LABORATORY OF PROGRAM

BACHELLOR OF PLANT PROTECTION

FACULTY OF AGRICULTURE

UNIVERSITY OF BENGKULU

Foreword

We give thanks to Allah SWT, because by His blessing and mercy, the Laboratory Handbooks of the Plant Protection Study Program have been completed. This handbook contains policies and procedures for students using the Plant Protection Laboratory, Faculty of Agriculture, Bengkulu University. Students must know the rules relating to laboratories used for research. Of course, this guidebook is still far from perfect, both in context and content, so we are open to suggestions and criticisms for future improvements. We would like to thank all those who have contributed greatly to the preparation of this guidebook.

Bengkulu, September 2022

Head of Laboratory

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CHAPTER I

PRELIMINARY

A. BACKGROUND

The laboratory is one of the educational infrastructures, which can be used as a place for students to practice understanding concepts by conducting experiments and observations. Thus, the laboratory is an integral part that cannot be separated from teaching in the classroom. The existence of a laboratory is needed to provide direct experience from the application of theories received through laboratory/practical activities, to support teaching and learning activities.

In connection with the above, the role of the laboratory becomes very important, because the laboratory is the center of the teaching and learning process to conduct experiments, investigations, or research in lectures. Thus the laboratory has a function as a place for supporting activities from class activities, or vice versa class activities are supporting laboratory activities.

The laboratory is one of the means of encouraging the optimization of the learning process.According to the Regulation of the Minister of State Apparatus Empowerment and Bureaucratic Reform No.03/Januari/2010 and the Joint Regulation of the Minister of National Education and the Head of the State Civil Service Agency no. 02 and No. 13/May/2010, what is meant by an EDUCATION LABORATORY is an academic support unit in an educational institution in the form of a closed or open room that is permanent or movable, managed systematically for testing, calibration, and/or production activities on a limited scale using equipment and materials based on scientific methods. certain activities, in the context of implementing education, research, and community service. The functions of the laboratory in the educational process according to Sukarso (2005) are as follows:

a. As a place to practice developing intellectual skills through observing, recording, and reviewing natural phenomena.
b. Develop students' motor skills. Students will increase their skills in using available media tools to seek and find the truth.
c. Giving and cultivating the courage to seek the nature of the scientific truth of an object in the natural and social environment.
d. Cultivating student curiosity as the capital of a prospective scientist's scientific attitude.
e. Build self-confidence as a result of skills and knowledge or discoveries obtained.

B. DISTRIBUTION OF TASKS AND FUNCTIONS OF THE LABORATORY

The learning process in the Plant Protection Laboratory, Faculty of Agriculture, Bengkulu University is divided into several sections based on science including:

1. The Biological Laboratory functions to carry out practicum on developing pest control materials and environmentally friendly fertilizers from both the plant protection study program and from other related study programs including the

Agrotechnology study program. The equipment available and often used in the Biological laboratory includes glassware (Petri, Goblet and refigator (refrigerator), binocular and monocular microscopes, laminar air flow, etc. The practicums carried out in the biological laboratory include the introduction of parasitoids and predators, the ability to prey on coccinelidae on aphids, identification of insect pathogens, use of microorganisms to control insect pests, isolation and purification of biological agents from the rhizosphere, isolation and purification of pathogens from plant tissues, in vitro testing of antagonistic biological agents,

2. The Molecular Laboratory functions to carry out practicum and research related to DNA/RNA plant viruses including Gemini virus, Cucumber Mosaic Virus etc. The equipment in the molecular laboratory includes glassware,centrifuge, Analytical balance, Autoclave, Heatblock / Drybath, Thermal Cycler TACLAB, MUPID Electrophoresis Machine (Korea), Transilluminator andNitrogen Containers. The practicums carried out in the molecular laboratory include the introduction of external symptoms, techniques for observing internal symptoms, mechanical transmission of plant viruses, virus stability in sap (TIP, LIV, DEP), introduction of insect vectors, serological virus detection (DIBA, TBIA), detection of virus based on nucleic acid (RNA/DNA) by PCR, viral disease control, etc.
3. The Entomology Laboratory functions to conduct practicum and research related to insects including the structure of insect development, insect anatomy, making insect collections and insect rearing. The equipment in the Entomology laboratory includes binocular microscopes, stereo microscopes, ovens, glass alars, insect nets, insect tweezers and jars. The practicums carried out in the entomology laboratory include diversity of arthropods, insect morphology, insect head, thorax, abdomen, development and metamorphosis, collection and preservation of insects, and description and identification of orders: Orthoptera, blatella, isopteran, odonata, Hemiptera.
4. The phytopathology laboratory is useful for student practicums related to the field of plant pathogens including isolation of bacteria and fungi, observing and calculating the number of bacteria and fungi, and is intended for research students in the field of phytopathology, equipment related to the laboratory including laminar air flow, autoclave, incubator, hot plate, glassware (petri) vortex. The practicums carried out in the phytopathology laboratory are symptoms and signs, Koch's postulates: isolation of pathogens, Koch's postulates: transmission, hypersensitivity reactions and enzymes as chemical weapons of pathogens.
5. Nematology Laboratory is useful for student practicum including basic, nematodes. Research related to plant nematology, nematode meloidogyne etc. and environmental conditions. The equipment in the nematology laboratory includes nematode level racks, analytical balances, nematode hooks, nematode-level filters, centrifuges, ovens, circuses, binocular microscopes, stereo microscopes. The practicums carried out in the nematology laboratory are as follows: nematology laboratory equipment, extraction/isolation of soil and tissue nematodes, nematode morphology, counting population and nematode fixation, transferring nematodes to pure glycerin, making

ordinary preserved preparations, measuring and calculating nematode dimensions, preparation for inoculum and population level tests.

C. ROLE OF THE LABORATORY

1. Laboratory as a place for practicum and research for students or lecturers and other users
2. The laboratory is a place to prove the theory learned by students or students.
3. Laboratory as a place to prepare students or students to be more skilled before entering the world of work.
4. Laboratory as a place to train students or students to be more disciplined, careful, thorough, and more patient
5. Laboratory as a place for students to develop knowledge.

CHAPTER II

PLANT PROTECTION LABORATORY PROFILE

Head of Plant Protection Department
Dr. Mimi Sutrawati, SP., M.Si

Head of Plant Protection Laboratory
Ir. Djamilah, MP

PJ Biological Division

Prof. Dr. Dwinardi A.

PJ Molecular Division

Dr. Mimi Sutrawati, SP.,

PJ Entomology Division

Agustin Zarkani, Ph.D

PJ Division of Phytopathology

Dr. Hendri Bustamam,

PJ Division of Nematology

Ir. Djamilah, MP.

PLP

Survani. A. Md. AK

THL

Aris Putra, SP

A. LABORATORY FACILITIES

1. Administration Room
2. Labs. Biological
3. Labs. Molecular
4. Labs. Entomology
5. Labs. Phytopathology
6. Labs. Nematology
7. Computers and printers
8. LCD

9. Bathroom
10. prayer room
11. Practical chair
12. Glassware
13. Instruments
14. Experimental garden
15. screen house
16. Chemical material
17. Practical room (R1, R2, and R3)

B. LABORATORY USERS

1. Lecturer
2. Student
3. Researcher

C. LABORATORY PROCEDURES

1. Students and lecturers before using the laboratory contact the person in charge of the laboratory (PLP) concerned.
2. Submit a permit for laboratory use, use of tools and materials.
3. Permission is submitted to the head of the laboratory
4. The head of the laboratory recommends to the PLP concerned
5. Students, lecturers or researchers fill in the form of borrowing tools and materials
6. Students, practitioners and researchers are required to wear practical clothes
7. It is forbidden to wear slippers and smoking inside and outside the laboratory
8. It is forbidden to bring food and eat in the laboratory room
9. Students, lecturers and lab users are required to maintain the cleanliness of the laboratory
10. If you break a tool or damage the laboratory user, it is mandatory to replace it
11. If you have finished using laboratory facilities, laboratory users return the equipment in good condition
12. Complete laboratory administration
13. It is not allowed to move lab equipment without the permission of the person in charge
14. If you want to use instrument equipment, you must report and be accompanied by the person in charge of the laboratory

D. PENALTY

1. Borrowing field equipment for a maximum of 2 weeks, if within 2 weeks the equipment has not been returned the borrower is obliged to extend for 1 time
2. If there are laboratory users who break or damage the equipment, they must replace them.

CHAPTER III
LABORATORY MANAGEMENT

According to Permenpan No. 3 of 2010 Laboratory is an academic support unit in educational institutions which is an open or closed place that is permanent or movable, managed systematically for testing, calibration and/or production activities on a limited scale by using materials and equipment based on certain knowledge in the context of implementation of education, research, and community service. Based on the above, the plant protection laboratory performs laboratory management so that it can facilitate all laboratory users, both students, lecturers, and researchers. The laboratory management carried out includes:

A. LABORATORY ACTIVITY PLANNING

The plant protection laboratory of Bengkulu University at the beginning of the year made or compiled an annual program chaired by the head of the laboratory, and each division person in charge made a work program that was known by the head of the laboratory and approved by the head of the laboratory. Laboratory planning includes activities that will be carried out both routine activities such as practicum, number of classes, needs for practicum tools and materials, procurement of fresh practicum tools and materials. At the end of each semester, each laboratory prepares a program for maintaining / maintaining equipment and storing equipment. The plant protection laboratory also arranges a schedule for inventory of tools and materials at the end of the semester. All annual programs are contained in the Plant Protection Laboratory's Plan of Action (POA).

B. EQUIPMENT MANAGEMENT

Equipment management in the Plant Protection Laboratory includes maintenance, storage and administration. Equipment in the Plant Protection laboratory consists of glassware, instruments and field equipment. At the end of the semester an inventory of tools is carried out after all practicum activities are completed which includes all the existing tools, both tools that are in good condition and tools that are in damaged condition, then record them in the tool inventory list book, and report whether the equipment will be repaired or destroyed.

1. Maintenance
    a. Glassware

Before storage, make sure that the glassware is clean by cleaning it with detergent and rinsing it with distilled water. If the equipment is difficult to clean with distilled water, it can be cleaned by immersing it in a 10% bichromate solution in concentrated sulfuric acid. Then wash with running water and rinse with distilled water then dry.

b. Instrument equipment

For optical instruments such as microscopes, the function of the microscope parts is checked and the microscope lens is checked if there is dirt, it is cleaned with lens tissue and alcohol. For other instrument equipment, a tool operating manual is made in each equipment to provide instructions to the user and avoid misuse. For measuring instruments, cleaning is carried out from dust and dirt or chemicals attached to the tool, then checking the function of the tool and storing the tool in the room provided, performing a simple calibration of the tool.

2. Storage

Storage of glassware and instruments is carried out separately in different rooms, glassware is stored in a dry state and stored in one room equipped with a cupboard. Glassware is stored based on the type of tool and its size. Meanwhile, instrument equipment is stored by type of tool and placed in a cupboard, such as a microscope stored in a microscope cabinet equipped with lights.

3. Tool administration

The administration of tools is carried out to make it easier for PLP to know the number of tools and the condition of the equipment in the laboratory, as well as make it easier for PLP to make proposals for equipment procurement. Equipment administration includes: tool name, tool specifications, number of tools, date of procurement, and condition of tools. Newly arrived equipment is recorded, recorded and included in the inventory list.

C. MATERIAL MANAGEMENT

Material management in the Plant Protection laboratory includes:

1. Maintenance

The principle of material maintenance is to maintain the condition of chemicals or other supporting materials in practicum and research in order to remain optimal in their use, among others by maintaining the cleanliness of the material storage area and maintaining room conditions such as maintaining humidity and good ventilation so as to reduce the occurrence of pollution and other accidents. Materials in the laboratory consist of general materials and special materials that require periodic maintenance considering the properties of different materials. Chemicals must be tightly closed after use to avoid contact with air and avoid evaporation. Consumables are separated between chemicals and non-chemicals, the rest of the chemicals in the practicum are placed in closed containers and stored in closed cabinets.

2. Storage

Chemicals in the Plant Protection Laboratory are placed in a chemical room which is equipped with a chemical cabinet and also a fume hood, the preparation of materials is separated between solid and liquid materials arranged alphabetically for easy search, each bottle of material is numbered, arranged in the ingredients cupboard chemistry alphabetically. Chemicals that are strong acids are placed in a special place or fume hood.

3. Material administration

At the end of each semester, material administration is carried out which includes recording the amount of material used, checking material stock. Any consumables that have just entered the laboratory are recorded in the incoming goods list book and then included in the material inventory list. At the end of each semester, the materials used for one semester are also counted and then included in the list of consumables, and make suggestions for materials to be used in the following semester.

D. WORKING METHODS MANAGEMENT

Activities in UNIB's plant protection laboratory include practicum activities, research both student research for final assignments or research by lecturers and other researchers and community service.

1. Practical activities

   To support the achievement of teaching and learning activities, the plant protection laboratory holds a practicum carried out by supporting lecturers who are assisted by lecturer assistants. Prior to the implementation of the practicum, a practicum schedule was prepared to avoid clashes in the implementation of the practicum. The provision of materials and equipment during the practicum is carried out by the PLP concerned by referring to the submission of tools and materials the day before the practicum is carried out.

   The flow of borrowing tools and practicum materials.

   a. The lecturer/assistant submits a receipt for borrowing tools and materials the day before the practicum begins by filling in the loan form.
   b. PLP prepares the tools and materials in question.
   c. PLP submits tools and materials to assistants/lecturers, with previously provided.

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      nation and supervision of the equipment in question and ensure that the equipment is in good working condition.
   d. If the practicum has been completed, the practitioner must return the equipment coordinated by the assistant.
   e. PLP checks the tools and materials and ensures that all are in good condition.
   f. If using instrument equipment, its use must be known and accompanied by the PLP concerned.
   g. If there is damage to the tool, the practitioner must replace it.

2. Research activities

   Research in the plant protection laboratory serves lecturers' research, student research who is doing their final project, and research from study program students, faculties, or other universities who are carrying out their final project.

   Research mechanism in plant protection laboratory:

1. Students/lecturers/researchers submit a research permit to the head of the laboratory
2. The head of the laboratory approves and gives instructions to the PLP concerned.
3. Students/lecturers/researchers submit applications for borrowing tools and materials by filling in the loan form.
4. PLP prepares equipment and materials according to the loan receipt.
5. Before being handed over to the student/lecturer concerned, PLP checks and supervises and provides an explanation of the borrowed tools and materials.
6. The use of the instrument equipment must be with the knowledge of or under the supervision of the PLP
7. Maximum use of field equipment for 2 weeks, before the equipment is borrowed PLP is obliged to provide explanations, supervise the tools and ensure that the condition of the equipment is in good condition.
8. If the research has been completed, the student / lecturer returns the tool in a clean and good condition
9. Students/lecturers do administrative work
10. Students have the right to be free from laboratories.

3. Community service activities

   Community service activities consist of community service carried out by lecturers and the role of PLP in providing and operating laboratory equipment (if needed) and analyzing samples from communities in need.

E. LABORATORY WORK ENVIRONMENT MANAGEMENT

To avoid accidents in the laboratory, a conducive work environment is needed, knowledge of the kinds of accidents in the laboratory and their causes. The plant protection laboratory is made in the form of an announcement board regarding safety and work safety guidelines in each sub-lab, and warning signs are made so that they can be used as guidelines by students, lecturers and other laboratory users. In addition, PLP also makes SOP/IK regarding security and safety guidelines in plant protection laboratories.

1. Types of accidents that can occur in the laboratory:
   a. Burning, can occur due to incorrect use of tools, errors in the heating process of the material.
   b. Injured, can be caused by being hit by broken glass or being stabbed by a sharp object
   c. Poisoning, can occur due to inhalation of harmful chemicals
   d. Electrocuted, due to using the wrong tool
   e. Explosion, caused by mishandling of materials.
2. Safety equipment in the laboratory

a. PPE personal protective equipment consists of practicum clothes, glasses, masks, gloves, boots or closed shoes.
b. APAR or fire extinguisher
c. First Aid Box

3. Steps to avoid accidents
   a. Laboratory users are required to comply with the regulations set by the laboratory.
   b. Laboratory users are required to wear PPE when working in the laboratory.
   c. Always read the instructions for use of the appliance before starting to use it.
   d. Always keep the room clean, if there is a spill of material or spilled water, clean it immediately.
   e. Do not leave the tool in a state of life except with certain notes
   f. Do not eat/drink in the laboratory.

F. INCREASING THE QUALITY OF LABORATORY SERVICES

One of the ways to improve the status of the Plant Protection Laboratory is by developing PLP knowledge of the Plant Protection Laboratory through many trainings that must be followed including knowledge of laboratory management, use of category 3 instrumentation equipment, knowledge of safety in laboratories, waste management, competency tests both internally and externally. external and others in accordance with laboratory standards in general. For this reason, it is very necessary for the relevant institutions to plan programs for PLP training and workshops.

CHAPTER IV
CLOSING

Thus the management of the laboratory at the Plant Protection Laboratory of the Faculty of Agriculture, Bengkulu University, in general, facilities and services can be improved by fulfilling the operational standards of laboratory infrastructure as the best research in the agency.