Innovative Horizons in Agronomy: Bridging Science, Sustainability, and Smart Farming

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EDTECH PUBLICATIONS

Published By: *EdTech Publications*

EdTech Publications

Vikas Nagar, Lucknow, U.P., India

Email - *edtechpublication@gmail.com*

Editors: *Dr. Adarsh Kumar*

Edition: *1st*

Publication Year: *2025*

Pages:

ISBN: *978-81-987409-4-6*

Price: *320/-*

Contents

Soil Enzymes and Their Methods of Determination

2

Shashank Singh, Shashi Bhushan Singh, Kaushalanand, Shubhangi Singh and Shubhendu Singh

Abstract

Soil enzymes are vital for nutrient cycling and organic matter decomposition, acting as sensitive indicators of soil health and fertility. Multiple analytical methods have been developed to assess their activities, each with unique principles and applications. Spectrophotometric methods use chromogenic substrates for simple and reproducible measurements. Titrimetric approaches quantify products like ammonium via acid-base titration. Fluorometric assays offer high sensitivity and rapid, multiplexed analysis. Radioisotopic techniques provide precise results but pose safety concerns. Manometric and electrode-based methods measure gas changes and pH shifts, respectively. Chromatographic methods (HPLC, GC) enable detailed product separation, while capillary electrophoresis offers high-resolution analysis of ionic species, supporting comprehensive evaluation of diverse soil enzyme functions.

Keywords

Soil enzymes, enzyme activity assays, spectrophotometry, titrimetry, fluorometry, radioisotopic methods

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Dr. A. Kumar (ed.) Innovative Horizons in Agronomy: Bridging Science, Sustainability, and Smart Farming