

Online Library Plant Factory An
Indoor Vertical Farming System
For Efficient Quality Food
Production

Plant Factory An Indoor Vertical Farming System For Efficient Quality Food Production

Plant Factory Basics,

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**takes the reader from an
overview of the need for and
potential of plant factories
with artificial lighting (PFALs)
in enhancing food production
and security to the latest**

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**advances and benefits of this
agriculture environment.**

**Edited by leading experts
Toyoki Kozai, Genhua Niu, and
Joseph Masabni, this book
aims to provide a platform of
PFAL technology and science,**

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**including ideas on its
extensive business and social
applications towards the next-
generation PFALs. The book is
presented in four parts:
Introduction, Basics,
Applications, and Advanced**

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**Research. Part 1 covers why
PFALs are necessary for urban
areas, how they can contribute
to the United Nations'
Sustainable Development
Goals, and a definition of PFAL
in relation to the term "indoor**

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**vertical farm." Part 2 presents
SI units and radiometric,
photometric, and
photonmetric quantities,
types, components, and
performance of LED
luminaires, hydroponics and**

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aquaponics, and plant responses to the growing environment in PFALs. Part 3 describes the indexes and definition of various productivity aspects of PFAL, provides comparisons of the

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productivity of the past and the present operation of any given PFALs, and compares PFALs with one another from the productivity standpoint by applying the common indexes. Part 4 describes the advances

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**in lighting and their effects on
plant growth, breeding of
indoor and outdoor crops,
production of fruiting
vegetables and head
vegetables, and concluding
with a focus on a human-**

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**centered perspective of urban
agriculture. Providing real-
world insights and experience,
Plant Factory Basics,
Applications, and Advances is
the ideal resource for those
seeking to take the next step**

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**in understanding and applying
PFAL concepts. Provides the
most in-depth assessment of
PFAL available Compares PFAL
to “indoor vertical farming and
provides important insights
into selecting optimal choice**

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**Presents insights to inspire
design and management of the
next generation of PFALs
Aeroponics: Growing
Vertical covers aspects of the
emerging technology,
aeroponics, which is a sister to**

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hydroponics, involving state-of-the-art controlled environment agriculture. The book begins with an introduction of aeroponics followed by a summary of peer-reviewed technical literature conducted

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**over 50 years involving
various aspects of aeroponics.
It covers the science and all
the patent literature since
2001 to give the reader a
comprehensive view of the
innovations related to**

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**aeroponics. This book is a
useful reference for people
interested in learning about
how aeroponics works. This
book is for novices as well as
scientists interested in
research activities conducted**

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**in countries around the world
as well as work in using
aeroponics in outer space.
Designed for the user
interested in research
conducted in the past, this a
helpful resource for those in**

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**the next generation of
profitable agricultural
endeavors. Features: ·
Comprehensive resource
presenting key aspects of
aeroponics · Focus on areas of
aeroponics including its**

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**history, science, innovations,
business, and practice ·**

**Provides a complete overview
of the intellectual property
associated with aeroponics ·**

**Presents a broad overview of
research using aeroponic**

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systems across the globe .

**Features information on key
start-up businesses and
activities that drive this
technology Thomas Gurley
earned a BA in chemistry from
Houghton College and a PhD in**

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**analytical chemistry from Case
Western Reserve University
and has 40 years industrial
chemistry experience with
companies including
Goodyear, Abbott Labs, and
his consulting company,**

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**Manning Wood LLC. He holds
two Fulbright scholarships to
Ukraine and Uganda. He is
currently R&D Director for
Aero Development
Corporation, a manufacturer of
aeroponic commercial growing**

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**systems. He conducts research
in aeroponics as an adjunct
professor at Charleston
Southern University in South
Carolina.**

**Aquaponics is the integration
of aquaculture and soilless**

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culture in a closed production system. This manual details aquaponics for small-scale production--predominantly for home use. It is divided into nine chapters and seven annexes, with each chapter

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**dedicated to an individual
module of aquaponics. The
target audience for this
manual is agriculture
extension agents, regional
fisheries officers, non-
governmental organizations,**

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**community organizers,
government ministers,
companies and singles
worldwide. The intention is to
bring a general understanding
of aquaponics to people who
previously may have only**

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known about one aspect.

As the world realises the benefits of education, more and more people move to cities; in search of a better future. A future which includes affordable housing, health-

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**care, quality education and
inexpensive food. However,
while the other options are
possible, the pressing
question here is: if so many
people relocate to the cities,
who will work on the farms**

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**then? Historically, the farms;
built in rural areas, have
provided the city-dwellers with
cheap food. However, times
are changing now. Modern
agriculturists believe that
cities too can produce ample**

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amounts of food. In this gripping book, we introduce you to modern agricultural technology, "Vertical Farms." A state-of-the-art farm, built inside a skyscraper, which grows enough fruits and

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vegetables to feed the entire town. This book leads you on an adventure inside a vertical farm; explaining how they can be built inside an abandoned building, and produce enough fresh fruits and vegetables to

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**feed every person in the city.
In fact, not just the city
dwellers, but vertical farms
can actually feed the
astronauts who live on the
International Space Station,
with produce grown on-**

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site. Small countries like Singapore are already taking advantage of vertical farming. With little land, water and sunlight, they have managed to produce tons of food for its fast growing population. If the

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**Singaporeans can do it,
anyone can do it.**

**Plant Response to Air Pollution
The Next Generation Indoor
Vertical Farms
How to Combine Business with
Environmental Awareness**

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**Agricultural Internet of Things
Principles for Mediterranean
Climate Areas
Transplant Production in the
21st Century
New Technologies in Indoor
Vertical Farming**

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Plant Factory An Indoor Vertical Farming System for Efficient Quality Food Production Academic Press

Profitable cold-water fish and vegetable production. Join the aquaponic farming revolution! Built

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around a proven 120' greenhouse system operable by one person, The Aquaponic Farmer is the game changer that distills vast experience and complete step-by-step guidance for starting and running a cold-water aquaponic farming

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business—raising fish and
vegetables together commercially.

Coverage includes: A primer on
cold-water aquaponics Pros and
cons of different systems Complete
design and construction of a Deep
Water Culture system

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Recommended and optional
equipment and tools System
management, standard operating
procedures, and maintenance
checklists Maximizing fish and veg
production Strategies for successful
sales and marketing of fish and

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plants. As the only comprehensive commercial cold-water resource, The Aquaponic Farmer is essential for farmers contemplating the aquaponics market, aquaponic gardeners looking to go commercial, and anyone focused

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on high quality food production.

Aquaponic farming is the most promising innovation for a sustainable, profitable, localized food system. Until now, systems have largely focussed on warm-water fish such as tilapia. A lack of

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reliable information for raising fish and vegetables in the cool climates of North America and Europe has been a major stumbling block. The Aquaponic Farmer is the toolkit you need.

In response to enormous recent

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advances, particularly in molecular biology, the authors have revised their warmly received work. This new edition includes updates on seed development, gene expression, dormancy, and other subjects. It will serve as the field's

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standard textbook and reference source for many years to come.

This book describes the concept, characteristics, methodology, design, management, business, recent advances and future technologies of plant factories with

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artificial lighting (PFAL) and indoor vertical farms. The third wave of PFAL business started in around 2010 in Japan and Taiwan, and in USA and Europe it began in about 2013 after the rapid advances in LED technology. The book

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discusses the basic and advanced developments in recent PFALs and future smart PFALs that emerged in 2016. There is an emerging interest around the globe in smart PFAL R&D and business, which are expected to play an important role

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in urban agriculture in the coming decades. It is also expected that they will contribute to solving the trilemma of food, environment and natural resources with increasing urban populations and decreasing agricultural populations and arable

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land area. Current obstacles to successful PFAL R&D and business are: 1) no well-accepted concepts and methodology for PFAL design and management, 2) lack of understanding of the environmental effects on plant

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growth and development and hydroponics among engineers; 3) lack of understanding of the technical and engineering aspects of PFAL among horticulturists; 4) lack of knowledge of the technical challenges and opportunities in

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future PFAL businesses among business professionals, policy makers, and investors and 5) lack of a suitable textbook on the recent advances in PFAL technologies and business for graduate students and young researchers. This book

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covers all the aspects of successful
smart PFAL R & D and business.

Cal/OSHA Pocket Guide for the
Construction Industry

The New Plant Parent

Hydroponic Strawberry Production

The Next Factory of the World

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Seeds

Aeroponics: Growing Vertical
Indoor Air Quality Engineering

*An easy-to-understand visual guide
to the facts of food and nutrition.*

*A nutritionist in a book that
explains key concepts about food*

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and what makes it good or bad for you, How Food Works brings the science of food to life. Through a highly visual approach that uses bold infographics, explore the good, the bad, the confusing, and the trending world of food. Discover

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*what an antioxidant is, find out
what a superfood does to your body,
and learn why it is dangerous to
reheat rice. Covering a wide variety
of topics, from dieting to gluten
intolerance, How Food Works
debunks common food myths,*

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explains nutrition, covers the food groups, and looks into organic vs. processed foods. Follow the history of food production and free-range farming, how food is transported, and what "sell by" dates really mean. How Food Works is a

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*completely comprehensive guide
that will help readers understand
the underlying biological effects of
everyday foods through scientific
evaluation, revealing the powers of
different types of food and drinks.
Sustainable Biofloc Systems for*

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*Marine Shrimp describes the
biofloc-dominated aquaculture
systems developed over 20 years of
research at Texas A&M AgriLife
Research Mariculture Laboratory
for the nursery and grow-out
production of the Pacific White*

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Shrimp, Litopenaeus vannamei. The book is useful for all stakeholders, with special attention given to entrepreneurs interested in building a pilot biofloc-dominated system. In addition to the content of its 15 chapters that cover topics on design,

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operation and economic analysis, the book includes appendices that expand on relevant topics, links to Excel sheets that assist in calculations, and video links that illustrate important operations tasks. Presents the most recent trials

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on nursery & gross-out of L.

*vannamei Includes a discussion of
site selection, equipment options and
water sources Provides a step-by-
step guides from tank preparation,
to feeding and harvest*

An illustrated guide to the

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houseplants you need for clean and fresh air when you're stuck at home

How clean is the air you breathe?

Plants are the lungs of the earth: they produce the oxygen that makes life possible, add precious moisture and filter toxins. Houseplants can

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perform these essential functions in your home or office with the same efficiency as a rainforest in our biosphere. In this beautifully illustrated guide, noted scientist Dr Bill Wolverton shows you how to grow 50 plants that filter the most

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*common pollutants, making it easy
for you to purify the environments
that impact you the most.*

*In the 1990s a small midwestern
American town approved the
construction of a massive pork
complex, where almost 7 million*

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hogs are birthed, raised, and killed every year. In Porkopolis Alex Blanchette explores how this rural community has been reorganized around the life and death cycles of corporate pigs. Drawing on over two years of ethnographic fieldwork,

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Blanchette immerses readers into the workplaces that underlie modern meat, from slaughterhouses and corporate offices to artificial insemination barns and bone-rendering facilities. He outlines the deep human-hog relationships and

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*intimacies that emerge through
intensified industrialization,
showing how even the most
mundane human action, such as a
wayward touch, could have serious
physical consequences for animals.
Corporations' pursuit of a perfectly*

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*uniform, standardized pig--one that
can yield materials for over 1000
products--creates social and
environmental instabilities that
transform human lives and
livelihoods. Throughout Porkopolis,
which includes dozens of images by*

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award-winning photographer Sean Sprague, Blanchette uses factory farming to rethink the fraught state of industrial capitalism in the United States today.

A Complete Guide to Building and Operating a Commercial Aquaponic

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System

Advances and Trends in

Development of Plant Factories

How To Grow Fresh Air

Porkopolis

How to Design and Build an

Inexpensive System for Growing

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Plants in Water

*[a Technical Guide to the
Hydroponic Production of
Strawberries]*

*Sustainable Biofloc Systems for
Marine Shrimp*

Much has changed and

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improved in lighting
technology over the past
10 years since industry-
leading experts on
lighting, in
collaboration with
Greenhouse Grower(r)

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magazine and Meister
Media Worldwide, brought
you Lighting Up Profits
(Fisher and Runkle,
2004). This updated and
substantially expanded
book presents the

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underlying biology of
how light influences
plant growth and
development of specialty
crops, especially those
grown in greenhouses and
controlled-environment

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growth rooms. Authors

Dr. Erik Runkle of

Michigan State

University and Dr.

Roberto Lopez of

Michigan State

University, along with

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19 other leading plant scientists from around the globe, discuss technology options for shade and lighting, including the latest developments in

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greenhouse and sole-
source lighting.

This Encyclopedia offers
a definitive source on
issues pertaining to the
full range of topics in
the important new area

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of food and agricultural ethics. It includes summaries of historical approaches, current scholarship, social movements, and new trends from the

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standpoint of the ethical notions that have shaped them. It combines detailed analyses of specific topics such as the role of antibiotics in animal

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For Efficient Quality Food
Production, the Green
Revolution, and

alternative methods of
organic farming, with
longer entries that
summarize general areas
of scholarship and

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explore ways that they
are related. Renewed
debate, discussion and
inquiry into food and
agricultural topics have
become a hallmark of the
turn toward more

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sustainable policies and lifestyles in the 21st century. Attention has turned to the goals and ethical rationale behind production, distribution and consumption of food,

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as well as to non-food
uses of cultivated
biomass and the products
of animal husbandry.
These wide-ranging
debates encompass
questions in human

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nutrition, animal rights
and the environmental
impacts of aquaculture
and agricultural
production. Each of
these and related topics
is both technically

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complex and involves an
- often implicit -
ethical dimension. Other
topics include methods
for integrating ethics
into scientific and
technical research

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programs or development
projects, the role of
intensive agriculture
and biotechnology in
addressing persistent
world hunger and the
role of crops, forests

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and engineered organisms
in making a transition
to renewable, carbon-
neutral sources of
energy. The Encyclopedia
of Food and Agricultural
Ethics proves an

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indispensable reference
point for future
research and writing on
topics in agriculture
and food ethics for
decades to come.

Air pollution poses a

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serious threat to human health and the environment worldwide. It contributes significantly to regional and global atmospheric issues such

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as global warming,
acidification and
depletion of the ozone
layer. It affects every
living thing, including
all kinds of vegetation
on which we depend for

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our survival. Although
several works have
appeared on air
pollution, few, are able
to provide the broad
background that
encompasses the whole

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gamut of plant responses
to atmospheric insult.

This multi-authored work
integrates the varied
plant growth responses
to the pollution stress;
the focus of the

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attention is plant
rather than pollutant.
This portrays a clearer
picture of plant
performance versus air
pollution, and helps
develop a better insight

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of the pollution-based disturbances at the different levels of plant life. The book shall interest both students and researchers of environmental botany

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and forestry as well as
all those who love
plants and have any
interest towards global
vegetation and
environmental health.

Written by experts,

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Indoor Air Quality

Engineering offers practical strategies to construct, test, modify, and renovate industrial structures and processes to minimize and inhibit

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contaminant formation,
distribution, and
accumulation. The
authors analyze the
chemical and physical
phenomena affecting
contaminant generation

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to optimize system
function and design,
improve human health and
safety, and reduce
odors, fumes, particles,
gases, and toxins within
a variety of interior

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environments. The book includes applications in Microsoft Excel®, Mathcad®, and Fluent® for analysis of contaminant concentration in various

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flow fields and air
pollution control
devices.

LED Lighting for Urban
Agriculture
Plant Factory Basics,
Applications and

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Advances
Production

A Proven 3-Month Program
for Maximum Fertility
Encyclopedia of Food and
Agricultural Ethics
Plant Factory
50 Houseplants To Purify

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Your Home Or Office

Good Agricultural

Practices for Greenhouse

Vegetable Crops

***Provides an authoritative
review of the latest research in
the development and***

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***application of plant factories
with artificial lighting (PFALs)
throughout an array of
agricultural settings Assesses
the environmental impact of
urban vertical farms and how
the use of energy and other***

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***resources can be optimised to
minimise this impact***

***Considers the application of
machine vision, plant
phenotyping and spectral
imaging in plant factories to
monitor plant health and***

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growth

Internet of things (IoT) is a new type of network that combines communication technology, expanded applications, and physical devices. Among them, agriculture is one of the

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***most important areas in the
application of the IoT
technology, which has its
unique requirements and
integration features.***

***Compared to the information
technology in traditional***

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***agriculture, the agricultural IoT
mainly refers to industrialized
production and sustainable
development under relatively
controllable conditions.
Agricultural IoT applies
sensors, RFID, visual capture***

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***terminals and other types of
sensing devices to detect and
collect site information, and
with broad applications in field
planting, facility horticulture,
livestock and poultry
breeding, aquaculture and***

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***agricultural product logistics.
It utilizes multiple information
transmission channels such
as wireless sensor networks,
telecommunications networks
and the internet to achieve
reliable transmission of***

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***agricultural information at
multiple scales and
intelligently processes the
acquired, massive information.
The goals are to achieve (i)
optimal control of agricultural
production process, (ii)***

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***intelligent electronic trading of
agricultural products
circulation, and (iii)
management of systematic
logistics, quality and safety
traceability. This book focuses
on three levels of agricultural***

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***IoT network: information
perception technology,
information transmission
technology and application
technology.***

***For indoor gardeners
everywhere, Darryl Cheng***

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***offers a new way to grow
healthy house plants. He
teaches the art of
understanding a plant's needs
and giving it a home with the
right balance of light, water,
and nutrients. After reading***

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***Cheng, the indoor gardener
will be far less the passive
follower of rules for the care of
each species and much more
the confident, active grower,
relying on observation and
insight. And in the process,***

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***the plant owner becomes a
plant lover, bonded to these
beautiful living things by a
simple love and appreciation
of nature. The New Plant
Parent covers all of the basics
of growing house plants, from***

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***finding the right light, to
everyday care like watering
and fertilizing, to containers,
to recommended species.
Cheng's friendly tone,
personal stories, and
accessible photographs fill his***

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***book with the same generous
spirit that has made
@houseplantjournal, his
Instagram account, a popular
source of advice and
inspiration for thousands of
indoor gardeners.***

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This guideline defines ventilation and then natural ventilation. It explores the design requirements for natural ventilation in the context of infection control, describing the basic principles

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***of design, construction,
operation and maintenance for
an effective natural ventilation
system to control infection in
health-care settings.***

***Natural Ventilation for
Infection Control in Health-***

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care Settings

***A Definitive Guidebook of
Soilless Food Growing
Methods for the Professional
and Commercial Grower and
the Advanced Home
Hydroponics Gardener***

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***Feeding the World in the 21st
Century***

***Physiology of Development
and Germination***

The Facts Visually Explained

DIY Hydroponic Gardens

Natural Farming, Global

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For Efficient Quality Food
***Restoration, and Ultimate
Food Security***
Production

This publication capitalizes
on the experience of
scientists from the North
Africa and Near East
countries, in collaboration

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with experts from around the world, specialized in the different aspects of greenhouse crop production. It provides a comprehensive description and assessment of the greenhouse

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production practices in use in Mediterranean climate areas that have helped diversify vegetable production and increase productivity. The publication is also meant to be used as a

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reference and tool for
trainers and growers as well
as other actors in the
greenhouse vegetables
value chain in this region.
The Cal/OSHA Pocket Guide
for the Construction Industry

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is a handy guide for workers, employers, supervisors, and safety personnel. This latest 2011 edition is a quick field reference that summarizes selected safety standards from the California Code of

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Regulations. The major
subject headings are
alphabetized and cross-
referenced within the text,
and it has a detailed index.
Spiral bound, 8.5 x 5.5"
Micropropagation is a

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technology that has developed within the past 30 years. Earlier overviews of plant tissue culture have reviewed micropropagation as just one of many tissue culture procedures in use.

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Since the applications of this technology have multiplied so rapidly in recent years, we decided that a specific overview of the technology was now appropriate Our book begins with a review of

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the general principles of tissue culture as applied to micropropagation. This review is concise since the general topic has been covered in numerous other books and reviews. The basic

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principles of laboratory design and construction are summarized in the second chapter. Common problems encountered in micropropagation, both during and after culture, are

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examined in detail in four chapters. As micropropagation developed from a laboratory curiosity to a commercial industry, different considerations became important. These

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are discussed in two chapters. An attempt has been made to assess the current status of commercial production around the world. This has been difficult because commercial

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production figures are often closely guarded and little has been done to collect statistics on this growing industry. Applications to a broad range of crops are discussed in a series of

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chapters. These try to report the state of the art in each area, but since applications for some crops are much more advanced than for others, the focus of these chapters varies depending

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upon the progress that has been made.

The plant metabolome is highly complex, being composed of over 200,000 metabolites. The characterization of these

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small molecules has been crucial to study plant growth and development as well as their response to environmental changes. The potential of metabolomics in plant research, particularly if

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applied to crop plants, is also extremely valuable in the discovery of biomarkers and in the improvement of crop yield and quality. This Frontiers Research Topic addresses many applications

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of metabolomics to crop research, based on different analytical platforms, including mass spectrometry, and nuclear magnetic resonance. It comprises 13 articles from

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109 authors that show the importance and the contribution of metabolomics in the analysis of crop's traceability and genetic variation, in the study of fruit development, and in the

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understanding of the plant's
response to the environment
and to different biotic and
abiotic stresses.

Hydroponic Food Production
How Food Works
Smart Plant Factory

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For Efficient Quality Food
Production
Plant Factory Using Artificial
Light

Adapting to Environmental
Disruption and Clues to
Agricultural Innovation

Sowing Seeds in the Desert

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A Best Business Book of 2017 -- The Financial Times China is now the biggest foreign player in Africa. It's Africa's largest trade partner, the largest infrastructure financier, and the fastest-growing source of foreign direct investment. Chinese entrepreneurs are flooding into the continent, investing in long-term assets

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such as factories and heavy equipment.

Considering Africa's difficult history of colonialism, one might suspect that China's activity there is another instance of a foreign power exploiting resources. But as author Irene Yuan Sun vividly shows in this remarkable book, it is really a story about resilient Chinese entrepreneurs

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building in Africa what they so recently learned to build in China--a global manufacturing powerhouse. The fact that China sees Africa not for its poverty but for its potential wealth is a striking departure from the attitude of the West, particularly that of the United States. Despite fifty years of Western aid

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programs, Africa still has more people living in extreme poverty than any other region in the world. Those who are serious about raising living standards across the continent know that another strategy is needed. Chinese investment gives rise to a tantalizing possibility: that Africa can industrialize in the coming generation.

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With a manufacturing-led transformation, Africa would be following in the footsteps of the United States in the nineteenth century, Japan in the early twentieth, and the Asian Tigers in the late twentieth. Many may consider this an old-fashioned way to develop, but as Sun argues, it's the only one that's proven to raise living

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standards across entire societies in a lasting way. And with every new Chinese factory boss setting up machinery and hiring African workers--and managers--that possibility becomes more real for Africa. With fascinating and moving human stories along with incisive business and economic analysis, *The Next Factory of*

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the World will make you rethink both China's role in the world and Africa's future in the globalized economy.

DIY Hydroponic Gardens takes the mystery out of growing in water. With practical information aimed at home DIYers, author Tyler Baras (Farmer Tyler to his fans) shows exactly how to build,

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plant, and maintain more than a dozen unique hydroponic systems, some of which cost just a few dollars to make. Growing produce without soil offers a unique opportunity to have a productive garden indoors or in areas where soil is not present. An expert in hydroponics, Baras has developed many unique and easy-to-

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build systems for growing entirely in water. In DIY Hydroponic Gardens, he shows with step-by-step photos precisely how to create these systems and how to plant and maintain them. All the information you need to get started with your home hydroponic system is included, from recipes for nutrient solutions, to light and

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ventilation sources, to specific plant-by-plant details that explain how to grow the most popular vegetables in a self-contained, soilless system. Even if you live in an area where water is scarce, a hydroponic system is the answer you've been looking for. Hydroponic systems are sealed and do not allow evaporation,

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making water loss virtually nonexistent.

Argues that the Earth's deteriorating condition is man-made and outlines a way for the process to be reversed by rehabilitating the deserts using natural farming.

Plant production in hydroponics and soilless culture is rapidly expanding

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throughout the world, raising a great interest in the scientific community. For the first time in an authoritative reference book, authors cover both theoretical and practical aspects of hydroponics (growing plants without the use of soil). This reference book covers the state-of-the-art in this area, while offering a clear view of

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supplying plants with nutrients other than soil. Soilless Culture provides the reader with an understanding of the properties of the various soilless media and how these properties affect plant performance in relation to basic horticultural operations, such as irrigation and fertilization. This book is ideal for agronomists,

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horticulturalists, greenhouse and nursery managers, extension specialists, and people involved with the production of plants. * Comprehensive discussion of hydroponic systems, irrigation, and control measures allows readers to achieve optimal performance * State-of-the-art book on all theoretical aspects of hydroponics and

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soilless culture including a thorough description of the root system, its functions and limitation posed by restricted root volume * Critical and updated reviews of current analytical methods and how to translate their results to irrigation and fertilization practices * Definitive chapters on recycled, no-discharge systems

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including salinity and nutrition

management and pathogen eradication *

Up-to-date description of all important
types of growing media

American Animality, Standardized Life,
and the Factory Farm

Small-Scale Aquaponic Food Production

Making Babies

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A Sustainable Development Model

Soilless Culture: Theory and Practice

Vertical Farming

Hydroponics for the Home Grower

The plant factory is a facility that aids the steady production of high-quality vegetables all year round by artificially controlling the cultivation

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environment (e.g., light, temperature, humidity, carbon dioxide concentration, and culture solution), allowing growers to plan production. By controlling the internal environment, plant factories can produce vegetables about two to four times faster than

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by typical outdoor cultivation. In addition, as multiple cultivation shelves (a multi-shelf system) are used, the mass production of vegetables in a small space is facilitated. This research topic presents some new trends on intelligent measuring systems;

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environment controlled and optimization; flavonoids; phenylpropanoids, transcriptomes, and bacteria.

Each century has its own unique approach toward addressing the problem of high density and the 21st century is no exception. As

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cities try to cope with rapid population growth - adding 2.5 billion dwellers by 2050 - and grapple with destructive sprawl, politicians, planners and architects have become increasingly interested in the vertical city paradigm. Unfortunately, cities all

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over the world are grossly unprepared for integrating tall buildings, as these buildings may aggravate multidimensional sustainability challenges resulting in a “vertical sprawl” that could have worse consequences than “horizontal” sprawl. By using

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***extensive data and numerous
illustrations this book provides a
comprehensive guide to the
successful and sustainable
integration of tall buildings into
cities. A new crop of skyscrapers
that employ passive design
strategies, green technologies,***

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energy-saving systems and innovative renewable energy offers significant architectural improvements. At the urban scale, the book argues that planners must integrate tall buildings with efficient mass transit, walkable neighbourhoods, cycling networks,

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vibrant mixed-use activities, iconic transit stations, attractive plazas, well-landscaped streets, spacious parks and engaging public art. Particularly, it proposes the Tall Building and Transit Oriented Development (TB-TOD) model as one of the sustainable options for

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large cities going forward. Building on the work of leaders in the fields of ecological and sustainable design, this book will open readers' eyes to a wider range of possibilities for utilizing green, resilient, smart, and sustainable features in architecture and urban

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planning projects. The 20 chapters offer comprehensive reading for all those interested in the planning, design, and construction of sustainable cities.

Plant Factory: An Indoor Vertical Farming System for Efficient Quality Food Production, Second

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Edition presents a comprehensive look at the implementation of plant factory (PF) practices to yield food crops for both improved food security and environmental sustainability. Edited and authored by leading experts in PF and controlled environment agriculture

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(CEA), the book is divided into five sections, including an Overview and the Concept of Closed Plant Production Systems (CPPS), the Basics of Physics and Physiology – Environments and Their Effects, System Design, Construction, Cultivation and Management and

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Plant Factories in Operation. In addition to new coverage on the rapid advancement of LED technology and its application in indoor vertical farming, other revisions to the new edition include updated information on the status of business R&D and selected

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commercial PFALs (plant factory with artificial lighting). Additional updates include those focused on micro and mini-PFALs for improving the quality of life in urban areas, the physics and physiology of light, the impact of PFAL on the medicinal components

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*For Efficient Quality Food
Production*
**of plants, and the system design,
construction, cultivation and
management issues related to
transplant production within closed
systems, photoautotrophic micro-
propagation and education, training
and intensive business forums on
PFs. Includes coverage of LED**

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***technology Presents case-studies
for real-world insights and
application Addresses PF from
economics and planning, to
operation and lifecycle assessment
"The vertical farm is a world-
changing innovation whose time
has come. Dickson Despommier's***

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visionary book provides a blueprint for securing the world's food supply and at the same time solving one of the gravest environmental crises facing us today."--Sting Imagine a world where every town has their own local food source, grown in the safest way possible, where no drop

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***of water or particle of light is
wasted, and where a simple
elevator ride can transport you to
nature's grocery store - imagine the
world of the vertical farm. When
Columbia professor Dickson
Despommier set out to solve
America's food, water, and energy***

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crises, he didn't just think big - he thought up. Despommier's stroke of genius, the vertical farm, has excited scientists, architects, and politicians around the globe. Now, in this groundbreaking book, Despommier explains how the vertical farm will have an incredible

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impact on changing the face of this planet for future generations.

Despommier takes readers on an incredible journey inside the vertical farm, buildings filled with fruits and vegetables that will provide local food sources for entire cities. Vertical farms will

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allow us to: - Grow food 24 hours a day, 365 days a year - Protect crops from unpredictable and harmful weather - Re-use water collected from the indoor environment - Provide jobs for residents - Eliminate use of pesticides, fertilizers, or herbicides - Drastically

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***reduce dependence on fossil fuels -
Prevent crop loss due to shipping
or storage - Stop agricultural runoff
Vertical farms can be built in
abandoned buildings and on
deserted lots, transforming our
cities into urban landscapes which
will provide fresh food grown and***

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harvested just around the corner.

Possibly the most important aspect of vertical farms is that they can be built by nations with little or no arable land, transforming nations which are currently unable to farm into top food producers. In the tradition of the bestselling The

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World Without Us, The Vertical Farm is a completely original landmark work destined to become an instant classic.

Instant Insights: Vertical Farming in Horticulture

The Aquaponic Farmer

An Indoor Vertical Farming System

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***Proceedings of the International
Symposium on Transplant
Production in Closed System for
Solving the Global Issues on
Environmental Conservation, Food,
Resources and Energy***

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The Fate of Food

***Light Management in Controlled
Environments***

Micropropagation

This book focuses on light-emitting diode (LED) lighting, mainly for the commercial

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production of horticultural crops in plant factories and greenhouses with controlled environments, giving special attention to: 1) plant growth and development as affected by the light environment; and 2)

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business and technological opportunities and challenges with regard to LEDs. The book contains more than 30 chapters grouped into seven parts: 1) overview of controlled-environment agriculture and its

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significance; 2) the effects of ambient light on plant growth and development; 3) optical and physiological characteristics of plant leaves and canopies; 4) greenhouse crop production with supplemental LED

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lighting; 5) effects of light quality on plant physiology and morphology; 6) current status of commercial plant factories under LED lighting; and 7) basics of LEDs and LED lighting for plant cultivation. LED

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lighting for urban agriculture in the forthcoming decades will not be just an advanced form of current urban agriculture. It will be largely based on two fields: One is a new paradigm and rapidly advancing

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concepts, global technologies
for LEDs, information and
communication technology,
renewable energy, and related
expertise and their
methodologies; the other is
basic science and technology

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that should not change for the next several decades.

Consideration should be given now to future urban agriculture based on those two fields. The tremendous potentials of LED lighting for urban agriculture

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are stimulating many people in various fields including researchers, businesspeople, policy makers, educators, students, community developers, architects, designers, and entrepreneurs.

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Readers of this book will understand the principle, concept, design, operation, social roles, pros and cons, costs and benefits of LED lighting for urban agriculture, and its possibilities and

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challenges for solving local as well as global agricultural, environmental, and social issues.

In this fascinating look at the race to secure the global food supply, environmental

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journalist and professor

Amanda Little tells the defining story of the sustainable food revolution as she weaves together stories from the world's most creative and controversial innovators on the

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front lines of food science, agriculture, and climate change. Climate models show that global crop production will decline every decade for the rest of this century due to drought, heat, and flooding.

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Water supplies are in jeopardy. Meanwhile, the world's population is expected to grow another 30 percent by midcentury. So how, really, will we feed nine billion people sustainably in the coming

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decades? Amanda Little, a professor at Vanderbilt University and an award-winning journalist, spent three years traveling through a dozen countries and as many U.S. states in search of answers to

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this question. Her journey took her from an apple orchard in Wisconsin to a remote control organic farm in Shanghai, from Norwegian fish farms to famine-stricken regions of Ethiopia. The raise to reinvent the global

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food system is on, and the challenge is twofold: We must solve the existing problems of industrial agriculture while also preparing for the pressures ahead. Through her interviews and adventures with farmers,

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scientists, activists, and
engineers, Little tells the
fascinating story of human
innovation and explores new
and old approaches to food
production while charting the
growth of a movement that

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could redefine sustainable food on a grand scale. She meets small permaculture farmers and "Big Food" executives, botanists studying ancient superfoods and Kenyan farmers growing the country's first GMO corn.

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She travels to places that might seem irrelevant to the future of food yet surprisingly play a critical role--a California sewage plant, a U.S. Army research lab, even the inside of a monsoon cloud above

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Mumbai. Little asks tough questions: Can GMOs actually be good for the environment--and for us? Are we facing the end of animal meat? What will it take to eliminate harmful chemicals

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from farming? How can a clean,
climate-resilient food supply
become accessible to all?

Throughout her journey, Little
finds and shares a deeper
understanding of the threats of
climate change and encounters

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a sense of awe and optimism
about the lessons of our past
and the scope of human
ingenuity.

We are facing global issues
concerning environmental
pollution and shortages of food,

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feed, phytomass (plant biomass) and natural resources, which will become more serious in the forthcoming decades. To solve these issues, immeasurable numbers of various plants and huge amounts of phytomass are

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required every year for food,
feed and for the improvement
of amenities, the environment
and our quality of life.

Increased phytomass is also
required as alternative raw
material for producing bio-

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energy, biodegradable plastics
and many other plant-
originated industrial products.
Only by using phytomass as a
reproducible energy source and
raw material, instead of fossil
fuels and atomic power, we can

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save natural resources and minimize environmental pollution. To increase phytomass globally, we need billions of quality transplants (small plants) to be grown yearly, in the field or in the

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greenhouse, under various environmental conditions.

However, these high quality transplants can be produced only under carefully controlled, rather than variable environmental conditions.

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Recent research has shown that the closed transplant production system requires considerably small amounts of electricity, water, fertilizer, CO₂ and pesticide to produce value-added transplants as scheduled

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with minimum release of
environmental pollutants and
minimum loss of transplants.

The closed or closed-type
transplant production system is
defined as a transplant
production system covered with

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opaque walls with minimized or controlled ventilation rates, using artificial lighting. With this system, photoperiod, light intensity and quality, air temperature, humidity, CO) concentration and air current

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speed can be controlled as desired.

Hydroponics offers many advantages to traditional soil-based horticulture. These include greater control over many of the limiting factors,

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such as light, temperature, and pests, as well as the ability to grow plants in all seasons. With instruction from one of the top recognized authorities worldwide, Hydroponics for the Home Grower gives you step-by-

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step guidance on how to grow tomatoes, peppers, cucumbers, eggplant, lettuce, arugula, bok choy, and various herbs year-round within your home or in a backyard greenhouse. Read an Interview with Dr. Resh here

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With Dr. Howard Resh's help,
you'll learn: Background
information on how
hydroponics evolved The
nutritional and environmental
demands of plants and how to
control these factors How to

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provide formulations of nutrients optimal to the plants you wish to grow The many different hydroponic systems you can purchase or build for yourself Designs for different types of greenhouses with

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components to fit your personal taste and budget Crop selection and step-by-step procedures, including seeding, transplanting, training, pest and disease control, and harvesting—along with when to

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plant and when to change crops
How you can grow microgreens
on your kitchen counter The
book includes an appendix with
sources of seeds and other
supplies, along with helpful
websites and lists of books,

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articles, and conferences on growing hydroponically and caring for your crops. By following the guidelines in this book, you'll understand everything you need to know to get your home-growing

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operation up and running in no
time.

The Vertical Farm

Advances in Plant Factories

Environmental Health and

Control of Indoor Pollutants

Metabolomics in Crop Research

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- Current and Emerging
Methodologies
Technologies and Applications
Develop Your Green Thumb and
Care for Your House-Plant
Family
The Vertical City

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**Plant Factory Using Artificial Light:
Adapting to Environmental
Disruption and Clues to Agricultural
Innovation features
interdisciplinary scientific
advances as well as cutting-edge
technologies applicable to plant
growth in plant factories using**

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artificial light. The book details the implementation of photocatalytic methods that ensure the safe and sustainable production of vegetables at low cost and on a commercial scale, regardless of adverse natural or manmade influences such as global warming,

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**climate change, pollution, or other
potentially damaging
circumstances. Plant Factory Using
Artificial Light is an essential
resource for academic and industry
researchers in chemistry,
chemical/mechanical/materials
engineering, chemistry, agriculture,**

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**and life/environmental/food
sciences concerned with plant
factories. Presents an
interdisciplinary approach to
advanced plant growth
technologies Features methods for
reducing electric energy costs in
plant factories and increasing LED**

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**efficiency Considers commercial
scale operation**

**This specially curated collection
features five reviews of current and
key research on vertical farming in
horticulture. The first chapter
describes and evaluates
technologies and methods for**

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growing edible plants indoors and presents a survey of selected commercial vertical farms currently operating that employ them. The second chapter explores the benefits of plant factories with artificial lighting (PFALs). The chapter assesses resource

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consumption, costs and performance of current PFALs, as well as methods for reducing resource consumption and production costs. The third chapter explores recent advances in the ornamentals industry, such as vertical propagation systems and

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LED technology, and how these can be implemented to meet the challenges of a changing marketplace and societal demands. The fourth chapter describes the advantages and disadvantages of hydroponics, along with the equipment and substrates used,

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**and also examines
soilless/hydroponic growing
systems for vegetables. The final
chapter describes the most recent
innovation in hydroponic
technologies for plant cultivation
within cities and their adaptability
to the urban fabric.**

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Making Babies offers a proven 3-month program designed to help any woman get pregnant. Fertility medicine today is all about aggressive surgical, chemical, and technological intervention, but Dr. David and Blakeway know a better way. Starting by identifying "fertility

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types," they cover everything from recognizing the causes of fertility problems to making lifestyle choices that enhance fertility to trying surprising strategies such as taking cough medicine, decreasing doses of fertility drugs, or getting acupuncture along with IVF. Making

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Babies is a must-have for every woman trying to conceive, whether naturally or through medical intervention. Dr. David and Blakeway are revolutionizing the fertility field, one baby at a time. What We'll Eat in a Bigger, Hotter, Smarter World

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