



# Adding Biology for Soil and Hydroponic Systems

*Carole Ann Rollins Ph.D., Ph.D. Carole Ann Rollins, Ph.D. Elaine Ingham*

Download now

[Click here](#) if your download doesn't start automatically

# Adding Biology for Soil and Hydroponic Systems

*Carole Ann Rollins Ph.D., Ph.D. Carole Ann Rollins, Ph.D. Elaine Ingham*

**Adding Biology for Soil and Hydroponic Systems** Carole Ann Rollins Ph.D., Ph.D. Carole Ann Rollins, Ph.D. Elaine Ingham

Simple explanations about how to add biology to any plant growing system makes this book easy-to-read for the general public. Guidelines for conventional, sustainable and organic applications -- whether you are growing indoors in controlled environments and soilless media or outdoors in open fields of soil, this book helps you design your growing systems and incorporate biology into your programs. Basic biology and chemistry of nutrient-cycling and plant growing environments are given, so the mystery is taken out of plant growing.

## TABLE OF CONTENTS

### CHAPTER 1. INTRODUCTION

Types of Nutrients for Growing Plants  
Plants Take Up Nutrients in the Form of Ions  
Chelation of Nutrients  
Beneficial and Non-Beneficial Microorganisms  
The Soil and Hydro Food Web

### CHAPTER 2. SYNTHETIC OR INORGANIC SYSTEMS

Chemical Dependency

### CHAPTER 3. BIOLOGICAL/ORGANIC SYSTEMS

How the Biology Works  
Organic Systems Require Nutrient Cycling  
Nutrient Cycling Depends on Biology  
Reduction of Salt and Toxic Levels Essential  
Benefits of Biological Organic Systems

### CHAPTER 4. PLANT GROWING SYSTEMS OUT OF BALANCE

Chemical Answers  
50 Years Ago  
Biological Alternatives

### CHAPTER 5. ROOTS INTERFACE BIOLOGY AND PLANTS

Balance of Beneficial Microorganisms Essential

### CHAPTER 6. TYPES OF MICROORGANISMS

Beneficial Aerobic Microorganisms  
Anaerobic Microorganisms

### CHAPTER 7. TYPES OF BENEFICIAL AEROBIC ORGANISMS

Bacteria  
Fungi  
Mycorrhizal Fungi

Pathogenic Fungi  
Saprophytic Fungi  
Protozoa  
Flagellates  
Amoebae  
Ciliates  
Nematodes  
Microarthropods

#### CHAPTER 8. ENVIRONMENTS FOR MAINTAINING MICROORGANISMS

Dissolved Oxygen Issues  
pH Issues  
Electrical Conductivity

#### CHAPTER 9. MICROBES AND PLANTS FORM A SYMBIOTIC RELATIONSHIP

Plants Feed Microbes and Microbes Feed Plants  
Fungal and Bacterial-Dominated Environments  
Bacterial-Dominated Growing Environments  
Fungal-Dominated Growing Environments  
Diversity of Microorganism Community Essential  
Bacteria and Fungi Retain Nutrients  
Protozoa and Nematodes Release Food for Plants

#### CHAPTER 10. INTEGRATING BIOLOGY INTO PLANT GROWING SYSTEMS

Pumps  
Checking Levels of Oxygen, pH and Electrical Conductivity  
Checking the Biology  
Examples of Plant Growing Systems  
Reservoir Systems -- Deep Water Culture, Ebb and Flow  
and Nutrient Film  
Drip Irrigation  
Aeroponics  
Sustainable Recycling Nutrient Film Technique for Hydroponics

#### CHAPTER 11. SOURCES OF BENEFICIAL MICROORGANISMS

Dormant Microbial Products  
Single Species Inoculums  
Trichoderma  
Pseudomonads  
Bacillus  
Dry Microbial Products  
Worm Casting/Compost or Vermicompost  
Thermophilic Compost  
Actively Aerated Compost Teas  
Leachates, Extracts, Plant and Manure Teas are not Compost Tea  
Quality of Compost Teas

#### CHAPTER 12. APPLYING MICROORGANISMS

Compost Tea Application Parameters  
Outside Field Applications of Compost Teas  
Seasonal Compost Tea Applications  
Seasonal Approach for Annual or Single-Season Plants  
General Approach to Applying Tea in Perennial Systems

#### CHAPTER 13. TESTING FOR BIOLOGICALS

Chemical Analysis  
Biological Analysis  
Types of Microbiological Tests  
Test Results Indicating Problems  
Plant Tissue Testing

#### CHAPTER 14. RESEARCH ON MICROORGANISMS AND INTERACTIONS

Endnotes  
Resource List  
About the Authors

#### PREFACE

This notebook is an attempt to provide basic information about adding biology to soil and soilless media whether in outdoor fields or indoor controlled environment hydroponics systems. Once we are equipped with the knowledge, we can then make intelligent decisions when faced with so many choices of brands and products in the marketplace. Whether we are using synthetic fertilizers/nutrients or sustainable practices, or have converted to organic systems, there is a way to add biology to enhance production, yield and quality. This notebook will provide you with some of the parameters, tools and knowledge so you can integrate biology into your specific growing system.

 [Download Adding Biology for Soil and Hydroponic Systems ...pdf](#)

 [Read Online Adding Biology for Soil and Hydroponic Systems ...pdf](#)

**Download and Read Free Online Adding Biology for Soil and Hydroponic Systems Carole Ann Rollins Ph.D., Ph.D. Carole Ann Rollins, Ph.D. Elaine Ingham**

---

**From reader reviews:**

**Betty Hood:**

Within other case, little individuals like to read book Adding Biology for Soil and Hydroponic Systems. You can choose the best book if you like reading a book. Given that we know about how is important a new book Adding Biology for Soil and Hydroponic Systems. You can add understanding and of course you can around the world by the book. Absolutely right, simply because from book you can recognize everything! From your country until eventually foreign or abroad you will end up known. About simple thing until wonderful thing you are able to know that. In this era, we can easily open a book or perhaps searching by internet unit. It is called e-book. You can utilize it when you feel weary to go to the library. Let's examine.

**Sharon Clayton:**

As people who live in typically the modest era should be update about what going on or info even knowledge to make these people keep up with the era which can be always change and move ahead. Some of you maybe will probably update themselves by looking at books. It is a good choice for yourself but the problems coming to an individual is you don't know what kind you should start with. This Adding Biology for Soil and Hydroponic Systems is our recommendation to help you keep up with the world. Why, because book serves what you want and wish in this era.

**Elizabeth Bello:**

Now a day people who Living in the era just where everything reachable by interact with the internet and the resources inside it can be true or not call for people to be aware of each facts they get. How individuals to be smart in receiving any information nowadays? Of course the correct answer is reading a book. Reading through a book can help individuals out of this uncertainty Information especially this Adding Biology for Soil and Hydroponic Systems book because this book offers you rich information and knowledge. Of course the knowledge in this book hundred % guarantees there is no doubt in it everbody knows.

**Helen Leavitt:**

Reading a reserve can be one of a lot of activity that everyone in the world likes. Do you like reading book and so. There are a lot of reasons why people love it. First reading a e-book will give you a lot of new details. When you read a guide you will get new information because book is one of a number of ways to share the information as well as their idea. Second, reading through a book will make anyone more imaginative. When you reading through a book especially fiction book the author will bring you to imagine the story how the character types do it anything. Third, you may share your knowledge to others. When you read this Adding Biology for Soil and Hydroponic Systems, it is possible to tells your family, friends and also soon about yours guide. Your knowledge can inspire others, make them reading a publication.

**Download and Read Online Adding Biology for Soil and  
Hydroponic Systems Carole Ann Rollins Ph.D., Ph.D. Carole Ann  
Rollins, Ph.D. Elaine Ingham #QMXHOJCZUVK**

## **Read Adding Biology for Soil and Hydroponic Systems by Carole Ann Rollins Ph.D., Ph.D. Carole Ann Rollins, Ph.D. Elaine Ingham for online ebook**

Adding Biology for Soil and Hydroponic Systems by Carole Ann Rollins Ph.D., Ph.D. Carole Ann Rollins, Ph.D. Elaine Ingham Free PDF d0wnl0ad, audio books, books to read, good books to read, cheap books, good books, online books, books online, book reviews epub, read books online, books to read online, online library, greatbooks to read, PDF best books to read, top books to read Adding Biology for Soil and Hydroponic Systems by Carole Ann Rollins Ph.D., Ph.D. Carole Ann Rollins, Ph.D. Elaine Ingham books to read online.

### **Online Adding Biology for Soil and Hydroponic Systems by Carole Ann Rollins Ph.D., Ph.D. Carole Ann Rollins, Ph.D. Elaine Ingham ebook PDF download**

**Adding Biology for Soil and Hydroponic Systems by Carole Ann Rollins Ph.D., Ph.D. Carole Ann Rollins, Ph.D. Elaine Ingham Doc**

**Adding Biology for Soil and Hydroponic Systems by Carole Ann Rollins Ph.D., Ph.D. Carole Ann Rollins, Ph.D. Elaine Ingham Mobipocket**

**Adding Biology for Soil and Hydroponic Systems by Carole Ann Rollins Ph.D., Ph.D. Carole Ann Rollins, Ph.D. Elaine Ingham EPub**