiae Fructus is the dried fruit of *Siraitia grosvenorii (Swingle*) C. Jeffrey ex A. M. Lu et Z. Y. Zhang (Cucurbitaceae)[1], which is mainly produced in Yongfu, Longsheng, and Lingui of Guilin, Guangxi. Yongfu County, known as the "Hometown of Siraitiae Fruit," represents one of its genuine producing regions. Guilin features a subtropical monsoon climate—warm, humid, with abundant rainfall—and its marine sediment-rich soil provides optimal ecological conditions for cultivation. The primary active constituents of *S. grosvenorii* are triterpenoid saponins and flavonoids, alongside lignans, carbohydrates, dietary fiber, amino acids, phenolic acids, steroids, and various trace inorganic elements, reflecting a diverse profile of nutritional and secondary metabolites[4]. Modern pharmacological studies [4] demonstrate that mogroside V exerts antitumor effects by promoting apoptosis, inhibiting invasion, and suppressing epithelial-mesenchymal transition in tumor cells. It also achieves multi-pathway, multi-target anti-renal cell carcinoma activity through modulation of signaling pathways such as PI3K/AKT and RAP1, as well as key targets including STAT3 and EGFR. Siraitiae Fructus, attributed to the lung meridian, clears heat, resolves phlegm, and relieves cough and dyspnea. Its antitussive effect is closely associated with inhibition of airway mucus secretion and attenuation of airway inflammation; this efficacy remains stable and is minimally influenced by producing area, cultivation method, or drying process. Mogroside potently regulates blood glucose by inhibiting α -glucosidase activity, thereby reducing diabetic chronic complications. *S. grosvenorii* polysaccharides enhance immune function, scavenge free radicals, and exhibit antioxidant, anti-aging, and anti-fatigue activities. Additionally, *S. grosvenorii* extract exerts anti-inflammatory effects via the gut – spleen axis and displays inhibitory activity against multiple bacteria and fungi, including *Escherichia coli* and *Staphylococcus aureus*. It also demonstrates broad pharmacological actions such as reproductive protection, neuroprotection, hepatoprotection, lipid regulation, immunomodulation, solubility enhancement, anti-pulmonary fibrosis, and alleviation of acute lung injury, underscoring its significant research value in both medicinal and health-promoting applications [4].

### 2.3 Anisi Stellati Fructus (Bajiaohuixiang)

Anisi Stellati Fructus is the dried ripe fruit of *Illicium verum* Hook. f. (Magnoliaceae) [1], is mainly produced in the Zuojiang and Youjiang regions of Guangxi, where favorable climatic and soil conditions contribute to its superior genuine quality. Its primary active constituents include volatile oils, flavonoids, phenolic acids, polysaccharides, organic acids, phenylpropanoids, and terpenoids [5]. Modern pharmacological studies indicate that Anisi Stellati Fructus exerts anti-inflammatory effects by inhibiting the release of inflammatory mediators, effectively alleviates pain, and improves cold syndrome-related pain symptoms with notable analgesic activity. Its extract exhibits significant antitumor effects against triple-negative breast cancer cells. Shikimic acid derivatives inhibit platelet aggregation, confer antithrombotic effects, and exert cardiovascular protection. Star anise contains multiple antimicrobial components that exert broad-spectrum antibacterial effects by disrupting pathogenic cell wall and membrane structures and interfering with cellular metabolism. Additionally, trans-anethole, a key constituent, demonstrates clear anxiolytic activity. The volatile oil exhibits insecticidal effects through inhibition of key enzymes, and various polar extracts show sedative and central inhibitory effects. Moreover, Anisi Stellati Fructus possesses antioxidant, anti-fatigue, antiemetic, anti-gastric ulcer, anti-atherosclerotic, leukogenic, and glucolipid metabolism-regulating activities, highlighting its significant research and application value in anti-infection, immunomodulation, and neuroprotection [5].

### 2.4 Curcumae Kwangsiensis Rhizoma (Guangxi Ezhu)

Curcumae Kwangsiensis Rhizoma is the dried rhizome of *Curcuma kwangsiensis* S. G. Lee et C. F. Liang (Zingiberaceae) [1]. It is produced in suitable areas such as Lingshan (Qinzhou), Bobai (Yulin), Hechi, and surrounding regions in Guangxi. Studies suggest authentic Guangxi Ezhu has specific soil preferences, with slightly acidic loam or sandy loam being optimal, and good adaptability to low base saturation soils, which may be a key characteristic for its authenticity. Chemical components include volatile oils, curcuminoids, flavonoids, polysaccharides, alkaloids, and sterols. Curcumin and curdione are its main pharmacodynamic substances and key anti-cancer components [6]. Its most prominent pharmacological effect is anti-cancer/anti-tumor activity, inhibiting proliferation of various tumor cells, inducing apoptosis, arresting the cell cycle (G2/M phase), inhibiting tumor angiogenesis, and enhancing sensitivity to radiotherapy/chemotherapy. Mechanisms involve regulating PI3K/Akt, NF- κB, and other signaling pathways. Curdione, a sesquiterpenoid isolated from the volatile oil, has anti-thrombotic effects by inhibiting platelet aggregation, offering potential for preventing thrombotic diseases. The volatile oil can inhibit hepatic stellate cell activation (anti-fibrotic) and reduce hepatocyte damage while promoting repair (hepatoprotective). It also exhibits comprehensive regulatory effects: antioxidant, anti-inflammatory, analgesic, antimicrobial, hypoglycemic, immune-modulating, treatment of endometriosis by inhibiting ectopic endometrial growth, and metabolic regulation [6].

### 2.5 Longan Arillus (Longyanrou)

Longan Arillus is the dried aril of *Dimocarpus longan* Lour. (Sapindaceae) [1], is mainly produced in Yulin, Guigang,

Chongzuo, and Qinzhou of Guangxi. Bobai and Pingnan are renowned as the "Hometown of Chinese Longan" and the "Hometown of Chinese Shixia Longan" respectively, with its genuine quality attributable to favorable local climatic and soil conditions. Its primary active constituents include polysaccharides, phenolics, volatile components, saponins, sterols, and various nutrients. Polysaccharides and phenolics in longan aril scavenge free radicals, alleviate oxidative damage, and exert anti-aging effects [7]. Longan polysaccharides enhance immune cell activity and boost immune function. This herb protects neuronal cells, improves brain function, exhibits potential preventive and therapeutic effects against Alzheimer's disease, and modulates the neuroendocrine axis to exert anxiolytic and anti-stress effects. Longan polysaccharides inhibit proliferation of various tumor cells via apoptosis induction and cell cycle arrest; after fermentation, they also regulate inflammatory cytokine balance and ameliorate ulcerative colitis. Additionally, longan aril demonstrates anti-fatigue, hepatoprotective, anti-atherosclerotic, hypoglycemic, and learning and memory-improving activities, underscoring its substantial application value in nutritional health and disease prevention [8].

### 2.6 Sophorae Tonkinensis Radix et Rhizoma (Shandougen)

Sophorae Tonkinensis Radix et Rhizoma is the dried root and rhizome of *Sophora tonkinensis* Gagnep. (Fabaceae)[1], is primarily produced in Hechi and Baise, Guangxi—its core genuine producing regions. The contents of matrine and oxymatrine in this crude drug significantly exceed Pharmacopoeia standards, a trait closely associated with soil nitrogen levels. Its major active constituents include alkaloids, triterpenoids, polysaccharides, and organic acids [9]. Pharmacological studies [9-10] demonstrate that the alkaloids, flavonoids, and polysaccharides from *S. tonkinensis* inhibit proliferation and induce apoptosis in various tumor cells, including hepatocellular, lung, and cervical carcinoma, while also modulating immune function and suppressing tumor angiogenesis, thereby exerting synergistic antitumor effects. The flavonoid and polysaccharide components exhibit anti-inflammatory and antioxidant activities, alleviating inflammatory responses and oxidative tissue damage. *S. tonkinensis* inhibits *Staphylococcus aureus*, *Streptococcus spp*., and various fungi; its total alkaloids, matrine, and other constituents also suppress Coxsackievirus, adenovirus, and hepatitis B virus by interfering with viral protein synthesis, demonstrating efficacy against viral hepatitis. Additionally, *S. tonkinensis* enhances immunity via its polysaccharides; its ethanol extract and flavonoid components inhibit gastric acid secretion, exerting anti-gastric ulcer effects. Matrine regulates blood lipids and improves hemorheology, while the alkaloid constituents exhibit sedative, analgesic, and antipyretic activities [9-10].

### 2.7 Spatholobi Caulis (Jixueteng)

Spatholobi Caulis is the dried vine stem of *Spatholobus suberectus* Dunn (Fabaceae) [1], is widely distributed in Guangxi, cultivated in Hezhou, Wuzhou, Liuzhou, Nanning, etc., with Baise and Hechi serving as major producing areas owing to favorable natural conditions. Its primary chemical constituents include flavonoids, phenolic acids, phenylpropanoids, anthraquinones, terpenoids, and sterols, among which flavonoids are the core bioactive components [11]. Spatholobi Caulis exhibits predominant pharmacological activities in hematopoietic protection and cardiovascular regulation. It increases erythrocyte, leukocyte, and platelet counts, ameliorates iron-deficiency anemia and aplastic anemia, inhibits platelet aggregation, regulates lipid metabolism, and reduces the risk of atherosclerosis. The herb and its active constituents exert antitumor effects via cell cycle arrest, apoptosis induction, and inhibition of proliferation and metastasis. Its ethanol extract suppresses HCV replication and alleviates hepatocyte injury, conferring hepatoprotective effects. Monomers such as epicatechin and ononin scavenge free radicals and modulate oxidation-related signaling pathways, demonstrating significant antioxidant activity. Multiple active components regulate key signaling pathways, promote osteogenesis, inhibit bone resorption, and exert anti-osteoporotic effects. Additionally, Spatholobi Caulis possesses sedative, analgesic, anti-inflammatory, antimicrobial, antidiabetic, antidepressant, and hypnotic activities, indicating broad application prospects [11].

### 2.8 Abri Cantoniensis Herba (Jigucao)

Abri Cantoniensis Herba is the dried whole plant of *Abrus cantoniensis* Hance (Fabaceae)[1], is mainly produced in Guigang and Yulin, Guangxi, where suitable climatic and soil conditions support the highest yield in China. Its major active constituents include alkaloids, flavonoids, triterpenoids, polysaccharides, organic acids, anthraquinones, sterols, and various trace elements [12]. Abri Cantoniensis Herba exhibits hepatoprotective and lipid-lowering effects as its core pharmacological actions. It alleviates hepatocyte injury, promotes repair, reduces transaminase levels, and protects against hepatitis, fatty liver, and liver damage, while also regulating blood lipids and decreasing hepatic lipid accumulation. Its ethyl acetate extract induces cell cycle arrest and apoptosis in hepatocellular carcinoma cells, exerting antitumor activity. Polysaccharides from *A. cantoniensis* modulate inflammatory cytokine levels, demonstrate definitive anti-inflammatory effects, inhibit Escherichia coli, and scavenge free radicals, reflecting potent antioxidant activity. Additionally, Abri Cantoniensis Herba promotes wound healing, activates blood circulation, resolves stasis, enhances immunity, and inhibits nitrosation reactions, underscoring its broad application value [12].

### 2.9 Zanthoxyli Nitidi Radix (Liangmianzhen)

Zanthoxyli Nitidi Radix is the dried root of *Zanthoxylum nitidum (Roxb.*) DC. (Rutaceae)[1], is primarily produced in its genuine producing areas of Nanning, Qinzhou, Guigang, and Yulin, Guangxi, where favorable climatic conditions prevail. Its major chemical constituents include alkaloids, coumarins, lignans, flavonoids, sesquiterpenes, organic acids, triterpenoids, and steroids[13]. Nitidine chloride, the core bioactive component, inhibits proliferation and induces apoptosis in various tumor cells, including hepatocellular, renal, lung, and gastric carcinoma. The alkaloids and lignans from *Z. nitidum* exert anti-inflammatory effects by suppressing inflammatory pathways and mediators, while modulating pain-related pathways, genes, and ion channels to confer notable analgesic activity. Its alkaloid and coumarin constituents exhibit significant antimicrobial effects against multiple pathogenic bacteria, including MRSA, by disrupting bacterial biofilms and reducing minimum inhibitory concentrations. The total alkaloids and nitidine chloride from *Z. nitidum* inhibit angiogenesis, protect renal and gastric mucosa, attenuate bone loss, and regulate autophagy. They also demonstrate efficacy against cerebral ischemia, cardiac hypertrophy, and osteoporosis. Furthermore, *Z. nitidum* possesses anticoagulant, antioxidant, antiparasitic, hemostatic, neuroprotective, and anti-hepatitis B virus activities, underscoring its significant value in the prevention and treatment of multi-system diseases [13].

### 2.10 Pheretima (Guang Dilong)

Pheretima is the dried body of *Pheretima aspergillum (E.* Perrier) (Megascolecidae)[1], is mainly produced in Yulin and Qinzhou, Guangxi. Its geo-authentic characteristics are closely associated with the region's moist, fertile soil conditions. Its major active constituents include proteins, peptides, enzymes, amino acids, lipids, steroids, and various trace elements[14]. Extracts and bioactive peptides from Guangdi Long inhibit tumor growth in ovarian, laryngeal squamous, and colon cancers. Earthworm peptides enhance macrophage phagocytosis and potentiate immune function. Components such as lumbrokinase and fibrinolytic enzymes exert antithrombotic effects by inhibiting coagulation and dissolving thrombi, while also dilating blood vessels and modulating central mechanisms to lower blood pressure. Guangdi Long relaxes bronchial smooth muscle, alleviates spasm, and exerts antitussive and anti-asthmatic effects, with marked efficacy in heat-type pulmonary asthma. It attenuates oxidative stress and inflammatory responses, suppresses pyroptosis and myocardial fibrosis, and protects cardiovascular and cerebrovascular function. It also inhibits glomerular mesangial cell proliferation and thrombus formation, conferring renoprotective effects. Purified proteins from Guangdi Long promote skin fibroblast proliferation and collagen synthesis, accelerating wound repair. Additionally, Guangdi Long ameliorates myocardial apoptosis and fibrosis via modulation of related signaling pathways, alleviates cerebral ischemia–reperfusion injury, and exhibits antipyretic, spasmolytic, channel-collateral-unblocking, diuretic, anti-inflammatory, antimicrobial, and heart failure-preventive activities [14].

## 3 Safety Studies of Ten Gui Herbs

### 3.1 Clinical Application Aspects

#### 3.1.1 Sophorae Tonkinensis Radix et Rhizoma (Shandougen)

Shandougen is the medicinal material with the highest safety risk among the "Ten Gui Herbs", manifesting as hepatotoxicity, neurotoxicity, gastrointestinal toxicity, and cardiovascular toxicity. Its toxicity is predominantly associated with components such as matrine and oxymatrine—constituents possessing dual pharmacodynamic–toxic properties10. Clinical adverse reactions frequently result from overdose, prolonged decoction, or inappropriate compatibility. Studies on toxicity reduction via processing indicate that S. tonkinensis processed with honey-fried licorice exhibits the highest $LD_{50}$ and the lowest toxicity, demonstrating that processing with licorice as an adjuvant significantly attenuates its toxicity.

#### 3.1.2 Other Medicinal Materials

Cinnamomi Cortex, Siraitiae Fructus, and longan aril are predominantly medicinal and edible dual-purpose herbs with favorable clinical safety profiles. Certain sesquiterpenoid constituents in Anisi Stellati Fructus exhibit neurotoxicity; high doses may induce severe reactions such as convulsions and hepatic failure. The aqueous extract of zedoary turmeric possesses extremely low toxicity, whereas excessive volatile oil intake may provoke gastrointestinal discomfort. Spatholobi Caulis and Abri Cantoniensis Herba are minimally toxic and demonstrate good safety at conventional clinical doses. Nitidine chloride in Zanthoxyli Nitidi Radix exerts dose-dependent cytotoxicity toward normal human cells. Earthworm protein peptides are safe for consumption within the tolerance range.

### 3.2 Dietary Therapy Aspects

Most "Ten Gui Herbs" can be used as dietary ingredients, but the principle of "syndrome differentiation for diet" should be followed to avoid blind consumption. Shandougen is not recommended for dietary use due to potential toxicity to

prevent poisoning from accidental ingestion. Rougui and Bajiaohuixiang are warm and drying; excessive consumption by individuals with Yin deficiency and fire excess may cause "heat" symptoms; consumption in summer should be moderate. Longan aril is high in sugar; diabetics should control intake, generally not exceeding 10 g daily according to folk experience, and avoid combining with other high-sugar foods. Ezhu, Jixueteng, and Liangmianzhen have strong blood-activating effects; pregnant women and women during menstruation should use cautiously to avoid miscarriage or excessive menstrual flow. Luohanguo, Jigucao, and Guang Dilong are mild in nature, suitable for daily moderate consumption, but excessive intake should be avoided to prevent gastrointestinal dysfunction. Recommended daily intake: Luohanguo not exceeding one fruit according to folk experience; Jigucao in soups not exceeding 15 g according to folk experience.

## 4 Conclusion

"Ten Gui Herbs," a core collection of Guangxi's genuine medicinal materials, thrives in the Lingnan ecosystem, forming a rich array of chemical constituents with broad pharmacological activities. These materials exhibit significant effects on the cardiovascular, immune, and digestive systems, with notable advantages in species such as Cinnamomum cassia, Siraitia grosvenorii, and Curcuma spp., providing a vital foundation for new drug development. However, several challenges remain: the pharmacodynamic substances and synergistic mechanisms of some medicinal materials are not yet fully understood; pharmacological research is mostly confined to animal and cellular levels, with insufficient clinical evidence; safety assessments are uneven, and comparative studies with other authentic medicinal materials are lacking. Additionally, imperfect quality control affects the stability of therapeutic efficacy. Future efforts should focus on systematic research to elucidate the active components and mechanisms of action, conduct high-quality clinical trials, and refine quality standards. It is also essential to develop new drugs, health products, and dietary therapies, strengthen safety evaluation and monitoring, and promote the rational application, sustainable development, and industrialization of "Ten Gui Herbs."

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