

# Construction of Scientific Research Innovation Training System for Undergraduates Majoring in Forestry

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## ABSTRACT

Forestry is one of the important majors to train high-end talents for ecological environment construction and management. An important way to promote ecological environment construction and development is to cultivate undergraduates majoring in Forestry with innovative thinking in scientific research. According to the objectives of talent training and course characteristics of Forestry, this paper discusses the development status and necessity of scientific research innovation training for undergraduates majoring in Forestry, and constructs a scientific research innovation training system for these undergraduates from the aspects of scientific research knowledge training combining theory with practice, scientific research skills training combining practical teaching with scientific research tasks and perfect evaluation of scientific research level of undergraduates. The purpose is to play a guiding role in the practice of scientific research innovation training for undergraduates majoring in Forestry.

**Keywords:** Forestry, Scientific research training, Construction.

## 1. INTRODUCTION

With the development of science and technology and intensifying international competition, the quality of college education and talent cultivation is an important factor influencing overall national strength and competitiveness [1]. Forestry is one of the most important majors to cultivate high-end talents for ecological environment construction and management for the country. Undergraduates majoring in Forestry should not only have a solid theoretical foundation, but also have a high scientific research ability. However, from the perspective of forestry industry development and scientific research on forestry, there are still some problems of restrictions such as insufficient scientific innovation efforts and shortage of innovative talents. Therefore, the core task and historical mission of the major construction of Forestry are to cultivate undergraduates majoring in Forestry with innovative thinking in scientific research, thereby meeting the demands of forestry industry development for professional talents in the new era.

## 2. DEVELOPMENT STATUS OF SCIENTIFIC RESEARCH INNOVATION TRAINING FOR UNDERGRADUATES

The scientific research innovation training for undergraduates was implemented earlier in foreign countries. At the end of 1970s, American colleges and universities such as MIT have launched the "Undergraduate Research Opportunity Program" (UROP). In the 1990s, well-known colleges and universities in China such as Tsinghua University and Zhejiang University successively implemented the "Student Research Training Program" (SRTP). As the Ministry of Education issued the *Notice on Approving the Implementation of the 2012 Construction Project of "Undergraduate Teaching Quality and Teaching Reform Project in Colleges and Universities" during the "12<sup>th</sup> Five-Year Plan"*, which decided to implement the innovation and entrepreneurial training program for college students during the 12<sup>th</sup> Five-Year Plan [2], colleges in China and provincial education authorities also launched innovation and entrepreneurial training programs at school and provincial levels at the right time. For example, the Beijing Municipal Education Commission launched the "Practice Ability Training

Program" for Cross-training High-level Talents in Colleges and Universities in Beijing. Beijing University of Technology, China University of Mining and Technology and University of Science and Technology of China also successively set up scientific research and training programs for college students [3]. Compared with foreign universities, the scientific research innovation training system for undergraduates was constructed relatively late in Chinese universities. As a whole, the effect and position of scientific research training for undergraduates are not highly valued, and its operation and management mode still need to be improved.

### **3. NECESSITY OF SCIENTIFIC RESEARCH INNOVATION TRAINING FOR UNDERGRADUATES MAJORING IN FORESTRY**

#### ***3.1. Scientific research innovation training for undergraduates is conducive to cultivating their rational scientific values and literacy***

Scientific research is a rigorous, practical and serious issue and also a process of exploration and innovation. Scientific research innovation training for undergraduates is to provide a platform for students to think independently, express themselves and face challenges; and to provide students with opportunities to explore innovative ways to analyze and solve practical problems in the face of failures and mistakes, thereby cultivating their innovative consciousness and capability [3]. At present, some students participate in scientific research training with vanity and weak will in scientific research. Through the scientific research innovation training for undergraduates, students are cultivated for their quality of integrity and sense of responsibility, so that they can respect science, establish correct scientific values and have good scientific literacy.

#### ***3.2. Scientific research innovation training for undergraduates is an important way to cultivate innovative forestry talents***

Forestry is a comprehensive major that studies production theory and science and technology of forestry. Under the background of ecological civilization construction, Forestry, as the core major of forestry colleges and universities, undertakes the important task of cultivating innovative forestry talents with the basic theoretical knowledge and practical skills in forestry, ecology, biology and other aspects as well as ecological civilization values. Besides, scientific research innovation training for undergraduates is an important way to cultivate innovative talents. It not only enables undergraduates to understand the development trend of forestry and the problems and challenges they

will face, but also improves their innovation and practical ability of scientific research, promotes teaching through scientific research, improves the quality of professional talents training, and provides professional talents for national ecological civilization construction and forestry development [2].

#### ***3.3. Scientific research innovation training for undergraduate is conducive to improving their interest and ability in scientific research***

Forestry is a practical, open and exploratory major <sup>[1]</sup>. To cultivate innovative forestry professionals with "solid foundation, wide knowledge, strong ability and high quality", students are required to have strong learning interest and autonomous learning ability. However, the lack of learning interest and ambition of modern college students has become an important factor affecting the quality of personnel training. How to motivate the interest of college students in learning and develop it into "academic inclination" has become an urgent problem to be solved in the cultivation of talents in colleges and universities. However, the cultivation of interest and ability in scientific research is not accomplished in an action, but is a long-term and gradual process. Through practical, targeted and innovative scientific research innovation training for undergraduates, students are gradually guided to understand the cutting-edge theories, methods and practices of Forestry, apply the theoretical knowledge learned to specific scientific research projects and solve professional problems, which will enhance their identification with Forestry, stimulate their interest in scientific research, improve their autonomous learning ability and scientific research ability, and ultimately improve their overall comprehensive quality [4].

### **4. CONSTRUCTION OF SCIENTIFIC RESEARCH INNOVATION TRAINING SYSTEM FOR UNDERGRADUATES MAJORING IN FORESTRY**

#### ***4.1. Construction of scientific research knowledge training system combining theory with practice***

In the education and teaching of Forestry, theory and practice are closely combined. The objective of scientific research innovation training for undergraduates majoring in Forestry is to systematically cultivate undergraduates' professional knowledge system and practical operation ability by means of strengthening theoretical teaching content, cultivating practical operation skills and combining theoretical knowledge with practical ability in combination with undergraduate thesis [5]. During teaching and training, the phenomenon that traditional theoretical courses and

practical courses are separated in time and space is eliminated, and the teaching contents of basic courses, major courses and practical courses are integrated into an organic whole to implement an integrated teaching mode. Taking the professional basic course Dendrology as an example, theory can be combined with the experimental practice in its teaching process. After the basic knowledge such as the ecological habits and morphological characteristics of trees are taught in the classroom, students can immediately observe, investigate and record the site environment, morphological characteristics and health status of the trees in the campus. In terms of training methods, practical teaching and scientific research training are closely combined to encourage undergraduates to participate in scientific research projects in the laboratory. Through the operation in specific scientific research projects, undergraduates are taught basic scientific literacy such as document retrieval, experimental design, data collection and processing, analysis of experimental results and paper writing. Moreover, students are trained for their ability to analyze and solve professional problems as well as the independent scientific research thinking and comprehensive practical ability, thereby gradually cultivating their rigorous scientific research attitude and scientific spirit of seeking truth from facts [4].

#### ***4.2. Construction of scientific research skills training system combining practical teaching with scientific research tasks***

Forestry is a major with strong applicability. Scientific research innovation training for students majoring in Forestry should cultivate their good scientific research spirit of "knowing what it is and why it is", systematically cultivate their scientific research ability and expand their academic visions. In practical teaching, students are encouraged to design experiment by themselves, master detailed operations in practice under the guidance of teachers and exercise their practical ability; students are encouraged to adopt various methods and approaches to solve practical problems and establish their innovative consciousness through comprehensive design experiments; undergraduates are encouraged to undertake or participate in the application of scientific research innovation training programs for undergraduates at school, provincial or national level, conduct project management on their own under the guidance of teachers, and independently carry out project work; undergraduates are encouraged to participate in the project research of teachers in the major, understand the task, duties, results and honors of the project experiment, and expand the knowledge level, and effectively improve the scientific research ability of undergraduates majoring in Forestry, thereby achieving the purpose of scientific research innovation training

and laying the foundation for innovative solutions to professional problems in Forestry in subsequent work and study [3][6].

#### ***4.3. Construction of perfect assessment system of scientific research level of undergraduates***

Scientific research innovation training for undergraduates aims to cultivate students' autonomous learning ability and scientific research innovation awareness. It should encourage innovation and tolerate failure, thus creating an academic atmosphere of staying realistic and pragmatic and being open and cooperative. However, the current assessment of scientific research innovation training for undergraduates mostly focuses on original scientific research achievements they have made, such as publications, authorized patents, honors, etc. For undergraduates with limited professional knowledge, this is very difficult. It not only severely discourages undergraduates' enthusiasm for participating in and teachers' enthusiasm for guiding undergraduates in scientific research innovation training, but also results in students' utilitarian and purposeful application for scientific research training programs. From the above, when developing the assessment system of scientific research innovation training for undergraduates, we should weaken the unified rigid assessment indicators such as papers and patents, adopt diversified assessment methods, and focus on assessing the whole scientific research process, such as flexible assessment of basic scientific research literacy based on the ability of literature retrieval and review, data collation and analysis, problem solving and report writing; assessment of teamwork ability based on project management competence and teamwork; and assessment of academic communication level based on students' ability of thesis defense and results of academic reports. In addition, the quality and effect of scientific research innovation training for undergraduates are closely related to instructors' experience and input, so instructors who are conscientious and responsible in this regard should be rewarded [3][7].

## **5. CONCLUSIONS**

As a national public welfare industry, forestry plays a prominent strategic role in the economic and social development, and its development needs a large number of high-quality innovative talents. The scientific research innovation training for undergraduates majoring in Forestry is an important way to cultivate high-quality innovative talents. Therefore, through the construction and continuous development of the scientific research innovation training system for undergraduates majoring in Forestry, we can effectively cultivate their innovative thinking and scientific research consciousness, enhance their scientific research ability and broaden scientific research vision, serving

for the cultivation of applied, comprehensive and innovative forestry talents that meet the industry demands.

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