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### The Basic Nature and analysis of Ganoderma Lucidum

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#### ABSTRACT

Ganoderma lucidum has been a well-known herb since ancient times and has the reputation of "Xiancao". In modern times, Ganoderma Lucidum is used more in nourishing health products. Chinese medicine believes that Ganoderma lucidum is sweet, flat, and beneficial to qi and blood. It has the effect of soothing the mind, strengthening the spleen and nourishing the stomach. Clinically, it is also often used to treat insomnia, fatigue, and asthma. The Ganoderma lucidum real estate area has changed greatly from ancient to modern. The wild production area has changed from the ancient Wuyue Mountain to the current major lakes and seas. The cultivation of Ganoderma lucidum began in the 1950s, and the production area has changed to today's Hubei, Hainan and other places. Currently cultivated Ganoderma lucidum. Has become the main body of Ganoderma lucidum. Hubei is an important real estate area. This paper mainly summarizes and analyzes the original plant and growth environment, cultivation techniques, pest control, medicinal properties, chemical composition, pharmacological effects and clinical use of the existing Chinese herbal medicine Ganoderma lucidum. From the research on the origin, traits, growth habits, medicinal properties and clinical application of Ganoderma lucidum, it provides practical information for the cultivation, use and pharmacological properties of Ganoderma lucidum. At the same time, the summary and analysis of Ganoderma lucidum information will be conducive to further research on the efficacy and marketization of Ganoderma lucidum.

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## Original plant

The shape of red *Ganoderma lucidum* is similar to that of an umbrella. The shape of the cap is similar to a circle or an ellipse, and the diameter is about 10 cm and the thickness is about 2 cm. Its skin is hard, bright and striped. Its edges are thinner, the middle is thicker and often curls inside. The color of the subject is generally white or gray. As a fungus, its spores are generally small, thin, tan or tan. The smell is a bit fragrant and the taste is bitter.

Purple *Ganoderma lucidum* is similar in shape to red *Ganoderma lucidum*, but its epidermis is purple or black with a paint-like color.

The main body is usually rust. The epidermis often adheres to yellow or brown spores [1].

## Growing environment

Most of *Ganoderma lucidum* prefers to grow in the forest, especially in sparse forests. They like the sun, and most of them are often seen on wooden stakes and sometimes on decaying wood. Of course, some species can only grow in areas where large trees and soil meet. Only a few types of growth environments are special, such as tropical *ganoderma lucidum*, which can often be found on plants of the same temperature zone.

The types of *Ganoderma lucidum* in different temperature zones are also different, which is closely related to geographical location, temperature and climate. Taking China as an example, the Qinling Mountain and Huaihe River to the north, northwest, northeast and other vast areas, representing *Ganoderma lucidum* as pine cedar [2]. The southern species are more complex, and are more common in tropical regions such as Guangxi, Hainan, Yunnan, and Taiwan. The climate here is suitable, and the variety of *Ganoderma lucidum* is also extremely rich. Purple *Ganoderma lucidum* with medicinal value is

more common. Therefore, the geographical distribution of *Ganoderma lucidum* in China is quite different, and *Ganoderma lucidum* can be seen in other regions, but it is not common. At the same time, since the diverse uses of *Ganoderma lucidum* have been discovered, wild *Ganoderma* resources have been scarce and need to be farmed to meet the requirements. For example, in Hubei, its wild *Ganoderma lucidum* resources are not abundant, but it has a *Ganoderma lucidum* breeding base, which is also the main source of *Ganoderma lucidum* drinks, health products, cosmetic skin care products, and pharmaceutical products.

## Cultivation Techniques

*Ganoderma lucidum* has been a relatively expensive Chinese herbal medicine since ancient times. The growth conditions of wild *Ganoderma lucidum* are generally harsh and the yield is also low. Later, the industrious and brave people began to simulate the growth environment of *Ganoderma lucidum* by simulating the growth habits of *Ganoderma lucidum* to cultivate a large demand for *Ganoderma lucidum*. Therefore, from ancient times to the present, many cultivation techniques for cultivating *Ganoderma lucidum* have been carried out, and combined with modern science for the analysis of *Ganoderma lucidum*, it can be roughly divided into the following steps to prepare the culture medium for the strain, isolate the strain and expand the culture and preparation. The culture medium required for the isolated strain is isolated, inoculated, and cultured.

### 1. Prepare the medium required for the strain

Usually, the carbon source needed for breeding the mother species is mainly starch crops, and the sugar can be added in an appropriate amount. The nitrogen source mainly uses peptone, and agar is used as the main coagulant. In add-

ition, an appropriate amount of a growth factor such as a vitamin may be added.

## 2. Separation and expansion of strains

Separation of the strains usually results in separation of the spores of the strains, the tissues of the fruit bodies, the sclerotia, and the hyphae. Usually, the isolation of *Ganoderma lucidum* strains is carried out by using the fruit body tissue separation method, and a certain part of the fruit body of *Ganoderma lucidum* is used to isolate the strains, and it is preferable to use the fruit bodies which are produced in the logarithmic growth phase. Not only the operation is simple and convenient, but also the possibility of mutation of the offspring is small. It is only necessary to take a small piece of the bacterial fruit body and place it in the prepared culture environment, so that it can be used to isolate the required strains. The preferred method of separation of strains. However, in the process of achieving the separation of strains, the most important thing is to strictly operate in a sterile environment to prevent the infection of bacteria. Separate the successful strains or culture dishes and store them at a suitable temperature. Generally, it is suitable at about 4 °C. On this basis, the isolated strains are activated, and some strains are transferred and placed on the previously prepared medium, and the expanded culture strain is obtained after the cultivation, and this process is also called subculture.

## 3. Prepare the medium required for the isolated strain

Different from the separation operation and the medium used for the expansion culture, the pure seed species obtained after the separation, the main material often needs to use the debris of the tree, and then add a certain amount of wheat bran, and add a small amount and a proper amount of sugar and inorganic salts. At

the same time, we must also control the amount of water, which is generally maintained at around 50%. The medium needs to be sterilized before use, and it can be sterilized by normal pressure steam sterilization in consideration of various factors such as safety and cost.

## 4. inoculation and cultivation

Different from the inoculation operation of the laboratory clean bench, there are suitable inoculation devices or inoculation environments in the actual production, such as the inoculation box and the inoculation room. However, the principle is the same, the ultra-cleaning station generally uses ultraviolet sterilization, and the actual production needs to move the inoculation device used to a specific place, fumigation with a disinfectant, and then inoculate after the sterilization effect is achieved. When cultivating, it is necessary to control the culture conditions according to the suitable planting conditions of the variety *Ganoderma lucidum*.

## 5. Types of cultivation techniques

Cultivation techniques are generally divided into two major types of cultivation techniques: short-wood cultivation and substitute cultivation. Both cultivation techniques basically require the seasons of cultivation, the selection of breeding sites, the selection of culture materials, the precautions for vaccination, and the management of the cultivation process. They have slight differences in these aspects. *Ganoderma lucidum* is basically inoculated in the spring, and the fruiting body begins to grow around June, and matures and collects from August to September. The tree species used for short-wood cultivation determines the quality of *Ganoderma lucidum*, while the substitute cultivation is generally the use of tree debris. The quality of *Ganoderma lucidum* grown in short-wood cultivation is better, but the amount of wood required is larger, and

the type of wood is higher. In addition, the growth period of *Ganoderma lucidum* is generally longer and the yield is lower. In comparison, the quality of *Ganoderma lucidum* cultured by the substitute is worse, but its advantage is that the requirements for raw materials are not high, and the production cost is saved. In addition, its growth time is shorter than that of short-wood cultivation. Based on these factors, in the actual production process, the cultivation method can be selected according to the needs.

In recent years, *Ganoderma lucidum* has been cultivated with good shape and strong ornamental and practicality. It is also a hot industry. This cultivation method combines traditional planting techniques and bonsai techniques to observe and record the growth habits of *Ganoderma lucidum*, regulate its growth conditions, and then use the pruning process to cultivate products that meet the market demand.

### **Pests and diseases**

The pests and diseases of *Ganoderma lucidum* are also a major problem in the cultivation process of *Ganoderma lucidum*. The breeding process is often susceptible to other bacteria, especially in humid and poorly ventilated conditions, such as *Streptomyces* sp. and *Trichoderma*. Therefore, when choosing to cultivate nutrients, it is necessary to pre-treat the nutrients, and the ultraviolet sterilization operation or exposure under the scorching sun can greatly reduce the chance of infection in the early stage. In addition, the water content of the cultivated nutrients should not be too high, but the water content should also meet the growth requirements of *Ganoderma lucidum*, and the ventilation conditions should be ensured. The environment in the ventilated area should be clean and away from the areas where other fungi grow rapidly. The aseptic operation process must

also be strictly implemented. The growth environment of *Ganoderma lucidum* should be kept as clean as possible to prevent the infection of bacteria.

### **Pest and prevention**

*Ganoderma lucidum* is very susceptible to pests during the production process, especially mosquitoes and flies. They will grow and multiply on the surface of *Ganoderma lucidum* during the rapid growth stage of *Ganoderma lucidum*. Their larvae will use the fruiting bodies of *Ganoderma lucidum* as nutrients as their own energy for growth and reproduction. The number of mosquito larvae is extremely large, and the destructive power is extremely strong, which causes great damage to the growth and reproduction of *Ganoderma lucidum* cells. In addition, mosquitoes and fly pests have a harsh living environment and often carry pathogens or other organisms that are harmful to *Ganoderma lucidum*. A typical example is the locust. The size of this pest is small, but it is so large that it will have an irreversible effect on the mycelium of *Ganoderma lucidum*. The fruiting body that *Ganoderma lucidum* is growing will be spoiled. In addition to these common pathogens or organisms, natural nematodes often grow in closed environments with high temperatures and high humidity. When the growth environment of *Ganoderma lucidum* deteriorates, it is very likely to infect nematodes and cause damage to *Ganoderma lucidum*.

Therefore, in the actual production process of *Ganoderma lucidum*, effective measures are needed to prevent pests. Common methods are divided into chemical control and physical control. Chemical control, hormonal chemical preparations are often used in actual production, which can interfere with the normal reproduction of mosquitoes and fly pests, and fundamentally

solve the adverse effects of mosquito and larvae on *Ganoderma lucidum*. Physical control, usually in the production base to establish isolation devices, such as fly traps, mosquito screens and so on.

### **Medicinal properties**

The morphological feature of *Ganoderma lucidum* is that when the mycelium of *Ganoderma lucidum* grows and multiplies to a certain period of time, it is intertwined under the corresponding environmental conditions, and there is a layer of white, smooth substance protruding upward on the surface of the substrate [3], also called Entity primordium. As a Chinese herbal medicine, its powder is brown or brown, and the hyphae are generally dispersed or lumped. The drug has maximum absorbance at 365 nm UV and can be identified by thin layer chromatography.

In addition, the approximate content of the triterpenoids in the sample *Ganoderma lucidum* can be quickly detected by ultraviolet spectrophotometry. The experiment is usually carried out by reverse silica gel chromatography using a special developing agent and an eluent, and then combined with high performance liquid chromatography. *Ganoderma lucidum* has had more than 20 years of research history, and its chemical composition is quite complicated. So far, *Ganoderma Lucidum* has detected more than ten major chemical components, and more than twenty trace elements have been detected.

### **Pharmacological action**

#### **Immunomodulatory effect**

In ancient times, *Ganoderma Lucidum* was known for its good function of regulating the body and supplementing blood. People often use *Ganoderma lucidum* to regulate the body, especially for the weak people. This is not without basis. According to research, the polysaccharides contained in *Ganoderma lucidum* [4]

can promote the work of high-load work to a certain extent, and also promote the improvement of the immune system. For example, the proteoglycan extracted from the red *Ganoderma lucidum* is injected into the mouse by intraperitoneal injection, and the white blood cells and phagocytic cells in the mouse are obviously detected to have different degrees of elevation, which indicates that the immunity is enhanced. By improving the body's ability to improve the body, it can achieve good results without causing other harm to the body due to drug residues. This natural green conditioning method will have great potential to occupy a specific market.

#### **anti-tumor activity**

Tumors are a disease that is high in the times, and more and more people are caught in the pain of cancer. Then, finding anti-tumor active substances is extremely critical. The polysaccharide material isolated from the red *Ganoderma lucidum* has been tested and found to have strong anti-tumor activity. It is scientifically believed that this mechanism of action may be through enhancing host immunity rather than directly through cytotoxicity. After detection, the specific tumor cells of the triterpenoid compound in *Ganoderma lucidum* have better inhibition ability [5]. So far, the polysaccharide substance in *Ganoderma lucidum* has been used as one of the anti-tumor treatment methods in the clinic. Among them, the wild medicinal activity of *Ganoderma lucidum* is stronger, and the medicinal effect of artificially cultured *Ganoderma lucidum* will be worse.

#### **improve sleep**

The rapid development of the times, people's pressure is increasing, and the decline in sleep quality is a general trend. In addition, the pollution of light causes the circadian clock of some people to become disordered, and the quality of

sleep is also affected. More because of depression or other diseases, it is difficult to fall asleep and go deep sleep. *Ganoderma lucidum*, in the past, has been used as a medicine to calm the nerves and help improve the quality of sleep. Studies by existing sciences have confirmed that *Ganoderma lucidum* extract can indeed help sleep and alleviate problems such as poor sleep quality.

#### **lowering blood sugar**

*Ganoderma lucidum* extract also has the effect of lowering blood sugar. The mechanism of action is the effect of *Ganoderma lucidum* extract on glucagon and epinephrine. As living conditions gradually improve, people's eating habits have undergone major changes, followed by high blood sugar. Under normal circumstances, the body can maintain its blood sugar level at a relatively normal level through its own regulation mechanism. However, under the interaction of genetic factors and dietary environment, the regulation mechanism in the body will be ineffective. At this time, drugs that can simultaneously inhibit glucagon and adrenaline are important. Therefore, *Ganoderma lucidum* will have greater significance in the study of blood sugar lowering.

#### **5. anti-aging, anti-oxidation**

One of the most important industries of the 21st century, the skin care industry. If a drug is very resistant to oxidation and anti-aging, it will have a very promising market potential. Aging and oxidation are mainly caused by external physical factors such as ultraviolet rays and free radicals in the human body. Studies have shown that the extract of *Ganoderma lucidum* has a good ability to scavenge free radicals in the human body. With further testing, it is found that the true anti-oxidation and anti-aging ability is the triterpenoids in *Ganoderma lucidum* [6].

#### **Safety study**

The active substances contained in *Ganoderma lucidum*, the most important one are the triterpenoids in *Ganoderma lucidum*. According to the relevant toxicological experiments, the triterpenoids in *Ganoderma lucidum* are safe for the body. *Ganoderma lucidum* products commonly found in the market, such as *Ganoderma lucidum* syrup, *Ganoderma lucidum* tablets, *Ganoderma lucidum* and *Ganoderma lucidum* injections, etc. in the taking and subsequent feedback, indicate that *Ganoderma lucidum* does not have harmful toxins to the human body. These studies will also lay the foundation for the research of *Ganoderma lucidum* components, and play an important role in the development and application of *Ganoderma lucidum* in other fields.

#### **Clinical application**

Clinically, *Ganoderma lucidum* syrup, *Ganoderma lucidum* tablets, *Ganoderma lucidum* and *Ganoderma lucidum* injections have been used. Among them, *Ganoderma lucidum* syrup and *Ganoderma lucidum* tablets are often used to improve and treat stomach problems such as neurasthenia and other problems such as sleep quality problems and loss of appetite. *Ganoderma lucidum* and *Ganoderma lucidum* injections are more targeted and are used to treat chronic bronchitis and improve some problems of the respiratory tract.

#### **Summary and discussion**

In this paper, a rough analysis of the growth environment, growth habits, cultivation techniques, pharmacological effects and clinical applications of *Ganoderma lucidum* was carried out. *Ganoderma lucidum* is a Chinese herbal medicine with extremely high value. Its growth environment is not very demanding, and it has been cultivated and cultured to meet the demand for

high quality *Ganoderma lucidum* on the market. As for its cultivation technology, it is already very mature. On this basis, it can be improved, cultured with *Ganoderma lucidum* according to local conditions, and even creatively cultivated functional *Ganoderma lucidum*. In addition, in addition to the role of *Ganoderma lucidum* in immune regulation, anti-tumor, anti-oxidation, anti-aging and many other aspects, there are still many unknown functions to be developed. This requires a deeper level of research and analysis. For the study of the medicinal properties of *Ganoderma lucidum*, or the research on the applicability and applicability of *Ganoderma lucidum* in food, health care products and other industries, there are still some problems that need to be improved, such as the possibility of *Ganoderma lucidum* entering other markets, and the value of its value in other industries, and so on.

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