

# Exploration on Teaching Reform of Agro-meteorology for Applied Meteorology Major in Local University

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## ABSTRACT

Agricultural meteorology is the core professional course of Applied Meteorology in Guangdong Ocean University, which plays a very important role in the cultivation of Applied Meteorology talents. According to the demand of cultivating high-quality applied talents in local universities, through the analysis of the current problems of Agrometeorology teaching, a series of targeted researches have been carried out. After taking a series of measures, such as determining the goal of scientific curriculum construction, updating and optimizing the teaching content and innovating the teaching method, the problems in the course construction and teaching have been solved; the teaching effect has been improved, and the local and professional characteristics have been highlighted. An autonomous learning model has been constructed to improve students' learning ability. It explores a new curriculum construction model which is consistent with the training target of talents, and constructs a teaching mode which meets the needs of the industry and development of students.

**Keywords:** local university, Agrometeorology, teaching reform, professional characteristics

## 1. INTRODUCTION

The research content of atmospheric science is very extensive; the major of atmospheric science offered by each university also has its own emphasis. Guangdong Ocean University offers atmospheric science and applied meteorology.

Agrometeorology is an interdisciplinary subject that studies the relationship between meteorological conditions and agriculture and its laws, in order to seek benefits and avoid harms and serve for agricultural production, the learning content has strong applicability and practicality. Agrometeorology is a core course of the applied meteorology major in Guangdong Ocean University. It is closely related to follow-up courses such as "agrometeorological disaster risk assessment", "meteorological disaster prevention and mitigation", and plays an important role in the knowledge system of personnel training [1-5]. The class hours of Agrometeorology are 56 hours of theoretical teaching, and one week of practice teaching.

To meet the needs of national economic construction and social development, the applied meteorology major in Guangdong Ocean University is to train the applied talents who are facing the needs of the meteorological industry. Therefore, we should continue to carry out teaching reform, so that our graduates have both broad theoretical knowledge and strong practical ability.

According to the current situation of the agrometeorology course and the requirements of the applied talents training, how to make the students not only master the meteorology

theoretical knowledge, but also have the ability to use meteorology knowledge to solve the practical problems in agriculture, which is an urgent problem to be solved in agrometeorology teaching.

## 2. SOLUTIONS TO PROBLEMS EXISTING IN AGROMETEOROLOGY TEACHING

There are some problems in the traditional teaching system of agrometeorology, which can't meet the requirements of training applied meteorological talents in the new era.

### 2.1. The teaching content is extensive, and is not suitable for the actual business

The textbook selected for agrometeorology is "The Principles of Agrometeorology", which is compiled by the team led by Pro. Shen Shuanghe in Nanjing University of Information Science and Technology. It condenses many years of teaching and scientific research results, combines the operational practice of the Meteorological Bureau, specifically analyzes the quantitative requirements of agrobiological and production process on meteorological conditions, and the risk assessment of agrometeorological disasters. It is recognized by experts as one of the best teaching materials of agrometeorology in China. However, the textbook is compiled for all applied meteorology majors in the mainland of China. China has a vast territory, complex climate types, and obvious regional differences in planting systems and crop layout.

The Agrometeorology teaching in Guangdong Ocean University has always been based on the outline and teaching plan according to state-compiled textbook. However, as a local university, most of our students are from Guangdong Province, and the teaching content should highlight and reflect the climate characteristics, agricultural production and meteorological disasters in South China, so the teaching content should also be targeted.

At the same time, "Agrometeorology" is a course for the Applied Meteorology students. They know little about agronomy, so some agronomy knowledge should be properly added. For teachers, "teaching" is not only the process of faithfully imparting the content of a textbook, but also to put the teaching of each course into the whole talent training program [4].

Therefore, based on the training objective of applied meteorology talents, on the premise of maintaining the original knowledge structure, it is necessary to appropriately delete or add some teaching contents, so as to help applied meteorology students to better understand the agronomy terms and improve their learning effect. If students passively accepting a lot of unfamiliar information in the classroom, it will reduce their enthusiasm for learning.

### ***2.2. The cultivation of students' practical ability needs to be improved***

According to the students' future career development planning and the needs of applied meteorology business, the teaching of agrometeorology should be practical and to cultivate applied talents. For the students who have been employed since graduation, teaching should strengthen their practical ability, strengthen training in combination with the actual situation, strengthen their ability to solve the practical problems of agricultural production with meteorology knowledge. However, in the teaching process of Agrometeorology, the theoretical knowledge in the textbook is often regarded as the key point, which can't be well combined with the production practice, and is far from the goal of application-oriented personnel training. Especially for the students from applied meteorology, meteorological courses are the main part of their curriculum system, and they have no practical experience in agricultural production, this kind of teaching method is not conducive to the practical ability cultivation, so it is particularly important for the teaching reform of Agrometeorology.

### ***2.3. The teaching method needs to be reformed***

The teaching method of traditional Agrometeorology teaching can no longer satisfy the students' way of seeking knowledge in the new era. This requires teachers to practice teaching with new roles. The formation of knowledge accomplishment is not dependent on simple

classroom teaching, but on students' participation in teaching activities: not only on memory and understanding, but also on perception and thinking. Therefore, based on the teaching core, teachers are required to grasp the essence of knowledge, create appropriate teaching situations, inspire students to think, let them understand the essence of knowledge, accumulate experience of thinking and practice.

## **3. TEACHING REFORM AND EXPLORATION OF AGROMETEOROLOGY**

### ***3.1. Improving the relevance with agricultural production, update and optimize the teaching content, keep pace with the times***

#### *3.1.1. Highlighting local characteristics*

Guangdong is located across the tropics and subtropics. There is no severe cold in winter and no intense heat in summer. Warm climate, abundant rainfall, but the complex terrain results in large vertical temperature differences and diverse climate types, thus forming a rich and unique three-dimensional climate pattern in Guangdong, which provides a natural basis for the development of characteristic agriculture in Guangdong. However, due to the alternation of the low latitude tropical weather system and the middle-high latitude weather system, the weather and climate are complex and changeable, typhoons, rainstorms, low temperatures and droughts often occur year after year. Guangdong is a province with many meteorological disasters, high frequency and serious damage. According to the characteristics of regional climate and agricultural production, the teaching content of Agrometeorology theory focuses on the introduction of the climate characteristics, climate resources and the occurrence law of agrometeorological disasters in South China. Students can have a deep understanding of the climate and agrometeorological characteristics in South China, on the premise of mastering the basic situation of agricultural climate resources in China. So that our graduates can better serve the actual production, such as: litchi, longan, banana, pineapple and other tropical and subtropical fruit planting, mulberry based fish pond, fruit based fish pond, sugarcane based fish pond and other three-dimensional agricultural forms, high-quality aquaculture, characteristic agriculture of flowers and seedlings in the Pearl River Delta, high-quality tea in the east of Guangdong, animal husbandry in the west of Guangdong, etc.

### *3.1.2. Highlighting professional characteristics*

"Agrometeorology" is the core course of applied meteorology major, the main part of the students' knowledge system of this major is meteorology, and their agricultural knowledge is lack. On the premise of complementing the necessary knowledge of Agronomy, the teaching content highlights the demand of main grain crops for temperature, light, water and gas and the main agrometeorological disasters in Guangdong. Students focus on the observation of farmland microclimate factors affecting rice growth, growth amount, growth quality, etc. The meteorological conditions suitable for local rice planting are studied, the adaptability indexes of rice planting, the meteorological indexes of rice diseases are worked out. And how to control the microclimate in the facility agriculture, strive for the goal of high yield and high quality of tropical fruits. Students can closely link agricultural knowledge and meteorological professional knowledge, carry out classification research according to different needs of planting industry and aquaculture products, and then integrate meteorological knowledge into actual production to guide production.

## **3.2. Enriching and innovating teaching methods based on the requirements of application-oriented personnel training**

### *3.2.1. Connecting with production practice to improve learning effect*

The traditional teaching method of Agrometeorology is multimedia teaching courseware display. Although teachers comprehensively use text, graphics, flash animation and video materials, and strive to show theoretical knowledge in front of students. But, the connection between teaching and production practice is not enough, and the teaching effect is still not very ideal. Through the efforts of the course group for many years, agrometeorology has strengthened some practice teaching modules, such as, dynamic monitoring of agricultural situation, characteristic agrometeorological observation, agrometeorological weather forecast, agrometeorological disaster forecast, etc. And taking advantage of the comprehensive university, the students majoring in applied meteorology, the students in agricultural college and fisheries school carry out collaborative research. Teachers guide students to carry out the practice of agricultural weather forecast, suitable period forecast of agricultural activities, meteorological condition grade forecast of diseases and insect pests. Especially early warning of agrometeorological disasters, for main grain crops (rice, peanut), characteristic crops (litchi, longan, flowers, Shatian pomelo, etc.) and aquaculture (Tilapia, grouper, golden pomfret, prawn, etc.) in Guangdong. It enables students to deepen their understanding of the importance of

Agrometeorology, through the practical connection of theoretical knowledge with life and production.

### *3.2.2. Improving students' participation in class*

One survey shows that at present, only one third of college students participate in class [6], which is not conducive to the improvement of students' learning ability. Therefore, in the process of teaching, it is very important to encourage students to actively participate in classroom teaching. Teachers arrange 10 minutes for the student groups to show their research results in each class. For example, some students introduce the relationship between agricultural production and climate in their hometown, some students talk about how to improve the efficiency and real-time level of agricultural meteorological data transmission, and some students talk about the refined services of agricultural meteorology in characteristic agriculture. Let students step on the stage, improve their participation in the classroom, and realize the common improvement of learning ability under the demonstration of excellent students.

### *3.2.3. Through case teaching, train students' thinking mode of integrating theory with practice*

In order to deepen the students' understanding of the knowledge points of agrometeorology, teachers timely introduce the practical cases of combining meteorology knowledge with agricultural production. For example, when explaining the effect of light and temperature on crop quality, teacher introduced the case of Pitaya planting in Yunjiao village (near our university). At the beginning, due to the lack of agricultural meteorological technical support, farmers suffered economic losses. After receiving the precise agricultural meteorological services provided by the professor of Guangdong Ocean University, Pitaya output increased, and local farmers increased income. This case enables students to fully realize what consequences agricultural production will be if agricultural climate factors are not taken into account, vividly understand the close relationship between agricultural production and meteorological conditions, and realize that blind introduction is not allowed in future production. This will deepen students' understanding of the knowledge point.

### *3.2.4. Moving the classroom to the farmland*

The purpose of agrometeorology course, on the one hand, is to let students master the relevant agrometeorology knowledge, on the other hand, it is more important to link meteorological knowledge with agricultural production and scientific research. Therefore, teachers combine with practice to explain some contents of this course in the farmland. For example, when teaching the agricultural

microclimate, teacher takes students to the farmland or greenhouse to observe the changes of meteorological elements within that specific area. After returning to the classroom, let students explain the temporal and spatial characteristics of the agricultural microclimate according to their actual observation, let students study from the agricultural production.

#### **4. CONCLUSION**

It has been proved by practice that, the adjustment and optimization of teaching contents and the innovation of teaching methods in Agrometeorology course, can attract students' attention and improve their interest in learning, based on the requirements of applied talents training. Encouraging students to go to the platform not only enriches the teaching content, but also improves the students' language organization and expression ability, and improves the students' participation in the classroom. The development of case teaching combines theory and practice closely, which can make students fully realize how to flexibly apply agrometeorology knowledge to production practice. The above reform measures allow students to establish a thinking mode from theory to practice, and then from practice to enrich theory.

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#### **REFERENCES**

- [1] Mei Xurong, The Progress and Prospect of Agrometeorology, *Journal of Agriculture*,2018,8(1),61-66. (In Chinese)
- [2] Yang Weijun, Wang Chunhua, A Research on the Effects of “Agricultural Meteorology” Course Interest Group, *Education Teaching Forum*,2016,50,150-151. (In Chinese)
- [3] Bai Yun, MA Chunyan, XU Weizhou, On the Teaching Reform and Innovation of "Agricultural Meteorology" in Agriculture and Forestry Specialty in Colleges and Universities, *Value Engineering*, 2017, 036(027):253-254. (In Chinese).
- [4] JingYuanshu, Shen Shuanghe, “Discussion on the construction of Applied Meteorology,” *Journal of Technology College Education*,2005,24(2),65-66. (In Chinese)
- [5] Xue Baoying, Yin Baozhong, The Reform and Practice of Agro-meteorological Teaching in Agricultural Universities and Colleges, *Journal of Anhui Agri. Sci.*, 2010,38(35):20481-20482. (In Chinese)
- [6] Gao Huibin, College Students' participation in class needs to be improved, *China Education Newspaper*, 2015-07-08(05). (In Chinese)