

Application of Plateau Characteristic crops in high school biology teaching -- Taking *Gastrodia elata* as an example

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Abstract: Under the background of the new curriculum reform, it is necessary to reasonably develop and utilize the local biology curriculum resources. This paper uses the literature method to study the teaching application of domestic biology curriculum resources, and makes clear the importance of rational development and utilization of local biology curriculum resources. A questionnaire survey was conducted to understand the development status of local *Gastrodia elata* resources in high school. With the help of literature and content analysis, 22 *Gastrodia elata* knowledge were integrated into high school biology teaching, and the corresponding teaching plan was designed based on PEP high school biology. According to the research results, taking *Gastrodia elata* as an example, this paper has important guiding significance for the integration of high school biology teaching and local resources.

Keywords: high school biology teaching; Curriculum resources; *Gastrodia elata* resources

Biology teaching needs resource support. In the biology curriculum standard for senior high schools (2017 Edition), it is also proposed to actively develop and utilize biology related curriculum resources. In the research on the development and utilization of life oriented curriculum resources for senior high school biology teaching, Wang Chuangqi pointed out that a large number of curriculum resources are needed to realize life oriented teaching. Fang Xiaoping Teachers can give full play to the characteristics of rural natural conditions, start from students' actual life, and use all kinds of things around life to educate students. *Gastrodia elata*, as a local characteristic cash crop in Zhaotong, has a strong flavor of life and is familiar to students. Teachers' integration of various teaching methods and teaching aids can stimulate students' interest in biology and help cultivate students' core literacy in biology.

1 Zhaotong *Gastrodia elata* resources

Gastrodia elata has a history of more than 2000 years in China. As early as the Han Dynasty, it has been recorded in the Shennong herbal classic that *Gastrodia elata* "is named as red arrow and is listed as the top grade of the grass", "it mainly kills ghosts and spirits, and is poisonous and vicious. It can benefit Qi power, grow Yin and health, and lighten the body and increase the age". With the in-depth study of *Gastrodia elata*, many secrets of *Gastrodia elata* have been excavated, such as the special symbiotic relationship between *Gastrodia elata* and *Armillaria mellea*, the optimized breeding of *Gastrodia elata*, the life history of *Gastrodia elata*, a variety of pharmacological components and mechanisms of action of *Gastrodia elata*, which provide rich curriculum resources for Biology teaching.

Gastrodia elata is a perennial, non autotrophic, rootless and leafless orchid plant. It is mainly distributed in tropical, subtropical and warm temperate mountainous areas. Zhaotong has a typical plateau monsoon three-dimensional climate and unique geographical environment coexisting with the warm temperate zone, which provides good conditions for the growth of *Gastrodia elata* and becomes the core area of wild *Gastrodia elata* in China. Zhaotong *Gastrodia elata* has therefore won the titles of "hometown of *Gastrodia elata*" and "origin of *Gastrodia elata* in the world". Based on the unique wild *Gastrodia elata* germplasm resources, Zhaotong Municipal People's government has issued a number of policies, measures and measures to promote the large-scale cultivation of *Gastrodia elata*, provide added value of agricultural products, expand the market of characteristic products, help the development of *Gastrodia elata* industry, and promote farmers' income. It can be seen that *Gastrodia elata*, as one of the characteristic crops in Zhaotong, is of great significance to promote the economic development of Wumeng Mountain. Therefore, the development and utilization of *Gastrodia elata* resources in Zhaotong can be combined with biological courses to promote the development of *Gastrodia elata* industry in Zhaotong to a certain extent.

2 development status of local *Gastrodia elata* resources in Senior High School

Through a questionnaire survey to understand students' understanding of *Gastrodia elata* and their acceptance of *Gastrodia elata* resources in class, we can preliminarily grasp the current situation of the development of *Gastrodia elata* curriculum resources in local middle schools.

According to the questionnaire survey, biology classroom has great advantages in the development and utilization of *Gastrodia elata* resources. Because *Gastrodia elata*, as a local characteristic crop in Zhaotong, is familiar and common in students' daily life. Secondly, of the 178 students surveyed, 95% longed for the knowledge of *Gastrodia elata* to enter the biology classroom in various ways, and agreed that it could promote the learning of biological knowledge. Even 62% of the students have plans to deal with *Gastrodia elata* learned in biology class, such as applying it to life, raising awareness to prepare for choosing a major in University, or introducing it to friends on the spot. 82% of the students knew that Zhaotong enjoyed the titles of "hometown of *Gastrodia elata*" and "origin of *Gastrodia elata*". 86% of the students were able to talk about many pharmacological effects and eating methods of *Gastrodia elata*. There are also some challenges in the development process. Because more than 70% of the students do not know much about the life course, family and genus of *Gastrodia elata*.

More than 60% of students' understanding of *Gastrodia elata* products also exists on the basis of *Gastrodia elata* powder, dried *Gastrodia elata* and *Gastrodia elata* wine. Nearly 80% of the students did not know and how to distinguish *Gastrodia elata* varieties. Students are unable to connect the pharmacological effects of *Gastrodia elata* with biological knowledge.

This also reflects the insufficient development of *Gastrodia elata* resources in local high schools. At the same time, it sets the goal for the development of *Gastrodia elata* resources in biology class. In the process of development, we link the special relationship between *Gastrodia elata* and *Armillaria mellea*, the life history of *Gastrodia elata*, various pharmacological effects and mechanisms of *Gastrodia elata* with biological knowledge, so that students can understand the biological knowledge of *Gastrodia elata* in the process of learning. Students' understanding of Zhaotong *Gastrodia elata* culture and curiosity about *Gastrodia elata* knowledge have stimulated students' interest in biological knowledge, thus promoting students' learning. Guide students to apply *Gastrodia elata* knowledge to their daily life, and enable students to use their biological knowledge to try to solve or explain the corresponding problems or phenomena in daily life. Cultivate students' hometown pride, spread Zhaotong *Gastrodia elata* culture, and help the development of local *Gastrodia elata* industry.

3 Development and utilization of *Gastrodia elata* resources in high school biology teaching

In the teaching of sugars and lipids in cells, students can be introduced to the types of *Gastrodia elata* polysaccharides to increase their understanding of the types of sugars in cells. In the teaching of protein function, after talking about the function of protein on human body, the students were introduced to the antibacterial effect of *Gastrodia* antifungal protein on most fungi, and the students were guided to talk about the application of *Gastrodia* antifungal protein in daily life, such as "zunjiao No.1", wheat resistant to *Verticillium* Wilt, tobacco resistant to disease, etc. Understand that protein is equally important for plants and humans, and let students properly understand the frontier of scientific development, so as to draw the distance between biology and life. In the course of cell life course, students should not only master the complete cell life process and the role of free radicals, but also understand anti-aging, correctly treat anti-aging health products and develop a healthy lifestyle. Taking the anti-aging effect of *Gastrodia elata* polysaccharide as the introduction, stimulate students' interest in learning. After learning this section, guide students to think about the anti-aging principle of *Gastrodia elata* polysaccharide in combination with the role of free radicals? And organize students to discuss how to resist aging in life? So that students can connect the pharmacological effects of *Gastrodia elata* polysaccharide with biological knowledge; And guide students to love beauty correctly and develop a healthy lifestyle. In the teaching of gene mutation and gene recombination, taking the breeding history of the world's first "space *Gastrodia elata*" and the "e Tianma No.1" with good parental traits obtained by crossing the black *Gastrodia elata* with higher *gastrodin* and the red *Gastrodia elata* with higher yield as the main line of teaching, a series of questions were designed: (1) what is the biological principle of aviation breeding? What's the point? (2) When did the gene mutation occur? (3) What are the factors causing gene mutation in the materials? What other factors are there? (4) What are the characteristics of this breeding method? First, the teacher shows the materials to guide students to learn the principle, essence and significance of aviation breeding, so as to master the knowledge of gene mutation. Then guide the students to design the corresponding question string of "gene recombination" according to the question string of "gene mutation", and explore and study in groups, and finally show it on the stage; Finally, the advantages and disadvantages of the two breeding methods were compared. Stimulate students' thirst for knowledge, let students know the hardships of science, encourage students to study, and cultivate students' scientific thinking and cooperative spirit. In the part of blood glucose balance regulation, students should not only master the principle of blood glucose regulation and the consequences of blood glucose imbalance, but also understand the causes of the formation of two types of diabetes, drugs for the treatment of different types of diabetes and prevention methods. When the topic is introduced, the teacher can ask the students whether there are diabetics in their home? Do you know the causes and therapeutic drugs of diabetes? Then the hypoglycemic effect of *Gastrodia elata* polysaccharide on type 2 diabetes mellitus was introduced. It can not only stimulate students' interest in learning this section of knowledge, but also understand students' care for the elderly, and virtually cultivate students' sense of social responsibility. After learning this section, guide students to summarize the mechanism of blood glucose balance and the structure of blood glucose imbalance. Let students try to explain the mechanism of *Gastrodia elata* polysaccharide reducing blood glucose in patients with type 2 diabetes according to the causes of type 2 diabetes? What are the preventive measures to prevent diabetes? To test students' knowledge, increase students' understanding of life common sense and scientific frontier, and gradually improve students' biological core literacy. In the section of immune disorders allergic reactions, teachers should know about the allergen situation of students and ask students to talk about the "allergic events" around them; And expand the *gastrodin* allergic reaction to shock events to arouse students' attention to allergy. In the course of ecosystem structure, the teacher led the students to watch the micro video of "the life of *Gastrodia elata*". The students learned the special symbiotic relationship between *Gastrodia elata* and *Armillaria mellea*, and why *Armillaria mellea* played the role of decomposer in the ecosystem. Let students pay attention to life, connect biological knowledge with life, and use biological knowledge to explain phenomena in life. In the teaching of ecosystem balance, teachers can expand the harm caused by excessive planting of *Gastrodia elata* Blume through pictures and oral statements, such as serious deforestation, serious soil erosion, destruction of soil microorganisms, waste of land resources, etc. Taking the harm caused by planting *Gastrodia elata*, a common trivial matter in students' daily life, as an example, students can further feel the importance of ecosystem balance, and strengthen students' awareness of caring for the environment and nature. In the practical application of ecological engineering, students try to build *Gastrodia elata* ecological engineering under the guidance of their theory, so that people realize the importance of ecosystem. In the course of application of traditional fermentation technology, students should not only master the production steps of pickles and wine, but also cultivate innovative spirit and practical ability. The teacher briefly

introduced the *Gastrodia elata* rice wine developed by the scientific community, which combines the function of *Gastrodia elata* and the flavor of rice wine, contains rich vitamins, gastrodin and trace elements, and is very beneficial to human health. The students were guided to explain the production process of rice wine, and then organized a group of students to discuss the steps of making *Gastrodia elata* rice wine. Then I went home to finish it with my parents at the weekend, and made videos and other records to show and share in class. In order to cultivate students' innovative ability and practical ability, and promote the feelings between students and parents.

4 conclusion and Prospect

Integrating *Gastrodia elata* Blume into high school biology teaching with a variety of teaching aids based on students' actual life can not only enrich local biology curriculum resources, help students understand teaching materials, promote the transformation of students' learning methods, urge students to pay more attention to observing biological phenomena around them in their daily life, and develop the learning habit of combining theory with practice. It can also cultivate students' hometown pride, so as to improve students' biological science literacy. With the increase of students' understanding of *Gastrodia elata* and the spread of local *Gastrodia elata* culture, it can promote the revitalization of rural areas and help the development of local *Gastrodia elata* industry to a certain extent.

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