

Chapter 1

Ganoderma (Lingzhi) in Traditional Chinese Medicine and Chinese Culture



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Abstract *Shen Nong Ben Cao Jing* (*Shennong Materia Medica*) and many other books in early Chinese history began to study, discuss, and report the scientific aspects of *Ganoderma* (Lingzhi) in respect to its categorization, habitat, bionomics, herbal nature, medication, etc. At the same time, incorrect or unsubstantiated information continues to be weeded out and updated. *Shennong Materia Medica* have been frequently referred in literature and used for further research and applications. Present chapter reviews the history of modern research on *Ganoderma* (Lingzhi) since 1950s.

Historically, Lingzhi has been viewed as a magic herb as well as an auspicious symbol by the Chinese. It is, therefore, also known as “Ruizhi,” “Shenzhi,” and “Xiancao,” with the meaning of good fortune and mysterious power. Taoism played an important role in promoting Lingzhi for either medical purposes or otherwise. Numerous myths and poems mentioning people’s love, worshipping, and beliefs on Lingzhi can be found in the Chinese literature since ancient times.

Keywords *Ganoderma* · Lingzhi · History · Culture · Myths

1.1 *Ganoderma* (Lingzhi) in Traditional Chinese Medicine

1.1.1 *Ganoderma* (Lingzhi) Described in *Shen Nong Ben Cao Jing*

Written in ca. 100 B.C., *Shen Nong Ben Cao Jing* (*Shennong Materia Medica*) was the earliest pharmaceutical book of Lingzhi. *Shennong Materia Medica* was the summation of the experiences gained by the ancient Chinese medical practitioners. The legend of the God of Agriculture, who tasted a hundred herbs and encountered

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Fig. 1.1 God of agriculture. A Liao Dynasty era painting on the wall of a wooden pagoda in Shanxi showing a barefooted man with a plump face and bared belly, covered himself with fur and leaves, shouldered a bamboo basket, held a Lingzhi, and walked on a rocky mountain. Scholars believe that the man in the picture was Shennong, the God of Agriculture. (Reproduced with permission from Ref. [2])



70 poisonous ones in a day, gives the discovery process a vivid picture. Likewise, the medicinal information on Lingzhi shown in *Shennong Materia Medica* was obtained through practices (Fig. 1.1). The book's real author is not known. Nonetheless, this monumental treatise listed 365 medicinal materials in categories according to their medicinal and toxic effects on human. The highest graded materials were those with medicinal efficacies without known toxicity. Lingzhi (including Cizhi, Qingzhi, Huangzhi, Baizhi, Heizhi, and Zizhi, which are red, blue, yellow, white, black, and purple, respectively) was among the highest graded materials, based on the categorization.

According to the theory of Yin and Yang and the 5-Elements in traditional Chinese medicine (TCM), *Shennong Materia Medica* categorized Lingzhi according to their colors into Cizhi (or Danzhi), Heizhi (or Xuanzhi), Qingzhi (or Longzhi), Baizhi (or Yuzhi), and Huangzhi (or Jinzhi) as “Five Zhi,” as well as Zizhi (or Muzhi). Detailed descriptions on their medicinal nature, properties and flavors, and medication were included in the book, indicating that Cizhi was bitter in taste, mild in nature, and nontoxic and could be used for relieving chest congestion and improv-

ing memory; Heizhi was salty, mild, and nontoxic and could be used for renal problems and increasing awareness; Qingzhi was acidic, mild, and nontoxic and could be used to improve eyesight and liver functions; Baizhi was pungent, mild, and nontoxic and could be used to cure coughs and ailments of the lungs; Huangzhi was sweet, mild, and nontoxic and could be used to rid of heart, spleen, and stomach illnesses; and Zizhi was sweet, warm (mild), and nontoxic and could be used to treat hard-hearing and arthritis. In addition, it emphasized that all six kinds of Lingzhi could be applied for long term to facilitate health, well-being, and longevity. Such information on Lingzhi is considered the classic reference for the TCM and has been quoted frequently in the literatures to date [1].

1.1.2 *Expounding on Ganoderma (Lingzhi) by Ancient Chinese Scholars*

Even in early history, the ancient Chinese scholars already exhibited substantial expounding on the biological characteristics of Lingzhi. In *Lie Zi (Scholars)*, the author observed that “Zhi grows above the rotten soil.” In *Lun Heng (Speaking of Balance)*, Wang Chong (27~about 97 A.D.) of the Eastern Han Dynasty pointed out that “Lingzhi grows from soils with balanced conditions.” And Tao Hong-Jing (456~536 A.D., the Southern Dynasties) stated that “Zizhi, of the appearance of mushrooms, grows from the rotted tree trunks.” It is evident that in the ancient times, it was already known that Lingzhi requires rotten soil or decayed wood to grow. *Bao Pu Zi (Magic Medicines)* edited by Ge Hon (284~364 A.D., the Eastern Jin Dynasty) described Lingzhi as organisms with red coral, white fat, lacquer black, peacock green, or golden yellow color and were bright and transparent like ice, in the sizes ranging from 5 kg to 1.5 kg. The color, appearance, and weight of the Lingzhi fruiting body were rather precisely recorded.

Furthermore, the mention of such things as “growing without flower are Zhi mushrooms” from *Li Ji Zhu Shu (Liji Notes)*, “rootless plant of Lingzhi” from *ErYa Zhu Shu (Erya Notes)*, “three crops a year of Lingzhi” and “all 6 kinds of Lingzhi can be harvested in June and August in a year” from the *Ben Cao Gang Mu (Compendium of Materia Medica)* show that the facts of these fungi are different from higher plants. The facts that Lingzhi have no roots, stem, and leaf differentiation, do not flower, and can be harvested several times in a year were known among the people working with Lingzhi in the early times.

The fact that Lingzhi can be used for medicinal purposes or as food was also recorded in Chinese history. For example, Wang Chong of the Eastern Han Dynasty stated in *Lun Heng (Speaking of Balance)*, “Lingzhi produces 3 crops in a year. Including it in diet can result in longevity as it is god’s food.” The legendary Chinese doctor, Li Shi-Zhen (Fig. 1.2), pointed out that, “Lingzhi has been harvested around the year for the gods. It is safe for consumption and should be considered as a vegetable.” Tao Hong-Jing believed that, “One may eat Lingzhi without a concern of

Fig. 1.2 Li Shi-Zhen (1518–1593 A.D., Ming Dynasty). (Reproduced with permission from Ref. [2])



dosage.” On the other hand, Su Jing (599–674 A.D., Tang dynasty) thoughtfully indicated that, “Lingzhi is so rare. It is difficult to find them. How can anyone expect to have it continuously for a long period of time?” Therefore, it is apparent that the Chinese at the time already knew Lingzhi’s health benefits and antiaging effects. However, the limited availability of the naturally grown Lingzhi prevented widespread applications.

Misinformation on Lingzhi exists in many Chinese medical literatures, including the classic *Shen Nong Ben Cao Jing* (*Shennong Materia Medica*). Criticisms by ancient scholars were found. Su Jing disagreed with the association of 5 Lingzhi with their growing areas: “It was found that the red Lingzhi was not limited to Huo mountain., the black not limited to Mt. Heng, the blue Lingzhi not limited to Mt. Tai, the white Lingzhi not limited to Hua mountain, and the yellow Lingzhi not limited to Song mountain.” Su’s observation is correct, as we know these varieties of wild Lingzhi can indeed be found in most parts of China. In the *Ben Cao Gang Mu* (*Compendium of Materia Medica*), Li Shi-Zhen reclassified Lingzhi according to the 5 colors and “5 Elements.” His different viewpoints included that “Lingzhi of different colors logically taste different, but their taste may not necessarily be correlated to their color.” More importantly, Li criticized the superstitious aspects associated with Lingzhi. Li also showed an accurate picture of Lingzhi in his book (Fig. 1.3) [2–6].

1.1.3 Overview of the History of Modern Research on Ganoderma (Lingzhi)

In the 1930s, Chinese scholar Deng Shuqun studied Ganoderma with modern scientific technology, and collected work in *Chinese fungi* (1964) [7]. Fungi taxonomists Zhao Jiding and Zhang Xiaoqing and Mao Xiaolan compiled the *Ganoderma*

Fig. 1.3 Illustration of Lingzhi in Ben Cao Gang Mu. (Reproduced with permission from Ref. [2])



(*Lingzhi*) in China (1981), the *New edition of China Ganoderma (Lingzhi)* (1989), and *The macrofungi in China* (2000) on the basis of the research work. These books detail the distribution, classification of *Ganoderma* in China, the biological characteristics, etc. [8–10].

Zhao JD et al. (1989) discussed the classification of “six Zhi” described in *Shennong Materia Medica* using a modern biological classification system. The results concluded that these “six Zhi” are not all Lingzhi and indicate Qingzhi (blue Lingzhi) could be a species similar to *Coriolus versicolor* or *Polystictus versicolor*; Huangzhi (yellow Lingzhi) is speculated to be the *Laetiporus sulphureus* or *Tyromyces sulphureus*; and Baizhi (white Lingzhi) as the possible fungus species is *Fomitopsis officinalis*. All these fungi do not belong to the *Ganoderma* genus [11].

In the 1950s, the Institute of Microbiology Chinese Academy of Sciences successfully achieved artificial cultivation of *Ganoderma lucidum*; then the other research organizations in Beijing, Wuhan, Shanghai, and Fujian also started research on the artificial cultivation of *Ganoderma lucidum* fruiting body, and cultivation of submerged fermentation mycelia and fermented liquid, and gradually extended to the country, for realizing the large-scale production for *Ganoderma lucidum* research and product development to provide ample raw materials [3].

In the 1970s, the Chinese medical scholars have carried out chemical and pharmacological studies on *Ganoderma lucidum* and preliminarily confirmed its medicinal value in clinical [12].

In the 1990s, the Chinese Pharmaceutical Association, China Edible Fungi association, and Beijing Medical University hosted the “First National Workshop of *Ganoderma* Research (1991)” and “First International Symposium on *Ganoderma*

Research (1994)” in Beijing, China. These academia meetings promoted modern research and industrial development of *Ganoderma*, and drove its application. The first edition of the *Modern research on Ganoderma (Lingzhi)* edited by Zhibin Lin, as a widely recognized academic monograph, was published in 1996. It was reprinted three more times in 2001, 2007, and 2015.

The *Pharmacopoeia of the Peoples Republic of China* (Part 1) (2000, 2005, 2010, and 2015 editions) listed the fruiting body of *Ganoderma lucidum* (Leyss. ex Fr.) Karst (Chi Zhi) (Fig. 1.4) and *Ganoderma sinensis* Zhao, Xu et Zhang (ZiZhi) (Fig. 1.5) as the legal traditional Chinese medicines. The efficacy of Lingzhi is “to

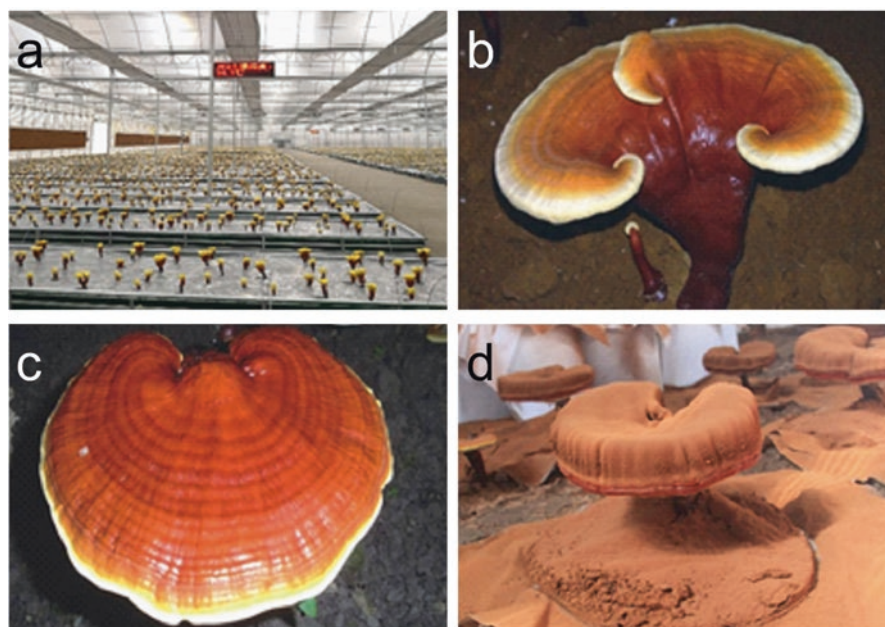


Fig. 1.4 *Ganoderma lucidum* (Leyss. ex Fr.) Karst (Chi Zhi) **a.** Growing *G. lucidum* in greenhouses; **b.** Growing immature fruiting body of *G. lucidum*; **c.** mature fruiting body of *G. lucidum*; **d.** The fruiting body of *G. lucidum* covered spore powder (Provide photos by Zhibin Lin)

Fig. 1.5 *Ganoderma sinensis* Zhao, Xu et Zhang (ZiZhi) (Reproduced with permission from Ref. [10])



Fig. 1.6 *Ganoderma tsugae* murr (Song shan Lingzhi) (Reproduced with permission from Ref. [10])



replenish *qi* and ease the mind, relieve cough and asthma” and its indications are “dizziness, insomnia, palpitation, shortness of breath, asthenic cough, asthma and loss appetite” [13].

Ganoderma tsugae murr (Song shan Lingzhi) (Fig. 1.6) has been approved by the Chinese government for health food production [3].

At present, *Ganoderma* (Lingzhi) preparation is not only used for clinical prevention and treatment of diseases but also used as health-care products for people, especially for the middle-aged and elderly population. In the future, the Chinese scholars should further scientifically study *Ganoderma* (Lingzhi) and reasonably apply and correctly evaluate it so as to make contributions to the health of human beings.

1.2 *Ganoderma* (Lingzhi) in the Traditional Chinese Culture

1.2.1 *Archaeological Evidence of Using Ganoderma (Lingzhi) in China*

In China, the earliest text recording of *Ganoderma* is the *Shennong Materia Medica*, which appeared more than 2100 years ago. Shennong, legend of the *God of Agriculture* in China, tasted a hundred herbs and encountered 70 poisonous ones in a day, giving the discovery process a vivid picture. He is said to be the first to collect and use medicinal plants in China. There is evidence for the use of medicinal plants dating back up to 60,000 years before present. However, owing to the lack of reliable archaeological evidence, it has been highly debated when prehistoric people began utilizing wild herbal medicine including *Ganoderma* (Lingzhi).

Recently, Yuan Y et al. (2018) examined the morphology of spores excavated from five *Ganoderma* samples (G1 – G5) in three archaeological sites located in Tianluoshan, Yuhangnanhu, and Qianjintadi that date back to the Neolithic era.

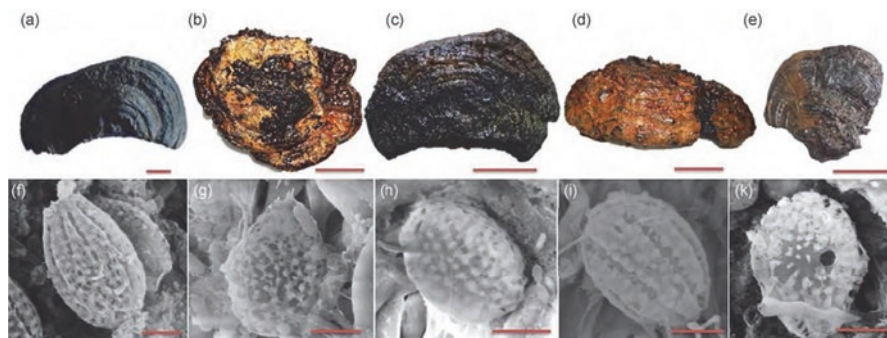


Fig. 1.7 The pileus surface and basidiospore morphological characteristics of ancient *Ganoderma* samples. The pileus surface of G1 (a), G2 (b), G3 (c), G4 (d), G5 (e); (f) the basidiospores of G1 are long ovoid, 5.4~7.3 μm long \times 3.5~4.8 μm width; (g) the basidiospores of G2 are long ovoid, 5.3 μm long \times 4.1 μm width; (h) the basidiospores of G3 are oblong, 5.3 μm long \times 3.1 μm width; (i) the basidiospores of G4 are oblong, 5.4~6.2 μm long \times 3.5~4.6 μm width; (k) the basidiospores of G5 are peer-shaped, 4.9~5.7 μm long \times 3.0~4.3 μm width; the scale bar of (a) is 1.0 cm, the scales of (b) to (e) are 5.0 cm, the scales of (f) to (k) are 2 μm . (Reproduced with permission from Ref. [10])

Dating back to using ^{14}C isotope revealed that the use of G1 sample began about 6817 ± 44 years before present in the Hemudu society, G2 sample began about 5379 ± 59 years before present, and G5 sample began about 4508 ± 50 years before present in the Hemudu society and Liangchu society. The comparison of morphological characteristics of spores from the prehistoric samples and spores of the present-day, modern *Ganoderma* species confirmed that the G1–G5 samples belong to the genus *Ganoderma* (Fig. 1.7). The Hemudu society is one of the birthplaces of the Chinese civilization, and people had started using reed mats and planted tea and rice. The prehistoric *Ganoderma* was unearthed with the cultural relics, such as wood carvings, head ornaments, jade articles, and so on. It was speculated that the witch had been using *Ganoderma* at that time. The earliest dates for the lower Yangtze River areas Neolithic indicate that it expanded the archaeobotanical records of herbal medicine (*Ganoderma*) exploitation in China to 6800 years before present. With the formation of early agriculture, people continued the exploration and utilization of fungi with *Ganoderma* appearance. In the course of the history, the ancient Chinese people gradually documented its value and extolled its purpose. This opinion is related to the legendary events of “Xuanyuan gifted with *Ganoderma*” and “Shennong gathers *Ganoderma*” in the mythological era of China [14].

1.2.2 *Lingzhi* in Myths

More than 2000 years ago, there was already evidence of the Chinese worshipping *Lingzhi*. Myths associated with *Lingzhi* can be found in history.

In the *Book of Shan Hai Jing (Mountains and Seas)* of the Warring States Period (476–221 B.C.), Yaoji, young daughter of Emperor Yan, was mystified that she

turned into the herb Yaocao (Grass of Yao) after she died. A poet from Chu, Song Yu engaged her in the fairy tale love story with a god. The myth eventually made Yaoji the origin of Lingzhi.

In the *Bai She Zhuan* (*Legend of the White Snake*), the heroine White Snake went alone to the Emei mountain to steal the celestial herb (i.e., Lingzhi) in order to save her husband's life. She overcame all sorts of hardships and finally moved the heart of the god who let her have the magical Lingzhi that revived her husband from the dead. The love story has become the subject of countless novels, dramas, movies, and posters in China (Fig. 1.8).

Ge Hong, in his *Legend of the Gods*, the beautiful goddess, Magu, pursued Taoism at Guyu mountain and lived on the Panlai Isle. She brewed the Lingzhi wine specifically for the Queen's birthday. This picture of Magu holding the wine, a child raising a birthday peach-shaped cake, an old man with a cup and a crane with Lingzhi in its mouth has become a popular folk art for birthday celebration with the wishes of fortune and longevity (Fig. 1.9) [2, 15].

1.2.3 *Lingzhi in Ancient Poems*

Lingzhi is the symbol of sanctity and goodness. It was a common motif in the Chinese literature in the past.

A famous poet from Chu, Qu Yuan described in his poem, *Nine Sons, Mountain Ghost*, a goddess longing for love. "Sanxiu" in the poem was another name for

Fig. 1.8 *Legend of the White Snake* (Steal the celestial herb).
(Reproduced with permission from Ref. [2])



Fig. 1.9 Poster of Magu for birthday wishes. (Reproduced with permission from Ref. [1])



Lingzhi, which can be harvested more than once a year. The “Mountain Ghost” was the goddess who picked Lingzhi in Wu mountain.

When Emperor Hanwudi officiated the sacrificial ritual, 70 young boys and girls would chant *The Song of Lingzhi* with the music. The lyric carried the messages of wishing for auspiciousness, good fortune, and longevity.

In the Period of Three Kingdoms, poet Cao Zhi referred frequently to Lingzhi. For instance, in his well-known poem, *Lingzhi Pian (On Lingzhi)*, he praised Lingzhi as creating the heaven and earth; the maroon herb growing along the bank of Luo river symbolized the prosperity of the nation and the glory of the god. In his poem *Luo Shen Fu (In Praise of the Goddess Luo)*, the poet depicted how graceful and beautiful the Goddess Luo was while harvesting Lingzhi and his admiration of the goddess. In the *Fei Long Pian (Flying Dragon)*, he told a story of his encounter in the misty Tai mountain with a Taoist monk on a white deer with a Lingzhi in his hand. It was from that man he learned the magical health benefits of Lingzhi.

In the *Chang Ge Xing (Singing Trip)* of a Han Dynasty Yuefu-style poem, a similar story was told. The author met a god-like man with short hair and long ears riding a white deer and was led to pick Lingzhi. At the legendary man’s home, he was shown the tonic herb made from the health-improving, hair-color darkening, and life-prolonging effects of the red herb [1, 15].

1.2.4 “Catholicon” According to Taoism

The Lingzhi culture was greatly influenced by Taoism, the native religion in China. Taoism believes that living is most important and that human beings can be immortal by following the regimens and taking certain magical herbs. *Bao Pu Zi* written

by Ge Hong presented the theory suggesting that a person could learn to become immortal. It even included stories of such occurrences by taking Lingzhi.

The ancient Taoist theory considered Lingzhi as the best among the catholicons, and by consuming Langzhi, one would never grow old or die. Therefore, Lingzhi acquired the names such as Shenzhi (heavenly herb) and Xiancao (magic grass) and became mystified. Most of the famous Taoists in history, including Ge Hong, Lu Xiu-Jing (406–477 A.D.), Tao Hong-Jing, and Sun Si-Miao (541–682 A.D.), saw the importance of Lingzhi studies. They influenced greatly in promoting the Lingzhi culture in China. In pursuing immortality, the Taoists enriched the knowledge on the herb and led to the evolution of the Taoist medical practice, which emphasizes health and well-being.

For their philosophy as well as a lack of scientific knowledge, the Taoists' understanding of Lingzhi was not only limited but also mostly superstitious. The term, "Zhi," used by them referred to many other kinds of fungi. It even included the mythical and imaginary herb. The religious connection was criticized by the medical profession in China and impeded the progress of Lingzhi's applications and true understanding [2, 3, 15].

1.2.5 Lingzhi Worship and Auspicious Symbol for the Chinese

Since the Han Dynasty, Confucian scholars gave Lingzhi the names of "fortune herb" or "fortune grass." They considered the circular lines on top of Lingzhi cap an auspicious symbol or fortunate halos. Gradually, the lucky charm characteristic of Lingzhi became a unique component in the Chinese culture.

For the Chinese, Lingzhi and its derivative, Ruyi (literally, as one wishes), have been the symbol for luck, fortune, longevity, peace, and prosperity. This is widely believed in and deeply affects the people and culture to date. Images of Lingzhi, and the "fortunate clouds" derived from it, can be found on palaces, temples, ancient buildings, clothing, embroidery, paintings, sculptures, china, and excavated archaeological relics. For example, they are on the pole in front of the Tiananmen Square, on the ceiling of the Qianian Hall at the Temple of Heaven, and on the royal passage leading to the Main Hall at the Forbidden City. There are carved Lingzhi bonsai on the fences at the Forbidden City, the Ancient Ministry of Education Building and the Confucius Temple, the graphic design on the base of the stone tablet at the Confucius Temple, as well as the wood carving of Lingzhi boni before the Sakyamuni statue in Yonghe Lamasery. These give the evidence of how the Chinese worshiped Lingzhi in the old times.

The silk painting by Emperor Qianlong of the Qing Dynasty (Fig. 1.10), a collection at the Palace Museum in Taipei, shows a vase with pine branches, camellia, and plum blossom. And on its side there are persimmon, lilies, and Lingzhi. This is a typical painting reflecting the wish for good luck and fortune.

To date, many Chinese idioms, such as "Ji Xiang Ru Yi" (good fortune and happiness), "Ci Fu Jia Xiang" (bestow blessing and happiness), "Zeng Tian Shou Kao"

Fig. 1.10 The silk (Ru Yi painting by Emperor Qianlong). (Reproduced with permission from Ref. [2])



(blessed with longevity), and “Guo Tai Ming An” (country is prosperous and people live in peace), continue to be used by the people, reflecting the ingrained Lingzhi culture [2].

1.3 Conclusion

Shennong Materia Medica and many other written records in the early Chinese history began to study, discuss, and report the scientific aspects of Lingzhi in respect to its categorization, habitat, bionomics, herbal nature, medication, etc. They have been frequently referred to in literature and used for further research and applications.

Ganoderma (Lingzhi) has been viewed as a magic herb as well as an auspicious symbol by the Chinese. It is, therefore, also known as “Ruizhi,” “Shenzhi,” and “Xiancao,” meaning good fortune and mysterious power. Numerous myths and poems mentioning people’s love, worship, and beliefs on Lingzhi can be found in the Chinese literature since ancient times.

Recent research on *Ganoderma* (Lingzhi) promotes the development of *Ganoderma* industrial application.

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