

### Biological Control

<b>Obligatory module or Selective module</b>	<b>Biological Control</b>	<b>PNH 3117</b>
<b>Semester</b>	V	
<b>Module level</b>	Undergraduate	
<b>Module Coordinator</b>	Prof. Dr. Ir. Fransiscus Xaverius Wagiman, S.U.	
<b>Lecturer(s)</b>	Prof. Dr. Ir. Fransiscus Xaverius Wagiman, S.U. Prof. Dr. Ir. Triwidodo Arwiyanto, M.Sc. Dr. Ir. Arif Wibowo, M.Agr.Sc. Dr. Tri Harjaka, S.P., M.P.	
<b>Type of Module</b>	1 hour and 40 minutes lecture Practical	
<b>Status</b>	C (compulsory courses)	
<b>Exam</b>	Written	
<b>Number of participants</b>	64	
<b>Credit Points:</b>	2/1 (5.02 ECTS)	
<b>Description:</b>	<p>In this course, the definition and concept of biological control and its history are discussed. In addition, the role of biological control in the trade of agricultural products and as a major component in integrated pest management is also discussed in depth. In the discussion of the next topic, it was presented about natural enemies and biological control agents, plant pathogens, and weeds. Students are also important to know about the potential of biological control agents in controlling pests, plant pathogens, and weeds. Finally, it was also conveyed about biological control techniques, management of biological control programs and their practices.</p>	
<b>Academic goal (competency):</b>	<ol style="list-style-type: none"> <li>1. Students can explain the definition, concept, and history of biological control of pests, plant pathogens and weeds.</li> <li>2. Students can explain the importance of biological control agents of pests, plant pathogens and weeds in IPM as well as in the trade of agricultural products.</li> <li>3. Students can explain the types of natural enemies and pests, plant pathogens and weeds biological control agents.</li> <li>4. Students can explain plant ecosystems and the potential of biological control agents and the role of host plants and the environment in the biological control of plant pathogens.</li> </ol>	

	<ol style="list-style-type: none"> <li>5. Students can explain the mechanism of biological control agents in controlling pests, plant pathogens and target weeds.</li> <li>6. Students can explain biological control techniques and management of biological control programs.</li> <li>7. Students can explain the application of biological control in practice from planning to evaluation.</li> </ol>
<p><b>Course outcomes:</b></p> <p>CO1 = Students are able to understand and explain the definition, concepts, history and importance of biological control of pests, plant pathogens and weeds in IPM as well as in the trade of agricultural products.</p> <p>CO2 = Students are able to understand and explain the types of natural enemies and biological control agents for pests, plant pathogens and weeds.</p> <p>CO3 = Students are able to understand and explain plant ecosystems and the potential of biological control agents for pests and weeds, as well as the role of host plants and the environment in controlling plant pathogens.</p> <p>CO4 = Students are able to understand and explain the mechanism of biological control agents in controlling pests, diseases and target weeds, biological control techniques, management of biological control programs, and application of biological control in practice.</p>	
<p><b>Contents:</b></p> <p><b>Lecture</b></p> <ol style="list-style-type: none"> <li>1. Definition, concept, and history of biological control of pests, plant pathogens and weeds</li> <li>2. Control of biological pests, plant pathogens and weeds in IPM as well as in the trade of agricultural products</li> <li>3. Natural enemies and biological agents that control pests, plant pathogens and weeds</li> <li>4. Plant ecosystems and potential biological control agents and the role of host plants and the environment in the biological control of plant pathogens</li> <li>5. The mechanism of biological control agents control pests, plant pathogens and target weeds</li> <li>6. Biological control techniques and management of biological control programs.</li> <li>7. Biological control in practice from planning to evaluation.</li> </ol> <p><b>Practicum</b></p> <ol style="list-style-type: none"> <li>1. Introduction and collection of Predators and Parasitoid and Weed-eating insects</li> <li>2. Study of Predation and Parasitism</li> <li>3. Introduction of Pathogen Pests (entomopathogenic nematodes, bacteria, fungi, viruses)</li> <li>4. Screening natural enemies of plant pathogens</li> <li>5. In vitro antagonism test and in vivo antagonism test in plants</li> </ol>	
<p><b>Which previous course required?</b> Plant Protection, Phytopathology, Agricultural Zoology</p>	
<p><b>Literature:</b></p> <p><b>Biological Pest Control</b>  Coppel, H. C. and J. W. Mertins. 1977. <i>Biological Insect Pest Suppression</i>. Springer-Verlag, New York.</p>	

Davis, D. W., S. C. Hoyt, J. A. McMurtry, and M. T. AliNiasee. 1979. *Biological Control and Insect Pest Management*. University of California.

Debach, P. and D. Rosen. 1991. *Biological Control by Natural Enemies*, 2nd ed. Cambridge University Press, Sydney.

Hoy, M. A. and D. C. Herzog. 1985. *Biological Control in Agricultural IPM systems*. Academic Press, New York.

Mangoendihardjo, S. dan E. Mahrub. 1983. *Diktat Kuliah Pengendalian Hayati*.

Ridgway, R. L. and S. B. Vinson. 1976. *Biological Control by Augmentation of Natural Enemies. Insect and Mite Control with Parasites and Predators*. Plenum Press, New York.

Wagiman, F.X. 2006. *Pengendalian Hayati Hama Kutu Perisai Kelapa Menggunakan Predator Chilocorus*. Gama Press, Yogyakarta.

Tanada and Kaya. 1993. *Insect Pathology*. Academic. New York. 666 p

Fuxa and Tanada. 1987. *Epizootiology of Insect Diseases*. John Wiley. New York

### **Biological Weeds Control**

Harley, K. L. S. and I. W. Forno. 1992. *Biological Control of Weeds. A Handbook for practitioners and students*.

### **Biological Control of Plant Diseases**

Boucias & Pendland. 1998. *Principle of Insect Pathology*. Kluwer Academic. London. 550 pp.

Cook, R. J. and K. F. Baker. 1983. *The Nature and Practice of Biological Control of Plant Patogens*. The APPS Press. St. Paul Minnesota.

Baker, K. F. and R. J. Cook. 1974. *Biological Control of Plant Pathogens*. W. H. Freeman. San Fransisco.

**Materials provided:** PPT ; hand out

**Requirements for exam:**75% attendance

<b>Teaching method(s)</b>	Classes Special assignment related to the subject matters
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Workload (hrs).

1. Theoretical of course:14 times
2. Lab work:7 times
3. Home studies: related to the chapter discussed in the class