

DOCTOR OF PHILOSOPHY

Major: Plant Protection

Code: 62 62 01 12

Mode of training: Full-time/Part-time

(Promulgated in Decision No: 4234 of President of Vietnam National University of Agriculture, 29th December 2015)

1. Training objectives and outcomes

1.1. Training objectives

Training in Ph.D. in Plant Protection, in two specializations, namely Plant Pathology and Entomology, with independent research capability, ability to detect and solve related problems in Plant protection occurring in production practices.

1.2. Standard output

To complete the training programs, Ph.D. students need to own the following knowledge, skills, attitudes and professional responsibilities:

Knowledge

- Systematizing important issues and new advances in plant pathology (classification, management, interaction with plants) and in major pathogens (fungi, bacteria). and viruses);
- Systematizing some important issues and new advances in insect science (model of quantitative change, prevention, biodiversity, ecology and classification);
- Creating new scientific knowledge in one or a number of fields related to plant protection science based on empirical evidence and developing principles and doctrines of research;
- Developing plant protection standards for legal documents related to environmental management and protection;

Skill

- Be proactive and professional in designing, organizing and implementing projects and projects on plant protection;
- Managing to identify and analyze complex issues plant protection field and providing innovative solutions to problems;
- Managing the establishment of national and international networks in the field of plant protection;
- Managing to develop collective intelligence, leading expertise in the field of plant protection to handle regional and international issues;
- Be able to use English at minimum level B2 according to the Common European Framework of Reference for Languages (CEFR). Specifically, Ph.D. students have ability to understand a complex text or report on specific and abstract topics, including scholarly exchanges in the subject area. Can communicate fluently with native speakers, write scientific reports, specialized reports and clear, detailed texts on a variety of topics and can explain their views on a subject, analyze the advantages and disadvantages of the different options.

Autonomy and responsibility

- Detecting and solving the problem of plant protection expertise, drawing principles and rules in the process of settling work
- Giving valuable plant protection initiatives and the ability to evaluate the value of

innovations.

- Having independent and creative research thinking;
- Adapting well to the international integration environment; Synthesize and analyze well the current status and development trends of the plant protection industry in the world and in Vietnam so as to take initiative in orienting scientific research.
- Having the capability to formulate and evaluate the plan; Ability to manage plan for research activities, knowledge development, new ideas, new processes in the field of plant protection.
- Ability to own leadership skill and provide a great influence on the direction of development of the groups; Producing the recommendations of the leading experts on plant protection with a solid scientific and practical argument.
- Proposing orientations in the research and development of the plant protection industry on the basis of scientific and practical reasoning; leading the group effectively following the direction and development strategy of the unit;

2. Training time

The duration of training for masters is 03 years, and 04 years is for those who do not have a master's degree.

3. Course total knowledge

No.	Curriculum	Credit numbers
1	Compulsory knowledge	6
2	Optional knowledge	8
3	Overview about Essay	2
4	Thematic	4
5	Thesis	70
	Overall	90

- If Ph.D. students do not have a master's degree, they must study additional 30 credits in the Master's Degree Program in Plant Protection, not including the Philosophy and English.

- For NCS students who already have Master's Degree in related fields or in Plant Protection field but graduated for years or having degrees provided by other training institutions, depending on each specific case, Ph.D. students must study some additional modules. as required by the training and research fields.

4. Entrance requirements

Following the current regulations of the Ministry of Education and Training and the Vietnam Agriculture Academy on Ph.D. training.

4.1. Major/ Specific Major

Plant Protection, Crop Science, Genetics and Plant Breeding, Agronomy, Crop Production.

4.2. Major/ relative major

Biotechnology, Biology, Forestry, Silkworm, Fruit and Vegetable Technology - Landscape, Gardening, Agricultural Engineering, Pedagogy

5. The training process, graduation conditions

Complying with the current regulations of the Ministry of Education and Training and the Vietnam Agriculture Academy on Ph.D. training.

6. Scale

Rating on a scale of 10.

7. Program specification

No.	Code	Vietnamese name	Tên tiếng Anh	Total credits	Theory	Practice	Compulsory	Elective
PhD credits								
Core credits I (Insect directions)								
1	NH0801	Biến động số lượng côn trùng	Population Dynamics of Insects	2	2	0	x	
2	NH0802	Những tiến bộ mới trong quản lý sâu hại	Advanceds in Insect Pests Management	2	2	0	x	
3	NH0808	Sinh lý giải phẫu côn trùng	Insect physiology	2	2	0	x	
Core credits I (Plant pathology direction)								
4	NH0803	Phân loại nấm gây bệnh cây	Taxonomy of plant fungi	2	2	0	x	
5	NH0810	Phân loại vi khuẩn gây bệnh cây	Taxonomy of plant bacteria	2	2	0	x	
6	NH0830	Phân loại virus gây bệnh cây	Taxonomy of plant viruse	2	2	0	x	
Elective credits								
7	NH0805	Đa dạng sinh học côn trùng nông nghiệp	Biodiversity of Agriculrural Insects	2	2	0		x
8	NH0806	Sinh sản côn trùng	Reproduction of Insect	2	2	0		x
9	NH0807	Tập tính học côn trùng	Insect Behavior	2	2	0		x
10	NH0831	Quan hệ giữa côn trùng và thực vật	Relationship between xinsects and plants	2	2	0		x
11	NH0832	Quan hệ giữa vi khuẩn và cây	Bacteria-Plant interraction	2	2	0		x
12	NH0809	Quan hệ giữa nấm và cây	Fungi- Plant interraction	2	2	0		x
13	NH083	Quan hệ giữa	Vius- Plant	2	2	0		x

	3	virus và cây	interraction					
14	NH080 4	Những tiến bộ mới trong quản lý bệnh cây	Advances in Plant Disease Management	2	2	0		x
General assignments and thematic catalogue								
1	TLTQ	Tiểu luận tổng quan					x	
2	CĐ	Giao tiếp hóa học ở côn trùng	Chemical communication in insects	2				x
3	CĐ	Tuyệt dục côn trùng và ứng dụng	Insect Sterilization and Application	2				x
4	CĐ	Cơ sở khoa học xây dựng ngưỡng phòng trừ sâu hại	Identification of economic thresholds for pest insect	2				x
5	CĐ	Các phương pháp điều tra thu mẫu côn trùng	Sampling and evaluation methods for insects	2				x
6	CĐ	Ngừng phát dục theo mùa ở côn trùng	Diapause in Insect	2				x
7	CĐ	Quản lý sâu hại tổng hợp	Integrated Insect Pest Management	2				x
8	CĐ	Tính kháng thuốc của côn trùng	Insecticide Resistance	2				x
9	CĐ	Các phương pháp đánh giá biến động số lượng côn trùng và ứng dụng	Evaluation methods for insect population dynamics and application	2				x
10	CĐ	Côn trùng thụ phấn	Insect Pollinators	2				x
11	CĐ	Biện pháp sinh học phòng chống sâu hại	Biological Control in Pests Insect	2				x
12	CĐ	Bệnh nấm hại cây lương thực	Fungal diseases of food crops	2				x
13	CĐ	Bệnh virus hại cây lương thực	Virus diseases of food crops	2				x
14	CĐ	Bệnh vi khuẩn hại cây lương thực	Bacterial diseases of food crops	2				x
15	CĐ	Bệnh tuyến	Nematode	2				x

		trùng hại cây lương thực	diseases of food crops					
16	CĐ	Bệnh nấm hại cây rau hoặc hoa, quả, CCN	Fungal diseases of vegetables or flowers, fruits, industrial crops	2				x
17	CĐ	Bệnh virus hại cây rau hoặc hoa, quả, CCN	Virus diseases of vegetables or flowers, fruits, industrial crops	2				x
18	CĐ	Bệnh vi khuẩn hại cây rau hoặc hoa, quả, CCN	Bacteria diseases of vegetables or flowers, fruits, industrial crops	2				x
19	CĐ	Bệnh tuyến trùng hại cây rau hoặc hoa, quả, CCN	Nematode diseases of vegetables or flowers, fruits, industrial crops	2				x
PhD thesis			Thesis	70			x	

8. Teaching plan

Semester	No	Course name	Code	Credit	Theory	Practical	BB/TC
1-4	1	Population Dynamics of Insects	NH0801	2	2,0	0,0	BB
1-4	2	Advanced in Insect Pests Management	NH0802	2	2,0	0,0	BB
1-4	3	Insect physiology	NH0808	2	2,0	0,0	BB
1-4	4	Taxonomy of plant fungi	NH0803	2	2,0	0,0	BB
1-4	5	Taxonomy of plant bacteria	NH0810	2	2,0	0,0	BB
1-4	6	Taxonomy of plant viruse	NH0830	2	2,0	0,0	BB
1-4	7	Biodiversity of Agricultural Insects	NH0805	2	2,0	0,0	TC
1-4	8	Reproduction of Insect	NH0806	2	2,0	0,0	TC
1-4	9	Insect Behavior	NH0807	2	2,0	0,0	TC
1-4	10	Relationship between insects and plants	NH0831	2	2,0	0,0	TC
1-4		Bacteria- Plant interaction	NH0832	2	2,0	0,0	TC
1-4		Fungi- Plant interaction	NH0809	2	2,0	0,0	TC

1-4		Virus- Plant interaction	NH0833	2	2,0	0,0	TC
1-4		Advances in Plant Disease Management	NH0804	2	2,0	0,0	TC
1-4	11	Review Essay		2			BB
3-5	12	Special subjects		4			BB
1-8	13	Dissertation		70			BB

9. Briefly describe the content and volume of modules

9.1. Course describe

- NH0801. Population Dynamic of Insects. (2 Credits: 2-0-4).** Basic concepts of insect population dynamics; Mechanism of regulating number of insects; Rules of population change; Fluctuations in the number of insects and the ecological factors that affect them (parasitic-host relationships in insects); Method of survey on insect population variation; Methods for describing insect population dynamics (graphs and organization charts, descriptions of mortality and survival rates, insect life tables ...),
- NH0802 Advanced in Insect Pests Management (2 Credits: 2-0-4).** New perspectives in pest management; The achievements of biotechnology in pest management; Nanotechnology and application in pest management; Juvenile Hormone Enzymes of pesticide agents in pest management; New generation pesticides; New technical advances in the management of several insect pests on different crops.
- NH0808 Insect Physiology: 2 Credits (2- 0- 4).** Introduction the internal structure and physiology of the insect organ systems; Functions and transformations of organs of insect.
- NH0805 Biodiversity of Agricultural Insects: 2 Credits (2- 0- 4).** General concept and meaning of biodiversity; Biodiversity of genes, species, ecosystems; Methods of comparative assessment of biodiversity; Agricultural ecosystems; Variety of agricultural insects; Variety of ways of life, distribution; Diversity and stability of agricultural ecosystems. Methods of collection of samples for biodiversity comparative assessment;
- NH0806 Reproduction of Insect: 2 Credits (2- 0- 4).** Concepts of reproduction and variants of reproduction in insects; Biology and ecology of insect reproduction; Behavior of insect reproduction; Sexual selection and reproductive competition in insects; Criteria for assessing reproductive performance and implications for quantitative changes in insects.
- NH0807 Insects Behavior: 2 Credits (2- 0- 4).** The biological meaning of insect behavior in nature; Behavior seeking and choosing food; Search behavior, mating selection, and reproduction; Self-defense and enemies elimination; Insect repellents, information systems; flocks and migration; Insect behavior with physiology and biodiversity.
- NH0803. Phân loại nấm gây bệnh cây (Taxonomy of Plant Fungi) (2: 2-0-4).** Principles of fungal taxonomy in plants; Taxonomy of Oocytetes; Taxonomy of Ascomycetes; Taxonomy of Basidiomycetes.
- NH0810. Phân loại vi khuẩn gây bệnh cây (Taxonomy of Plant Bacteria) (2: 2-0-4).** Principles of bacterial taxonomy in plants; Taxonomy of gram-negative bacteria (Alphaproteobacteria); Taxonomy of gram-negative bacteria (Betaproteobacteria); Taxonomy of gram-negative bacteria (Gammmaproteobacteria); Taxonomy of gram-positive bacteria and Mollicutes.
- NH080. Phân loại virus gây bệnh cây (Taxonomy of Plant Viruses) (2: 2-0-4).** Principles of classification of plant pathogenic viruses; Classification of single-

- stranded RNA virus; Classification of monoclonal and dipoletic RNA viruses; Classification of double-stranded RNA viruses; Classification of DNA viruses.
10. **NH0830. Quan hệ giữa nấm và cây (Plant- Fungi relationship) (2: 2-0-4).** Basic knowledge about the relationship between fungi and plant species; Analyze the symbiotic, parasitic and neutral relationships between fungi and plants in the evolution process, thereby setting up good impact mitigation measures; Evaluating the influence of environmental factors on the relationship between fungi and plants; The relationship of fungi and plants at the cellular level.
11. **NH0832. Quan hệ giữa vi khuẩn và cây (Plant - Bacteria relationship) (2: 2-0-4).** Molecular basis of interaction between bacteria and plants; Methods of studying the interaction between bacteria and plants; Interaction between *Ralstonia solanacearum* and trees; Interaction between *Xanthomonas* and plants; Interaction between *Pseudomonas* and Plants.
12. **NH0833. Quan hệ giữa virus và cây (Plant – Virus Interaction) (2: 2-0-4).** Molecular basis of interaction between virus and plant; Interaction between RNA and plant; Interaction between monoclonal / dipole-negative monoclonal RNA viruses and plants; Interactions between double-stranded RNA viruses and plants; Interaction between DNA and plant viruses. Prerequisite: None
13. **NH0804. Những tiến bộ mới trong quản lý Bệnh hại (Advances in Plant Disease Management) (2: 2-0-4).** Strategies to prevent viral disease; New achievements against some important viral diseases; Strategies for fighting fungal diseases; New achievements against some important fungal diseases; Strategies for preventing bacterial diseases; New achievements against some important bacterial diseases. Prerequisite: None.
14. **NH0831. Insect – Plant Interactions (2 Credits : 2 – 0 - 4).** Overview of the relationship between insects and plants; The response of plants to the exploitation of insects; Insect response to food crops; The ecological significance of insect and plant relationships.

9.2. Review Essay

a) Regulations

The essay review, equivalent to 2 credits, was presented by the students about the research situation and issues related to their thesis topic. Ph.D. students have the ability to analyse and evaluate existing works of authors in Vietnam and abroad on matters closely related to these subject. Point out the outstanding issues that the thesis should focus on research and solve. The essay should not exceed 15 A4 pages, 1.5 lines spacing; PowerPoint presentations should not exceed 20 minutes.

b) Evaluation Criteria

Criteria for Review of Essay (on a scale of 10)

- Quality of professional information: 5 points
- Quality of presentation: 2 points
- Answer the council question: 3 points

9.3. Special subject

a) Regulations

The special subjects require students to update themselves with new knowledge directly related to their topic in order to improve the capacity of scientific research, helping

students solve some contents of the thesis.

Students must write special subjects (each topic must not exceed 15 A4 pages, 1.5 line spacing) and PowerPoint presentation (not exceeding 20 minutes) before the evaluation council.

b) Evaluation Criteria

Special subject evaluation criteria (on a scale of 10)

- Quality of professional information: 5 points
- Quality of presentation: 2 points
- Answer the council question: 3 points

c) Descriptive special subject

A. Special subject catalogue – Insect (Choose 2 in special subjects)

- 1. *Chemical communication in insects:*** Communication activities of insects, especially social insects such as bees, ants, termites, honey bees...; Mechanisms of chemical communication of insects in the transmission of information signals to the members of the forum. Knowing some chemical communication in insects such as Pheromones is called exocrine glands; Composition of key communicable chemicals in insects that damage agricultural crops and the ability to produce them by artificial pathways. Based on that, the results of research on chemical communication in insects will be used to develop predictive and pest control solutions in agro-forestry crops in a rational and safe manner, school and human health.
- 2. *Insect Sterilization and Application:*** The research results and the principle of the impact of certain chemicals and radioactive isotopes have the potential to sterile insect pests. The content of this subject is closely related to the mass rearing insect pests sterile the male and release into the wild. The technique is used to sterile insect pests and the application in insect control.
- 3. *Identification of economic thresholds for pest insect:*** Insect pests control threshold; the influence of the factors to the exclusion threshold; Identify key factors for establishing control thresholds for some key pests from a scientific standpoint.
- 4. *Sampling and evaluation methods for insects:*** Methods of surveying, collecting insects in soil, in residues of plants, growing plants, in the air; Insect density survey method; Component survey method; Methods of handling and preserving insect samples; Basic survey on pests in food crops, fruits and vegetables. Method of survey of natural enemies of agricultural pests.
- 5. *Diapause in Insect:*** Biological and physiological characteristics of seasonal diapause in insects; diversity in seasonal insect diapause behavior. The relationship between seasonal diapause behavior and some insect living factors. The role of insect diapause to insect population grows and also the insect population dynamic. The practical implications of seasonal diapause research in the management of beneficial and harmful insects.
- 6. *Integrated Insect Pest Management:*** Need for IPM, Achievements of IPM in Vietnam; Principles of IPM; Measures in IPM, strengths and weakness and their role in IPM; Mathematical statistics, economic efficiency measures, Economic thresholds Methods for establishing and implementing the IPM program; Class organization and practice of IPM training; Pay attention to the object of the thesis topic
- 7. *Insecticide Resistance:*** Definition of insecticide resistance. Insecticide resistance mechanisms of insects. The current situation of insecticide resistance in the world and Vietnam. Evaluation method of insecticide resistance. Introduce management measures for the management of insecticide resistance of some insect pests.
- 8. *Evaluation methods for insect population dynamics and application:*** Methods of assessment of insect population dynamics, quantitative adjustment mechanisms, ecological factors affecting the number of insects. Based on research on insect

population variability, development of appropriate and effective methods and applications of agricultural pests and diseases protection and environmental protection.

9. *Insect Pollinators:* The behavior of insects especially pollinators such as *Bombus* bees, honey bees, Syrphids, butterflies, beetles ...; Functional and mechanism of insect in transfer plant flowers pollen. Understanding the diversity of insects as pollinators; Adaptation of plant flowers to insect pollinators under the influence of environmental factors. Based on that, the results of research on pollinating insects will be used to develop solutions for the conservation and use of key insect species in agricultural crop breeding and hybrid seed production.

10. *Biological Control in Pests Insect:* Promising achievements and challenges in biological control in pest and disease prevention in the world and in the country; Dive into a specific species related to thesis topic

B. Thematic catalogue - Plant Pathology

1. *Thematic Diseases (Select 2 in thematic directions)*

Each topic will target a specific disease or group of diseases. The theme is based on the most up-to-date information in the last five years. Each topic should address at least one of the following: (i) classification, diversity and diagnosis, (ii) biology of the pathogen, (iii) interaction at the molecular level between the causative agent diseases and plants, (iv) epidemiology, and (v) prevention. Topic includes:

- Fungal diseases on food crops
- Viral diseases on food crops
- Bacterial diseases on food crops
- Nematode diseases on food crops
- Fungal diseases on vegetables, flowers, fruits and industrial crops
- Viral diseases on vegetables, flowers, fruits and industrial crops
- Bacterial diseases on vegetables, flowers, fruits and industrial crops
- Nematode diseases on vegetables, flowers, fruits and industrial crops

10. Scientific research and doctoral dissertation

10.1. *Scientific research*

Scientific research is a specific stage, compulsory in the process of researching the doctoral dissertation. Each student must conduct a thesis in the form of research, investigation and experiment to supplement the necessary data, so that the researcher reaches a new knowledge or new solution. These are the most important institutions for PhD students to write their thesis.

Ph.D. students must ensure the truthfulness, accuracy and novelty of their scientific research results, and abide by the intellectual property regulations of Vietnam and the World.

10.2. *Scientific article*

Ph.D. students must publish at least two papers related to the dissertation in scientific journals included in the list of journals published by the State Council for Professors (according to five articles published) or in the following journals list. There must be at least 01 paper published in the Journal of Science and Development of Vietnam National University of Agriculture and must have at least 01 paper with Ph.D. student as the first author.

No.	Name of journal	Publisher
1	National and international foreign scientific journals are written in one of the following languages: English, Russian, French, German, Chinese, Spanish.	

2	Other foreign scientific journals to be decided by the Council for Professor (including paper, not exceeding 1 point)	
3	The Scientific paper at the National and International Scientific Conference publishes the full text in the scientifically critical conference proceedings	
4	Agriculture and Rural Development (former name: Agriculture Science & Technology, Agriculture & Food Industry, Forestry, Irrigation, Agricultural Economics)	Ministry of Agriculture and Rural Development
5	Plant protection	Plant protection department
6	Science	Can Tho University
7	Science of Agriculture and Forestry	Nong Lam University
8	Science and development (old Science and Technology)	VNUA
9	Biological	Science and Technology
10	Biotechnology	Science and Technology

10.3. Scientific seminar

Ph.D. student is required to attend and present at least two national seminars (encouraging participation and presentation of international conferences) on dissertation-related contents.

10.4. Doctoral dissertation

The doctoral dissertation must be an innovative scientific research project of the graduate student who has contributed theoretically and practically in the field of research or new solutions of value in the development and increase scientific knowledge in the field of research, creative solving of the problems of science or socio-economic realities.

The dissertation must have new academic contributions, presented in scientific language, using the basic arguments of science to analyze and comment on the points and results achieved in the Previous research related to the topic of the dissertation, on the basis of which the new problem, the new hypothesis or new solutions to solve the problems of the thesis and prove with new materials. The author of the dissertation must have the honor of his scientific work. Encourage students to write and defend their thesis in English.

The doctoral dissertation has a maximum of 150 A4 pages, excluding annexes, of which at least 50% of the papers present the research results and the dissertation of the PhD student.

The format of the thesis must be presented in accordance with the regulations of the Vietnam National University of Agriculture and evaluated through two levels: Department level and University level.

11. List of faculty members to implement the program

No.	Course	Department	Lecturers		
			Name of lecture	Date of birth	Highest certificate

1	Population Dynamics of Insects	Entomology	Assoc. Prof. Dr. Nguyễn Thị Kim Oanh Prof. Dr. Nguyễn Văn Đĩnh Assoc. Prof. Dr. Hồ Thị Thu Giang Assoc. Prof. Dr. Trần Đình Chiến Assoc. Prof. Dr. Đặng Thị Dung		
2	Advanced in Insect Pests Management	Entomology	Prof. Dr. Nguyễn Văn Đĩnh Assoc. Prof. Dr. Hồ Thị Thu Giang Assoc. Prof. Dr. Lê Ngọc Anh Dr. Nguyễn Đức Tùng		
3	Insect physiology	Entomology	Assoc. Prof. Dr. Khuất Đăng Long Assoc. Prof. Dr. Hồ Thị Thu Giang Assoc. Prof. Dr. Lê Ngọc Anh Dr. Nguyễn Đức Tùng		
4	Taxonomy of fungal pathogens in plants	Plant Pathology	Assoc. Prof. Đỗ Tấn Dũng Assoc. Prof. Ngô Bích Hào Assoc. Prof. Hà Việt Cường Dr. Trần Nguyễn Hà Dr. Nguyễn Đức Huy		
5	Taxonomy of bacterial pathogens in plants	Plant Pathology	Assoc. Prof. Đỗ Tấn Dũng Assoc. Prof. Ngô Bích Hào Assoc. Prof. Hà Việt Cường Dr. Trần Nguyễn Hà Dr. Nguyễn Đức Huy		
6	Taxonomy of viral pathogens in plants	Plant Pathology	Assoc. Prof. Đỗ Tấn Dũng Assoc. Prof. Ngô Bích Hào Assoc. Prof. Hà Việt Cường Dr. Trần Nguyễn Hà Dr. Nguyễn Đức Huy		
7	Biodiversity of Agricultural Insects	Entomology	Assoc. Prof. Dr. Khuất Đăng Long Assoc. Prof. Dr. Hồ Thị Thu Giang Assoc. Prof. Dr. Lê Ngọc Anh Dr. Nguyễn Đức Tùng		
8	Reproduction of Insect	Entomology	Prof. Dr. Nguyễn Việt Tùng Assoc. Prof. Dr. Hồ Thị Thu Giang Assoc. Prof. Dr. Trần Đình Chiến Dr. Nguyễn Đức Tùng		
9	Insect Behavior	Entomology	Assoc. Prof. Dr. Khuất Đăng Long Assoc. Prof. Dr. Hồ Thị Thu Giang Dr. Nguyễn Đức Tùng		
10	Relationship between insects and plants	Entomology	Assoc. Prof. Dr. Khuất Đăng Long		

			Assoc. Prof. Dr. Hồ Thị Thu Giang Assoc. Prof. Dr. Lê Ngọc Anh Dr. Nguyễn Đức Tùng		
11	Plant-Bacteria Relationship	Plant Pathology	Assoc. Prof. Đỗ Tấn Dũng Assoc. Prof. Ngô Bích Hảo Assoc. Prof. Hà Việt Cường Dr. Trần Nguyễn Hà Dr. Nguyễn Đức Huy		
12	Plant-Fungi Relationship	Plant Pathology	Assoc. Prof. Đỗ Tấn Dũng Assoc. Prof. Ngô Bích Hảo Assoc. Prof. Hà Việt Cường Dr. Trần Nguyễn Hà Dr. Nguyễn Đức Huy		
13	Plant-Viruses Relationship	Plant Pathology	PGS.TS Đỗ Tấn Dũng PGS.TS. Ngô Bích Hảo PGS.TS. Hà Việt Cường TS. Trần Nguyễn Hà TS. Nguyễn Đức Huy		
14	Advances in plant disease management	Plant Pathology	Assoc. Prof. Nguyễn Văn Viên Assoc. Prof. Đỗ Tấn Dũng Assoc. Prof. Ngô Bích Hảo Assoc. Prof. Hà Việt Cường Dr. Trần Nguyễn Hà Dr. Nguyễn Đức Huy		

12. Facilities for learning

12.1. Key Laboratory and laboratory equipments

Laboratory of Department of Entomology

- The Insect Lab is the place where insect teaching and practicing activities are carried out for the staff of the department, graduate students, doctoral students.
- Centre kept and preserved specimens of insects serve for teaching and scientific research in the Department of Entomology.
- The insect lab is the place where scientific research projects are implemented.
- The Insect Lab is composed of a variety of specialized departments including:
 1. General insect practice room
 2. Practicing Semi-Wild Insect Practices
 3. Lab of Insect Ecology
 4. Lab of Acarology
 5. Lab of honey bee
 6. The net houses for rearing insects
 7. Insect Museum

Some equipments:

- Climate chamber Elbantoh (Netherlands), RXZ500B (China): Maintain temperature and humidity stability for insect rearing.
- Binder insect drying system, Memmert (Germany): Maintaining temperature for dried insect specimens.
- Cages for rearing insects and mite.
- Stereo microscope, microscope connect camera Olympus, Nikon microscope
- Sample storage system preserves a large number of insect specimens for study and

reference

Laboratories of Plant Pathology Department

The system of plant pathology laboratories is home to teaching, professional practice and plant pathology research for department staff, graduate students, postgraduate students in the field of plant diseases and students. Department of Plant Pathology, Vietnam National University of Agriculture:

1. Practical lab for general plant pathology
2. Lab for plant bacteria
3. Lab for seed pathology
4. Lab for plant fungi
5. Lab for nematodes
6. Center Lab for tropical plant disease
7. Shaded houses

Main equipments:

- Sterilized autoclave
- Biological culture cabinet
- Incubator
- Microscope and microscope
- Refrigerator (usually minus 20°C and 80°C)
- Centrifugation (centrifugal, super centrifugal)
- PCR, electrophoresis

- 12.2. Library
- Luong Dinh Cua Library
 - The Faculty of Agronomy has 738 books. Including textbooks, reference materials, professional services for research and training. In addition, the library has 138 textbooks and English-language reference materials for the Crop Science Advanced Program. Every year serves thousands of readers
 - Insect Entomology Materials
 - Department of Plant Pathology.

12.3. Textbooks

TT	Course	Textbook	Author	Publisher	Year
1.	General Entomology	General Entomology	Nguyễn Việt Tùng	Agricultural publisher	2006
2.	General Plant Pathology	Plant Diseases in Agriculture	Lê Lương Tê	Agricultural publisher	2007
3.	Chemicals in Plant Protection	Chemicals in Plant Protection	Nguyễn Trần Oánh, Nguyễn Văn Viên, Bùi Trọng Thủy	Agricultural Publisher	2007
4.	Biocontrol	Biological control in	Nguyễn văn Đĩnh	Agricultural	2006

		pest management		publisher	
5.	Post-harvest insect pests	Storage entomology	Bùi Công Hiến	Agricultural publisher	1995
6.	Fungal diseases in Plants	Fungal diseases in Plants			
7.	IPM	IPM	Hà Quang Hùng	Agricultural publisher	1998
8.	Epidemiology of plant protection	Epidemiology of plant protection	Hà Quang Hùng	Agricultural publisher	2005
9.	Specific plant pathology 1	Specific plant pathology	Vũ Triệu Mân	Agricultural publisher	2007
10.	Specific plant pathology 2	Specific plant pathology	Vũ Triệu Mân	Agricultural publisher	2007
11.	Agricultural Entomology 1	Agricultural Entomology	Entomology Department	Agricultural publisher	2004
12.	Agricultural Entomology 2	Agricultural Entomology	Entomology Department	Agricultural publisher	2004
13.	Bacterial diseases in Plants	Bacterial diseases in Plants	Đỗ Tấn Dũng		2007
14.	Honey bee	Bee keeping	Pham Hong Thai	Agricultural publisher	2015
15.	Biotechnology in plant protection	Biotechnology in plant protection	Hà Việt Cường		2010
16.	Plant immunology	Plant immunology	Đỗ Tấn Dũng		2011
17.	Major Practice				
18.	Food Security	Food Security			
19.	Pesticide residue management	Pesticide residue management	Nguyễn Trần Oánh, Nguyễn Văn Viên, Bùi Trọng Thủy	Agricultural publisher	2007
20.	Plant viruses, viroid, phytoplasma	Plant viruses, viroid, phytoplasma	Hà Việt Cường	Agricultural publisher	2012
21.	Nematode diseases in Plants	Plant nematodes and controlled facilities	Nguyễn Ngọc châu	Science and Technology publisher	2003
22.	Seed Pathology	Seed Pathology	Ngô Bích Hào		2007
23.	Insect taxonomy	Specific insect taxonomy	Entomology Department	Agricultural publisher	2004
24.	Virology	Plant viruses, viroid and phytoplasma	Hà Việt Cường	Agricultural publisher	2012

13. Program Implementation Guide

- The related disciplines develop detailed syllabus, lectures and syllabus for each module as described in the brief description of the module.
- The Department of Specialization and the Training Management Board jointly develop training plans for each course to ensure the rational distribution of the volume of knowledge

for each semester and the logical order of the modules, not violating the conditions. The previous syllabus is detailed in the syllabus of each module

14. Course outline of modules (attached)

PRESIDENT