

# api 20e code book pdf

**api 20e code book pdf** is an essential resource for microbiologists, clinical laboratory technicians, and researchers working with the identification of Enterobacteriaceae and other Gram-negative bacteria. This document provides comprehensive codes and interpretations based on biochemical test results obtained from the API 20E system, a standardized and widely used diagnostic tool.

Understanding how to effectively utilize the api 20e code book pdf can significantly enhance the accuracy of bacterial identification, improving diagnostic outcomes in clinical and research settings. This article explores the contents, structure, and practical applications of the api 20e code book pdf, along with guidance on how to interpret and use the biochemical codes generated from the testing strips. The following sections will cover the fundamentals of the API 20E system, the detailed coding process, how the code book facilitates bacterial identification, and its importance in laboratory workflows.

- Overview of the API 20E System
- Understanding the API 20E Code Book PDF
- Step-by-Step Guide to Using the API 20E Code Book
- Applications of the API 20E Code Book in Microbiology
- Benefits and Limitations of the API 20E Code Book PDF

## Overview of the API 20E System

The API 20E system is a standardized identification method used primarily for Enterobacteriaceae and other Gram-negative bacteria. It consists of 20 microtubes containing dehydrated substrates that test for various enzymatic activities and carbohydrate fermentations. When a bacterial suspension is inoculated into these microtubes and incubated, each well produces a positive or negative reaction based on the metabolic characteristics of the microorganism.

This system is highly favored in clinical microbiology due to its simplicity, rapid turnaround time, and reproducibility. The results from the individual biochemical tests are then interpreted through a numerical code, which is cross-referenced in the api 20e code book pdf to determine the bacterial species or genus.

## Components of the API 20E Strip

The API 20E strip contains 20 miniature biochemical tests, each designed to detect specific enzymatic or metabolic properties. These include tests for:

- Decarboxylation of amino acids (arginine, lysine, ornithine)
- Hydrolysis of substrates like urea and gelatin

- Fermentation of sugars such as glucose, mannitol, and sorbitol
- Production of indole and hydrogen sulfide (H<sub>2</sub>S)
- Utilization of citrate as a sole carbon source

The combination of these test results creates a biochemical profile unique to each bacterial species, which forms the basis for identification.

## How the API 20E System Works

After inoculating the strip with a bacterial suspension, the tests are incubated, typically for 18 to 24 hours. Each test well changes color or exhibits other reactions indicating positive or negative results. These outcomes are recorded and then grouped in sets of three to generate a seven-digit numerical code. This code is the key to unlocking the bacterial identity by consulting the api 20e code book pdf.

## Understanding the API 20E Code Book PDF

The api 20e code book pdf is a detailed manual that lists the numerical codes alongside corresponding bacterial species. It serves as the primary reference for interpreting the biochemical profiles obtained from the API 20E test strips. This document is indispensable for laboratories seeking rapid and reliable identification of Gram-negative bacteria.

## Structure and Content of the Code Book

The code book is organized to facilitate quick lookup of codes and provides additional information such as:

- Species name and taxonomy
- Typical biochemical characteristics
- Additional notes on strain variability
- Instructions for code calculation and interpretation

The pdf format ensures easy distribution, printing, and accessibility, allowing users to reference the code book in various laboratory environments.

## Role of the Code Book in Identification

Once the seven-digit code is generated from the API 20E strip results, the code book is used to match the code against a database of known profiles. This matching process confirms the bacterial species or suggests the closest possible identification. The code book also aids in recognizing atypical or rare

strains by providing extended information on variable biochemical patterns.

## Step-by-Step Guide to Using the API 20E Code Book

Proper use of the api 20e code book pdf requires a systematic approach to ensure accurate bacterial identification. The following steps outline the process:

1. **Perform the API 20E Test:** Inoculate the strip with the test organism and incubate as per protocol.
2. **Record Biochemical Reactions:** Observe color changes or other indicators in each well to determine positive (+) or negative (-) results.
3. **Group Results into Triplets:** Organize the 20 test results into seven groups of three tests each (except the last group with two tests), assigning values of 1, 2, or 4 for positive reactions.
4. **Calculate the Numerical Code:** Sum the values within each triplet to form a digit, resulting in a seven-digit code.
5. **Consult the Code Book PDF:** Look up the code in the api 20e code book pdf to identify the bacterial species associated with that profile.
6. **Interpret Results with Caution:** Consider any notes or warnings about atypical reactions or similar species listed in the code book.
7. **Confirm Identification:** Use complementary tests or molecular methods if necessary to verify the identification.

## Tips for Accurate Interpretation

Accuracy in reading the test results and code calculation is critical. The code book also provides guidelines for:

- Handling ambiguous or weak reactions
- Dealing with unusual or mixed cultures
- Understanding the limitations of biochemical testing alone

## Applications of the API 20E Code Book in Microbiology

The api 20e code book pdf is widely used in clinical, environmental, and industrial microbiology

laboratories. Its applications include:

## Clinical Diagnostics

Rapid and accurate identification of pathogenic Enterobacteriaceae such as *Escherichia coli*, *Salmonella* spp., and *Klebsiella* spp. is crucial for patient management. The code book facilitates timely microbial diagnosis, guiding appropriate treatment decisions.

## Food and Water Safety Testing

Detection of coliforms and other Gram-negative bacteria in food and water samples helps ensure public health safety. The API 20E system, together with the code book, supports routine monitoring and outbreak investigations.

## Research and Taxonomy

Microbiologists use the code book to classify and study bacterial isolates, contributing to taxonomic studies and the discovery of new species. It also assists in phenotypic characterization of strains in research projects.

## Benefits and Limitations of the API 20E Code Book PDF

Utilizing the api 20e code book pdf offers several advantages, but it also comes with limitations that users should consider.

### Advantages

- **Standardization:** Provides a consistent framework for interpreting test results worldwide.
- **Efficiency:** Speeds up bacterial identification compared to traditional biochemical testing.
- **Accessibility:** The pdf format allows easy sharing and updating of the code book.
- **Comprehensiveness:** Covers a wide range of species relevant to clinical and environmental microbiology.

### Limitations

- **Dependence on Accurate Test Performance:** Incorrect inoculation or incubation can lead to erroneous codes.

- **Ambiguous Results:** Some bacteria may produce similar biochemical profiles, complicating identification.
- **Limited Scope:** Primarily designed for Enterobacteriaceae and related Gram-negative bacteria; not suitable for all bacterial groups.
- **Need for Complementary Tests:** Molecular or serological methods may be necessary for definitive identification.

## Frequently Asked Questions

### What is the API 20E code book PDF used for?

The API 20E code book PDF is used for identifying Enterobacteriaceae and other Gram-negative bacteria based on the results of biochemical tests performed using the API 20E system.

### Where can I download the API 20E code book PDF?

The API 20E code book PDF is typically available from the official bioMérieux website or authorized distributors. It is recommended to access it through official or institutional sources to ensure the latest and most accurate version.

### How do I interpret results using the API 20E code book PDF?

To interpret results, you compare the numerical profile generated from the biochemical tests with the code book, which provides corresponding bacterial species identification based on the unique code.

### Is the API 20E code book PDF free to access?

The API 20E code book PDF may not always be freely available due to copyright restrictions. Some laboratories or institutions provide access to it as part of their resources, but official versions are often provided with the purchase of the API 20E test kits.

### Can the API 20E code book PDF identify bacteria other than Enterobacteriaceae?

While the API 20E system is primarily designed for Enterobacteriaceae and other Gram-negative rods, the code book also includes identification keys for some non-Enterobacteriaceae species.

### Are there digital tools that replace the need for the API 20E code book PDF?

Yes, there are software and online databases that can interpret API 20E test results digitally, potentially offering quicker and more user-friendly identification compared to the traditional PDF code book.

## How often is the API 20E code book updated?

The API 20E code book is updated periodically to include new bacterial species and improved identification algorithms. Users should check for the latest version from official sources to ensure accurate identification.

## Additional Resources

### 1. *API 20E Code Book: A Comprehensive Guide*

This book offers an in-depth overview of the API 20E system, providing clear explanations of the biochemical tests used for bacterial identification. It includes detailed instructions on interpreting results and coding procedures. Ideal for microbiologists and laboratory technicians, this guide simplifies the complexities of the API 20E code book.

### 2. *Practical Microbiology: Using the API 20E System*

Focused on hands-on applications, this text walks readers through the step-by-step process of performing API 20E tests. It incorporates case studies and troubleshooting tips to ensure accurate bacterial identification. The book is a valuable resource for students and professionals in clinical microbiology.

### 3. *Manual of Biochemical Tests for Identification of Medical Bacteria*

This manual covers a wide range of biochemical tests, including those featured in the API 20E system. It explains the principles behind each test and provides guidance on interpreting results in clinical settings. The book is essential for anyone working in medical bacteriology laboratories.

### 4. *API 20E System: Interpretation and Applications*

Designed to complement the official code book, this guide delves into the interpretation of API 20E profiles and their applications in diagnostic microbiology. It includes charts, flow diagrams, and example profiles to aid understanding. The text is suitable for both beginners and experienced microbiologists.

### 5. *Identification of Enterobacteriaceae Using API 20E*

This specialized volume focuses on the identification of Enterobacteriaceae family members using the API 20E system. It discusses the significance of accurate identification in clinical and environmental microbiology. The book also addresses common pitfalls and offers solutions for ambiguous results.

### 6. *Clinical Microbiology Procedures Handbook*

A comprehensive resource that covers various microbiological procedures, including the use of API systems like API 20E. It provides protocols, quality control measures, and interpretation guidelines. This handbook is widely used in clinical laboratories worldwide.

### 7. *Microbial Identification Techniques: Biochemical and Molecular Approaches*

This book compares traditional biochemical methods, including API 20E, with modern molecular identification techniques. It discusses the advantages and limitations of each method, helping readers choose the appropriate approach for their needs. The text is valuable for microbiologists seeking a broad perspective on microbial identification.

### 8. *Laboratory Manual for Microbial Techniques*

Featuring practical exercises and detailed protocols, this manual includes sections dedicated to the API 20E system. It guides users through sample preparation, inoculation, incubation, and result

interpretation. The book is ideal for students and trainees in microbiology labs.

#### 9. *Biochemical Identification of Medical Bacteria*

This text provides a thorough overview of biochemical testing methods for medical bacteria, emphasizing the use of standardized systems such as API 20E. It includes identification keys, result interpretation charts, and case studies. The book serves as a reliable reference for clinical microbiologists and infectious disease specialists.

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# API 20E Code Book PDF: Your Comprehensive Guide to Bacterial Identification

Ebook Name: Mastering API 20E: A Practical Guide to Bacterial Identification

Ebook Outline:

Introduction: What is API 20E? Its applications and limitations. Understanding the methodology.

Chapter 1: Preparing for the Test: Gathering necessary materials, inoculating the strips, and incubation procedures. Troubleshooting common preparation errors.

Chapter 2: Interpreting the Results: Understanding the API 20E code, using the numerical profile, and accessing online databases for identification. Dealing with ambiguous results.

Chapter 3: Advanced Applications and Interpretation: Exploring the limitations of API 20E.

Combining API 20E with other identification methods. Case studies of bacterial identification using API 20E.

Chapter 4: Quality Control and Troubleshooting: Ensuring accurate results through proper technique and quality control measures. Identifying and resolving common problems.

Conclusion: Recap of key concepts, future trends in bacterial identification, and resources for further learning.

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## **API 20E Code Book PDF: A Comprehensive Guide to Bacterial Identification**

The API 20E system is a widely used, standardized biochemical identification system for identifying Enterobacteriaceae and other Gram-negative, oxidase-negative rods. This comprehensive guide provides a detailed explanation of the API 20E system, from sample preparation to result interpretation, and offers invaluable insights for both beginners and experienced microbiologists.

Understanding the API 20E code and its associated numerical profile is crucial for accurate bacterial identification, which has profound implications for patient care, public health, and environmental microbiology. This article aims to demystify the process, empowering readers to confidently utilize this powerful tool.

## **1. Introduction: Understanding the API 20E System**

The API 20E system, manufactured by bioMérieux, is a miniaturized identification system consisting of 20 biochemical tests performed simultaneously in a plastic strip. These tests assess various metabolic capabilities of bacteria, such as carbohydrate fermentation, enzyme production, and other metabolic activities. The results of these tests generate a numerical profile, which is then used to identify the bacterial species using a database, either through a provided manual or online software. Understanding the system's strengths and limitations is crucial for accurate identification. The API 20E system offers several advantages: its rapid turnaround time, ease of use, and the standardized nature of the tests contribute to its popularity. However, it's crucial to acknowledge that it is not foolproof and might require further testing in cases of ambiguous or unexpected results.

## **2. Chapter 1: Preparing for the Test: A Step-by-Step Guide**

Accurate results depend heavily on proper preparation and execution. This chapter outlines the critical steps involved in preparing the API 20E strip for inoculation:

**Material Gathering:** Before beginning, ensure you have all necessary materials: API 20E strips, sterile saline or distilled water, pure bacterial culture (ideally 18-24 hours old), inoculating loop, incubator (35-37°C), and a reading chart or access to online databases.

**Inoculating the Strips:** Using a sterile inoculating loop, suspend a bacterial colony in sterile saline or distilled water to achieve a turbidity matching a 0.5 McFarland standard. This ensures consistent inoculation across all wells. Then, using the suspension, inoculate each cupule (small well) of the strip fully and carefully, following the manufacturer's instructions.

**Incubation Procedures:** After inoculation, carefully add the sterile mineral oil to the appropriate cupules as per the instructions (this prevents oxidation and allows for anaerobic conditions). Seal the strip according to the manufacturer's recommendations and incubate the strip at the optimal temperature (typically 35-37°C) for 18-24 hours. The precise incubation time may vary slightly based on the specific bacterial strain.

**Troubleshooting Preparation Errors:** Common errors include insufficient inoculation, incorrect incubation temperature, or contamination. These can lead to inaccurate results. Understanding potential sources of error and how to prevent them is crucial for reliable identification. This section covers the most common errors and how to rectify them.

## **3. Chapter 2: Interpreting the Results: Deciphering the API 20E Code**

After incubation, the results of each biochemical test are recorded based on the observed changes (color changes, gas production, etc.). Each positive reaction is assigned a numerical value (typically 1 or 5), while a negative reaction is assigned a 0. These values are compiled to create a seven-digit numerical profile. This numerical profile is then compared to a database (either the printed manual or online database), which provides a list of possible bacterial species with their corresponding profiles and probability scores.

**Understanding the API 20E Code:** Each digit in the numerical profile represents a group of tests. The interpretation of the code is crucial and requires careful examination. This section provides a comprehensive guide to understanding each test and its contribution to the overall profile.

**Using the Numerical Profile:** Using the generated 7-digit numerical profile, users refer to the provided database to identify potential matching bacterial species. Understanding the importance of probability scores and confidence levels is crucial for accurate identification.

**Accessing Online Databases:** Many online databases are available, offering up-to-date information and a more efficient identification process compared to using the printed manual. This section covers several reputable online databases and their usage.

**Dealing with Ambiguous Results:** In some cases, the numerical profile may not yield a definitive identification. This section explores strategies for handling ambiguous results, including performing additional confirmatory tests or considering alternative identification methods.

## **4. Chapter 3: Advanced Applications and Interpretation: Beyond the Basics**

This chapter explores more advanced aspects of using API 20E:

**Limitations of API 20E:** While a powerful tool, API 20E is not without its limitations. Understanding these limitations, such as the inability to identify all bacterial species or the potential for misidentification due to atypical strains, is essential for responsible interpretation.

**Combining API 20E with other identification methods:** API 20E results can be effectively combined with other identification techniques, such as MALDI-TOF mass spectrometry or 16S rRNA gene sequencing, to enhance accuracy and confirm results. This chapter demonstrates how to integrate API 20E results with other methods for a holistic approach to bacterial identification.

**Case Studies of Bacterial Identification using API 20E:** This section presents real-world examples of bacterial identification using the API 20E system, illustrating the practical application of the techniques discussed throughout the guide. These case studies highlight both successful identifications and situations where additional testing was necessary.

## 5. Chapter 4: Quality Control and Troubleshooting: Ensuring Accuracy

Maintaining high standards of quality control is paramount to ensure the reliability of API 20E results. This chapter addresses:

**Ensuring Accurate Results through Proper Technique:** This section reinforces the importance of meticulous technique at each stage of the process, from sample preparation to result interpretation.

**Quality Control Measures:** Regular quality control using known bacterial strains is essential to validate the system's performance and identify potential problems early on. This section outlines appropriate quality control procedures.

**Identifying and Resolving Common Problems:** This section provides a troubleshooting guide to address common issues encountered during the API 20E procedure, allowing users to identify and solve problems effectively.

## Conclusion: The Future of Bacterial Identification

The API 20E system remains a valuable tool in bacterial identification. This guide has provided a comprehensive overview, from preparation and interpretation to advanced applications and troubleshooting. While advancements in molecular techniques are transforming the field, the API 20E system continues to provide a reliable and cost-effective method for many applications. Further research into optimizing the system and integrating it with newer technologies will continue to improve its accuracy and utility.

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### FAQs:

1. What is the shelf life of API 20E strips? The shelf life is printed on the packaging and typically ranges from 12 to 24 months depending on storage conditions.
2. Can API 20E identify all bacteria? No, it primarily identifies Gram-negative, oxidase-negative rods, particularly Enterobacteriaceae. Other bacteria may require different identification systems.
3. What if I get an ambiguous result? Perform additional confirmatory tests, such as serological tests or molecular methods, or consult a microbiology expert.
4. How do I ensure the accuracy of my results? Follow the manufacturer's instructions meticulously, implement proper quality control measures, and use a fresh bacterial culture.
5. What is the ideal incubation temperature? Typically 35-37°C for 18-24 hours.
6. Where can I find the API 20E database? The database is available in the printed manual or through online access provided by bioMérieux.

7. What is the 0.5 McFarland standard? It's a turbidity standard used to ensure consistent bacterial inoculum density for accurate results.

8. What are the limitations of the API 20E system? It may not identify all bacterial species, and atypical strains can lead to misidentification.

9. What are the applications of API 20E? It's used in clinical microbiology, environmental microbiology, food microbiology, and research settings for the identification of Gram-negative bacteria.

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#### Related Articles:

1. API 20E vs. MALDI-TOF: A Comparative Analysis: A comparison of the API 20E system with MALDI-TOF mass spectrometry, highlighting their strengths and weaknesses.

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**api 20e code book pdf:** [Bergey's Manual of Systematic Bacteriology](#) David R. Boone, Richard W. Castenholz, 2012-01-13 Bacteriologists from all levels of expertise and within all specialties rely on this Manual as one of the most comprehensive and authoritative works. Since publication of the first edition of the Systematics, the field has undergone revolutionary changes, leading to a phylogenetic classification of prokaryotes based on sequencing of the small ribosomal subunit. The list of validly named species has more than doubled since publication of the first edition, and descriptions of over 2000 new and realigned species are included in this new edition along with more in-depth ecological information about individual taxa and extensive introductory essays by

leading authorities in the field.

**api 20e code book pdf: RFID Handbook** Klaus Finkenzeller, 2010-11-04 This is the third revised edition of the established and trusted RFID Handbook; the most comprehensive introduction to radio frequency identification (RFID) available. This essential new edition contains information on electronic product code (EPC) and the EPC global network, and explains near-field communication (NFC) in depth. It includes revisions on chapters devoted to the physical principles of RFID systems and microprocessors, and supplies up-to-date details on relevant standards and regulations. Taking into account critical modern concerns, this handbook provides the latest information on: the use of RFID in ticketing and electronic passports; the security of RFID systems, explaining attacks on RFID systems and other security matters, such as transponder emulation and cloning, defence using cryptographic methods, and electronic article surveillance; frequency ranges and radio licensing regulations. The text explores schematic circuits of simple transponders and readers, and includes new material on active and passive transponders, ISO/IEC 18000 family, ISO/IEC 15691 and 15692. It also describes the technical limits of RFID systems. A unique resource offering a complete overview of the large and varied world of RFID, Klaus Finkenzeller's volume is useful for end-users of the technology as well as practitioners in auto ID and IT designers of RFID products. Computer and electronics engineers in security system development, microchip designers, and materials handling specialists benefit from this book, as do automation, industrial and transport engineers. Clear and thorough explanations also make this an excellent introduction to the topic for graduate level students in electronics and industrial engineering design. Klaus Finkenzeller was awarded the Fraunhofer-Smart Card Prize 2008 for the second edition of this publication, which was celebrated for being an outstanding contribution to the smart card field.

**api 20e code book pdf: Gram-positive Organisms** Dannie G. Hollis, 1981

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**api 20e code book pdf: The Prokaryotes** Martin Dworkin, Stanley Falkow, Eugene Rosenberg, Karl-Heinz Schleifer, Erko Stackebrandt, 2006-12-13 With the launch of its first electronic edition, The Prokaryotes, the definitive reference on the biology of bacteria, enters an exciting new era of information delivery. Subscription-based access is available. The electronic version begins with an online implementation of the content found in the printed reference work, The Prokaryotes, Second Edition. The content is being fully updated over a five-year period until the work is completely revised. Thereafter, material will be continuously added to reflect developments in bacteriology. This online version features information retrieval functions and multimedia components.

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and detail, Android Security Internals is a must-have for any security-minded Android developer.

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2012-12-06 The food industry, with its diverse range of products (e.g. short shelf-life foods, modified atmosphere packaged products and minimally processed products) is governed by strict food legislation, and microbiological safety has become a key issue. Legally required to demonstrate 'due diligence', food manufacturers are demanding analytical techniques that are simple to use, cost effective, robust, reliable and can provide results in 'real time'. The majority of current microbiological techniques (classical or rapid), particularly for the analysis of foodborne pathogens, give results that are only of retrospective value and do not allow proactive or reactive measures to be implemented during modern food production. Rapid methods for microbial analysis need to be considered in the context of modern Quality Assurance (QA) systems. This book addresses microbiologists, biochemists and immunologists in the food industry, the public health sector, academic and research institutes, and manufacturers of kits and instruments. This volume is an up-to-date account of recent developments in rapid food microbiological analysis, current approaches and problems, rapid methods in relation to QA systems, and future perspectives in an intensely active field. P.D.P. Contributors Public Health Laboratory, Royal Preston Hospital, PO Box F.J. Bolton 202, Sharoe Green Lane North, Preston PR2 4HG, UK. D. M. Gibson Ministry of Agriculture, Fisheries and Food, Torry Research Station, 135 Abbey Road, Aberdeen AB9 8DG, Scotland. P.A. Hall Microbiology and Food Safety, Kraft General Foods, 801 Waukegan Road, Glenview, Illinois 60025, USA.

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loads. Policy makers face a difficult balancing act as they seek to nurture the recovery while safeguarding price stability and fiscal sustainability. A comprehensive set of policies will be required to promote a strong recovery that mitigates inequality and enhances environmental sustainability, ultimately putting economies on a path of green, resilient, and inclusive development. Prominent among the necessary policies are efforts to lower trade costs so that trade can once again become a robust engine of growth. This year marks the 30th anniversary of the Global Economic Prospects. The Global Economic Prospects is a World Bank Group Flagship Report that examines global economic developments and prospects, with a special focus on emerging market and developing economies, on a semiannual basis (in January and June). Each edition includes analytical pieces on topical policy challenges faced by these economies.

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Take an in-depth look at machine learning  
 Get to know natural language processing (NLP)  
 Understand malware feature engineering  
 Build generative adversarial networks using Python libraries  
 Work on threat hunting with machine learning and the ELK stack  
 Explore the best practices for machine learning

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poor quality microplants or micro-shoots. In this symposium, a holistic approach to pathogen and microbial contamination control is evident with the recognition that micropropagators must address pathogen and microbial contamination in vitro, and diseases and microplant failure at establishment. There is increasing interest in establishing beneficial bacterial and mycorrhizal association with microplants in vitro and in vivo.

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