

Thoughts on Teaching Reform of Agricultural Plant Pathology — Taking Yili Normal University as an Example

Dongyu Li , Xiaolu Chen*

YiLi Normal University, Yining 835000, Xinjiang, China. E-mail: cxl8109@163.com

Fund Project: This paper is supported by the teaching reform project “Exploration of Localized Reaching Reform of Agricultural Plant Pathology” of Yili Normal University in 2020. Project number: ZDZYJSJG202001.

Abstract: Taking the theoretical teaching, experimental teaching and practice of agricultural plant pathology of plant protection specialty in college of biology and geographical sciences of Yili Normal University as an example, this paper discusses how to carry out teaching and experimental practice in combination with the characteristics of agricultural production in Yili Valley, and the thinking of the problems in each teaching practice link.

Keywords: Agricultural Plant Pathology; Teaching Reform; Yili Normal University

Agricultural plant pathology, as one of the core courses for undergraduate teaching of plant protection major, has been set in the fifth semester of four-year undergraduate teaching since its establishment in 2017, based on the courses of Plant Physiology, Biochemistry, Botany, Microbiology and General Plant Pathology. In the practice of this course, the college has signed school enterprise cooperation agreements with a number of agricultural related enterprises and institutions in the region, and established a number of teaching practice and training bases outside the school, basically meeting the talent training needs of students majoring in plant protection.

Through practice, under the guidance of professional technicians with rich experience in agricultural production and professional teachers on campus, students can combine the theory learned in class with the practice of agricultural production, master certain agricultural production experience, and lay a foundation for the development after graduation. Combined with the talent training goal of “based on Yili, radiating the whole Xinjiang” of plant protection specialty in our university, the teaching team of our university carried out the teaching and practice of Agricultural Plant Pathology from the following aspects.

1. Adjusting teaching content according to local conditions

Yili Normal University is located in the Yili River Valley area with favorable climate conditions. The area is surrounded by mountains on three sides, and the west is open. Three rivers converge into the Yili River and flow into the Balkhash Lake. Due to the obstruction of the West Tianshan Mountains on three sides, the moist air flow in the west finally converges in the Yili River Valley area. The region is located in the north temperate zone between 42° 14' - 44° 50'N, frost free period between 150-180 days, annual $\geq 10\text{ }^{\circ}\text{C}$, active accumulated temperature above 3200 $^{\circ}\text{C}$, annual precipitation more than 300 Mm, good temperature and humidity conditions can meet the growth needs of a variety of crops. At present, grain crops such as wheat, corn and rice are widely planted, oil crops such as rape, oil sunflower, soybean and flax, fruit trees such as apple, pear, plum,

Copyright© 2021 Dongyu Li *et al.*

doi: 10.18686/ahe.v5i4.3535

This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

apricot, peach and grape are widely planted.

“Adjusting measures to local conditions” is the fundamental concept of agricultural production. The teaching team takes this concept as guidance in the teaching design, theoretical teaching and experimental teaching of Agricultural Plant Pathology, tracking the latest disease occurrence and development trends in real time, highlighting and reflecting the local characteristics of Yili Valley to the greatest extent. The textbook of the course is *Agricultural Plant Pathology (Third Edition)* (edited by Dong Jingao), supplemented by relevant literature and reports on crop diseases in this region. The teaching focuses on diseases of grain crops, oil crops and fruit trees. The typical symptoms, pathogenic biological characteristics, disease cycle characteristics and control points of main diseases in this region are explained. Such as: wheat scab, leaf rust, powdery mildew, snow mold, stem base rot, full rot; Head smut, smut and stem rot of maize; Rice blast, bacterial blight and bakanae; Powdery mildew and dwarf smut of rape; Black shank, white rust, sclerotinia and orobanche of oil sunflower; Soybean root rot, downy mildew; Apple canker, rust, scab, etc. We should combined with the introduction of some minor diseases in this region, such as fusarium wilt of cotton, downy mildew of cruciferous vegetables and soft rot of cruciferous vegetables; And the introduction of some important crop diseases in China, such as citrus Huanglong disease, potato late blight, soybean blight, etc., so that students can classify and summarize the occurrence and damage characteristics of agricultural plant diseases in this region from two aspects of pathogen and host characteristics, and deepen students’ general understanding of the damage laws of crop diseases in Xinjiang centered on Yili River Valley, lay a theoretical foundation for the later professional practice, so that students can quickly combine what they have learned in the classroom into the production practice, which has also been praised by the internship unit.

2. Adjusting the content of experiment course

The current teaching material of the experimental course is “*Experimental Practice Guidance of Agricultural Plant Pathology*” (edited by Li Honglian), which is not closely combined with the local agricultural production. Based on this, the teaching team investigated, sampled and sorted out the main diseases of the main crops in the region. After many discussions, it was decided that based on the current teaching materials and the occurrence and damage of the main crop diseases in this area, targeted development of fungal diseases: wheat rust, wheat scab, rice bakanae, corn head smut, sunflower sclerotinia, soybean root rot; Bacterial diseases: rice bacterial blight, cabbage soft rot; Viral diseases: eggplant diseases. In this paper, the preparation of specimens, identification of disease symptoms, identification of pathogens, observation of disease cycle and disease control experiments were carried out. It can strengthen students’ understanding of disease cycle, disease diagnosis and disease control theory, and enhance students’ practical ability. In addition, through college students’ entrepreneurial projects and undergraduate graduation practice, we can enrich the collection and arrangement of disease specimens, enrich the living and sliced specimens of major crop diseases in the region, cultivate students’ interest and experimental operation ability, and enrich the teaching aids of experimental courses.

3. Entering the front line to carry out production practice

At present, the college of biology and geography of Yili Normal University has set up two productions, study and research bases and six undergraduate practice and training bases related to agricultural production. In 2020, we will complete the graduation production practice of grade 17 undergraduates. In the process of this work, the teaching team found that there are great differences between the theoretical learning and experimental courses and agricultural production practice. For example, in the aspect of determining the sowing time of different crops, in addition to the temperature and humidity indicators taught in the theoretical course, students do not have the method of how to roughly measure the temperature and humidity without the detection equipment, and lack of basic practical experience. For another example, in the process of fungicide preparation, students cannot configure the appropriate concentration of fungicide according to the temperature, application time and other factors. The above problems need the teaching team to add the explanation of specific production experience in the next session of students’ professional courses. In the practice of agricultural production, there are few opportunities for students to contact with agricultural production. The students of this major mainly come from the local towns in Xinjiang, and there are few students from rural areas. In the undergraduate learning stage, only relying on a few theoretical courses cannot make up for the lack of practical experience in agricultural production, which requires teachers to explain the specific production experience in

combination with local agricultural production activities in the teaching process.

In the practice of “Agricultural Plant Pathology”, the students of our school took the diseases of grain crops and oil crops as the main content, supplemented by diseases of fruit trees and vegetables, to carry out the field observation and diagnosis of typical symptoms of crop diseases, so as to deepen the students’ understanding of important concepts. For example, during the seedling stage of winter wheat, the students were organized to investigate the diseases of wheat seedling stage, deepen their understanding of compound infection diseases, organize the operation of different concentrations of fungicides in the fruit bud stage, and investigate the disease index before and after spraying, so as to deepen the students’ use of fungicides in combination with the factors such as spraying time and temperature. Before clearing the orchard, the students were organized to investigate the damage of apple rust to its alternate host, in order to deepen their understanding of the theory of alternate host parasitism; The symptoms of wheat smut were observed at booting stage, and the students’ understanding of systemic infection and local symptoms was deepened through anatomical observation and explanation.

To carry out the theory teaching and production practice of undergraduates majoring in plant production according to local conditions, its direct purpose is to combine the study of professional theory with specific production practice, and transform the theoretical knowledge in books into specific production experience. At the same time, the practice process in production will deepen the students’ understanding of classroom theory. The two promote each other, and the ultimate goal is to enhance the practical ability of students, especially the practical ability according to the characteristics of local agricultural production. After graduation, students with existing practical experience by analogy, will continue to deepen and systematize the production practice ability, and enhance the competitiveness in the future study and work.

References

1. Bi Y. Analysis on the current situation, existing problems and protection countermeasures of agricultural resources and environment in Yili River Valley. *Xinjiang Agricultural Science and Technology* 2016; (1): 13-15.
2. Chen W, Guo W, Jiao Z, *et al.* Occurrence, distribution, damage and control strategies of main wheat diseases in Yili River Valley. *Xinjiang Agricultural Sciences* 2007; (1): 124-126.
3. Li Y. Occurrence dynamics of insect pests on three main crops in 64 regiment of the fourth division of corps and selection of control agents. Tutor: Zhao Sifeng; Wang Pu. Shihezi University 2017.
4. Ou Y. Study on regionalization and sustainable development strategy of maize seed production in Yili reclamation area. Shihezi University 2014.