A Brief Report on Value-Added Course on

"Biochar: A Sustainable Solution for Soil and Environment"
Course Code: AGV-04-2425
(18th April 2025 to 2nd May 2025)
Organized by Department of Agriculture,
Integral Institute of Agricultural Science and Technology (IIAST),
Integral University, Lucknow

Biochar, a carbon-rich material produced through pyrolysis of organic biomass under limited oxygen conditions, is gaining increasing relevance in the Indian context as a sustainable solution for improving soil health, enhancing crop productivity, and addressing environmental challenges. In India, where soils are often degraded due to intensive agriculture, excessive chemical inputs, salinity, acidity, and low organic matter content, biochar offers a value-added approach to soil restoration and fertility enhancement. Derived from locally available agricultural residues such as rice husks, sugarcane bagasse, coconut shells, and crop stubble, biochar not only provides a productive use for agricultural waste but also improves the physical, chemical, and biological properties of soil. Its porous structure and high cation exchange capacity help retain water and nutrients, particularly in sandy or nutrient-deficient soils common in regions like Rajasthan, Madhya Pradesh, and parts of eastern India. In acidic soils of the Northeast and central India, biochar can raise pH levels, improving nutrient availability and reducing aluminum toxicity. Furthermore, in Indian rainfed and marginal lands, biochar application can improve moisture retention, making agriculture more climate-resilient. Importantly, biochar contributes to carbon sequestration and mitigates greenhouse gas emissions, aligning with India's climate goals under the Paris Agreement. In the context of a value-added course, integrating biochar education with practical knowledge of soil science, waste-to-resource management, and sustainable farming practices is essential for empowering students, farmers, and professionals. The course can explore region-specific feedstock availability, appropriate pyrolysis techniques suitable for small and medium enterprises, and field-level application strategies for different Indian soil types. It should also emphasize policy support, economic feasibility, and entrepreneurship opportunities in biochar production and marketing. As India seeks to balance

agricultural productivity with environmental sustainability, biochar represents a transformative tool rooted in both scientific innovation and traditional wisdom—making it a critical component of future-ready, climate-smart agriculture.

Recognizing its importance, the **Department of Agriculture, IIAST, Integral University** organized a **30+ hour value-added virtual course** from **18th April to 2nd May 2025**, focusing on the scientific principles, practical applications, and entrepreneurial opportunities associated with biochar. This interdisciplinary course was open to students from all departments across the university. The course attracted a wide range of participants and was designed to bridge academic knowledge with field-level applications. A total of 163 students were registered and 149 students passed in the course based on quiz and attendance.

Course Objectives

- To introduce the basics of biochar production, types, and feedstock selection.
- To understand its role in improving soil health and enhancing agricultural productivity.
- To examine its environmental benefits including pollution remediation and climate change mitigation.
- To promote sustainable and regenerative agricultural practices using biochar.
- To explore innovation and entrepreneurship in the commercial biochar sector.

The Value-Added Course was conducted under the guidance of Prof. Mohd Haris Siddiqui, Director, IIAST and Prof. Saba Siddiqui, Head, Department of Agriculture, Integral University and was coordinated and facilitated by the following faculty members.

1. Dr. Khalid Habib
2. Dr. P. Smriti Rao

The Course modules were addressed by the following resource persons:

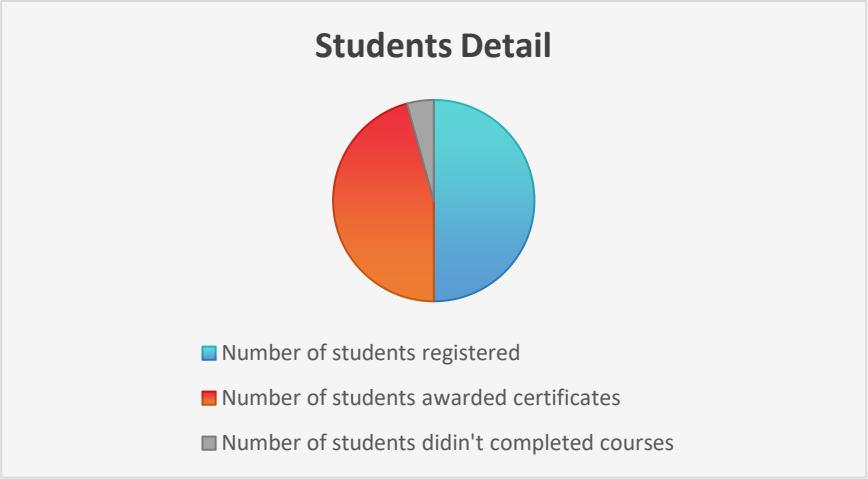
S. No.	Date	Course Instructor	Module Title	Outcome
1	18/04/2025–20/04/2025	Dr. Khalid Habib	Historical background and evolution of biochar, biomass feedstocks, and pyrolysis techniques	Students gained foundational understanding of biochar production and feedstock management.
2	21/04/2025–23/04/2025	Dr. P. Smriti Rao	Biochar's impact on soil properties, nutrient retention, and integration with compost and INM	Learners understood how biochar affects soil chemistry and microbial ecology.
3	24/04/2025–26/04/2025	Dr. Khalid Habib	Role of biochar in climate change mitigation, carbon sequestration, and regenerative farming	Students explored biochar's contribution to sustainability and climate resilience.
4	27/04/2025–29/04/2025	Dr. P. Smriti Rao	Use of biochar for pollution control, heavy metal adsorption, and environmental remediation	Participants learned applications of biochar in soil and water pollution management.
5	30/04/2025–02/05/2025	Dr. P. Smriti Rao	Trends in biochar agribusiness, market potential, policy frameworks, and research methodologies	Students examined the entrepreneurial and research avenues in biochar technology.

Course Engagement

Number of students registered

Number of students registered	No of students attained certificate	Percentage engagement
163	149	91.4 %

Participants were awarded **e-certificates** based on their quiz scores, attendance (minimum 75%), and final assessment (minimum 50% marks). The feedback from participants was overwhelmingly positive, indicating increased interest in sustainable soil management and environmental restoration using biochar.



Glimpse of the Course