



<b>Subject</b>	<b>Microbiology</b>
<b>Paper No. and Title</b>	<b>X, Agricultural Microbiology</b>
<b>Module (Flipped classroom) No. and Title</b>	<b>1, Lignin degradation</b>
<b>Module Tag</b>	<b>DAYA_MICRO_NRD_M3</b>

By,

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## Module No. 1,

- **Prerequisites** – Learners have read out Soil Microbiology by Alexander book.
- **Objectives of the Module**  
⇒ **Sub Unit 1**

	<b>Content</b>	<b>Objectives (Learner should be able to )</b>	<b>Cognitive Level</b>
1.1	Introduction and location and amount of lignin	What is lignin and its location	Remembering
		Memorise the component lignin and its location	Remembering
			Remembering
		Compare with the locations of other components	Understanding
		Evaluate the lignin component in plants	Evaluating
1.2	Structure and structural complexity	Understand the structure of lignin and its structural complexity	Understanding
		Explain the various components of lignin and difficulties in understanding the structure	Understanding
		Apply the structural difference with other components	Applying
		Create structure of lignin	Creating

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## Detailed Plan of Out-of -class and In-class activities

Week 1

Sub Unit 1 – **Objectives** –

- To know about the lignin component its location and its % in plants. To know the structure and structural complexity
- To understand difficulties in purifying lignin.
- To know the significance of lignin degradation.

## Resources Needed –

⇒ Title and Nature of Resources –  
Syllabus of B.Sc.III

⇒ Material

- 1) Soil Microbiology - Alexander Book-
- 2) Agricultural and environmental microbiology-  
N.S.Kulkarni

3) Instructor-made

### Lignin degradation material on Google classroom

<https://drive.google.com/file/d/1j9pcg9UMfEjupYmX1eJLuWb-WyxXzYJr/view?usp=sharing>

4) Instructor-made

### Lecture recording:

<https://drive.google.com/file/d/1LAGexDH-FKDggJFMgUkEEE1X6QpUlwth/view?usp=sharing>

Units	Out-of –class activity Details of Activity	In-class activity Details of Activity	Assessment
1.1	Students should read out the topic from reference books Students should read the material on Google class room. Student should listen to recording	Discussion on the topic Check the level of understanding of the topic through Question – answer session	Question – answer session

1.2	Students should read out the topic from reference book. Students should read the PPT	Same as above  Help the students to study the composition	Question answer session
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Week 2

Sub Unit 2 - **Objectives** –

Students should study possible pathway

Study of different intermediates produced.

Organisms involved

**Sub Unit 2**

	<b>Content</b>	<b>Objectives (Learner should be able to )</b>	<b>Cognitive Level</b>
2.1	Study of possible pathway of degradation	To know possible pathway of degradation	Understanding
		To understand the intermediates formed	Understanding
		Memorise the intermediates formed and understand their structure	Remembering
		Study the proposed pathway by some scientists	Understanding
		Remember the examples of bacterial genera responsible for degradation of lignin	Understanding

Resources Needed –

→ Title and Nature of Resources –

→ Syllabus of B.Sc.III

1) Soil Microbiology - Alexander Book-

2) Agricultural and environmental microbiology-  
N.S.Kulkarni

→ Material

Instructor made

**Lignin degradation material on Google classroom**

<https://drive.google.com/file/d/1j9pcg9UMfEjupYmX1eJLuWb-WyxXzYJr/view?usp=sharing>

**Lecture recording:**

<https://drive.google.com/file/d/1LAGexDH-FKDggJFMgUkEEE1X6QpUlwth/view?usp=sharing>

Units	Out-of – class activity Details of Activity	In-class activity Details of Activity	Assessment
2.1	Students should read out the topic from Google class room	Check the level of understanding of the topic through Question – answer session	Question – answer session.

