University of Kerala

Discipline	**ZOOLOGY**				
Course Code	**UK5SECZOO301**				
Course Title	**Vermiculture and Vermicomposting**				
Type of Course	**SEC**				
Semester	V				
Academic Level	300 - 399				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	3	2 hours	-	2 hours	4
Pre-requisites	Pass of Class XII				
Course Summary	The course on Vermiculture and Vermicomposting provides an understanding of the essential skills required for proficient vermicomposting and efficient vermiculture management. It covers the scope of vermiculture and the different species of earthworms used in vermiculture, including indigenous and exotic species. The course equips students with practical knowledge in identifying suitable worm species, understanding earthworm morphology and life cycle, and mastering vermicompost production techniques. It also introduces the by-products of vermiculture, management of pests and pathogens, and the challenges involved in vermiculture practices. The course enables students to contribute to sustainable waste management, soil fertility improvement, environmental conservation, and enhancement of agricultural productivity through eco-friendly vermiculture technologies.				

Detailed Syllabus

Module	Unit	Contents	30 hrs
I		**Introduction to Vermiculture**	**5**
	1.1	Definition, Scope of Vermiculture	1
	1.2	Ecological distribution of earthworms: Epigeic, endogeic and anecic, Indigenous and exotic species suitable for vermicomposting (*Eudrilus eugeniae/Eisenia fetida/Perionyx excavatus/ Lampito mauritii).*	4
II		**Morphology of Earthworms**	**5**
	2.1	Morphological features-Segmentation, Clitellum, Genital aperture and Setae.	2
	2.2	Brief description of life cycle of Earthworm	1
	2.3	Identification of Vermi-composting species.	2
III		**Economic Importance of Vermiculture**	**6**
	3.1	Advantages of Vermicomposting, Vermicompost profile and applied aspects: Physical, Chemical and Biological properties of Vermicompost.	3

	3.2	Vermiwash, Vermicompost teas, Vermin, Vermi-remediation and Waste disposal.	3
IV	**Vermicompost Technology**		**10**
	4.1	Methodology of vermicomposting systems: Small scale earthworm farming for home gardens; Large scale farming (Pit, brick and heap systems, Kadapa slab method). Containers for culturing, raw materials, environmental pre-requisites.	6
	4.2	Feeding, harvesting, and storage of vermicompost.	4
V	**Management of Vermiculture**		**4**
	5.1	Natural enemies of earthworms (Predators and Pathogens).	2
	5.2	Management, Maintenance and Challenges in Vermiculture	1
	5.3	Training institutes (Kerala Agricultural University, Institute for Industrial Development) and Funding agencies (NABARD, State Horticulture Mission Kerala).	1

REFERENCES

1. Chaudhuri, P.S. (2005). Vermiculture and vermicomposting.as biotechnology for conversion of organic wastes into animal protein and organic fertilizer. *Asian Jr. of Microbiol. Biotech. Env. Sc.,* 7(3):359-370.
2. Chaudhuri, P.S. (2006). Kenchor Jeevan Baichitra: Kencho Projukti. JyanBichitraPrakashani, Tripura, ISBN: 81-8266-088-2, 128pp.
3. Christy, M. V. (2008) Vermitechnology, 1st edition, MJP Publishers.
4. Dash, M. C. (2012) Charles Darwin's Plough Tool for Vermitechnology, I. K. International Publishing House Pvt Ltd. New Delhi, India.
5. Ismail, S.A. (1997). Vermicology - The Biology of Earthworms. OrientLongman,92pp.
6. Ismail S A (2005) The Earthworm book. 2 nd Edition. Other India Press. ISBN-13.978-8185569666-10: 8185569665.
7. Kale, R.D. (1998). Earthworms: Cinderella of organic farming. Prism Books Pvt. Ltd., Bangalore
8. Lekshmy, M. S., Santhi R. (2012) Vermitechnology, Sara Publications, New Delhi, India.
9. Mary Appelhof (1982) Worms eat my Garbage, First edition, Flower press, pp100. ISBN 9780942256031.
10. Sathe,T.V (2022) Vermiculture and Organic farming, Daya Publishing House, 9788170353287.

Web resources

1. https://www.in.gov/idem/health/greening-our-backyards/composting/worm-composting/
2. https://www.ijcmas.com/abstractview.php?ID=23101&vol=11-9-2022&SNo=22
3. https://kau.in/ml/node/12561
4. https://businesswales.gov.wales/farmingconnect/vermicomposting
5. https://www.sciencedirect.com/topics/earth-and-planetary-sciences/vermicomposting

PRACTICUM
Credit - 1 (Total 30 hours)
Name of the Course: Vermiculture and Vermicomposting

Sl. No	Topic	
1	Morphological Identification of different species of earthworms used in vermiculture. (Any four)	Major
2	Field trip- Visit to Vermicompost unit and submit a report.	Minor
3	Setting up of Vermicompost unit (Campus/Residence/ Public).	Major
4	Study the effects of vermicompost and vermiwash on any two short duration crop plants.	Major
5	Identification of the byproducts of vermiculture and write down their economic importance.	Minor
6.	Prepare a chart on natural enemies of Earthworm.	Minor/Spotter

Course Outcomes

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Recall, understand, and apply the concepts, scope, ecological distribution, and species diversity of earthworms used in vermiculture, and analyse and evaluate their suitability and ecological significance in vermicomposting systems.	R,U,Ap,An, E,C	PSO-1,3
CO-2	Remember, understand, and identify the morphological features, life cycle, and vermicomposting species of earthworms, and analyse and evaluate their taxonomic and ecological importance in vermiculture practices.	R,U,Ap,An, E,C	PSO-3
CO-3	Understand and apply the concepts, advantages, properties, and applied aspects of vermicomposting products and technologies, and analyse and evaluate their role in waste management, soil fertility, and environmental sustainability.	R,U,Ap,An, E,C	PSO-5
CO-4	Recall, understand, and apply the methodologies of small-scale and large-scale vermicomposting systems, including culturing methods, raw materials, environmental requirements, feeding, harvesting, and storage techniques, and analyse and evaluate their	R,U,Ap,An, E,C	PSO-6

	efficiency in sustainable waste management and organic farming.		
CO-5	Understand and analyse the natural enemies, management practices, maintenance methods, challenges, training institutes, and funding agencies associated with vermiculture, and evaluate the role of vermiculture in sustainable agriculture, soil enrichment, environmental management, and organic farming practices.	R,U,Ap,An, E,C	PSO-6,7

R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Name of the Course: Vermiculture and Vermicomposting
Credits: 2:0:1 (Lecture: Tutorial: Practical)

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/Tutorial (T)	Practical (P)
1	Recall, understand, and apply the concepts, scope, ecological distribution, and species diversity of earthworms used in vermiculture, and analyse and evaluate their suitability and ecological significance in vermicomposting systems.	PO1/ PSO1,3	R,U,Ap, An,E,C	F, C	T	P
2	Remember, understand, and identify the morphological features, life cycle, and vermicomposting species of earthworms, and analyse and evaluate their taxonomic and ecological importance in vermiculture practices.	PO 3/ PSO 3	R,U,Ap, An,E,C	F	T	P
3	Understand and apply the concepts, advantages, properties, and applied aspects of vermicomposting products and technologies, and analyse and evaluate their role in waste management, soil fertility, and environmental sustainability.	PO 6/ PSO 5	R,U,Ap, An,E,C	P	T	P

4	Recall, understand, and apply the methodologies of small-scale and large-scale vermicomposting systems, including culturing methods, raw materials, environmental requirements, feeding, harvesting, and storage techniques, and analyse and evaluate their efficiency in sustainable waste management and organic farming.	PO 3, PO 6/ PSO 6	R,U,Ap, An,E,C	P,	T	P
5	Understand and analyse the natural enemies, management practices, maintenance methods, challenges, training institutes, and funding agencies associated with vermiculture, and evaluate the role of vermiculture in sustainable agriculture, soil enrichment, environmental management, and organic farming practices.	PO 1, PO 3, PO 7/ PSO 6, PSO 7	R,U,Ap, An,E,C	C, P	T	P

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Mapping of COs with PSOs and POs

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**
CO 1	1	-	2-	-	-	-	-	1`	-	-	-	-	-	-	-
CO 2	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-
CO 3	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-
CO 4	-	-	-	-	-	1	-	-	-	1	-	-	2	-	-
CO 5	-	-	-	-	-	1	2	1	-	2	-	-	-	3	-

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

Assignment /Seminar topics

1. Emerging trends and technologies in Vermiculture
2. Products of Economic Importance
3. Applications of Vermicompost in Non-agricultural sectors
4. Case Study and examples of successful vermicompost applications
5. Economic and environmental benefits of Integrating Vermiculture into agricultural practices.
6. Indigenous and exotic species used in vermiculture.
7. Training Institutes and funding agencies of Vermiculture.

Continuous Comprehensive Assessment

1. Assignments
2. Seminar
3. Submission of Report
4. Field Report
5. Test
6. Quiz/Debate

End Semester Evaluation

1. Multiple Choice Questions
2. Very short answer Questions
3. Short answer questions
4. Essay type Questions
5. Practical examination

Mapping of COs to Assessment Rubrics:

	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO 1	✓	✓		✓
CO 2	✓	✓		✓
CO 3	✓	✓		✓
CO 4	✓	✓		✓
CO 5	✓	✓		✓