

Ecology Action

5798 Ridgewood Road

Willits CA 95490-9730

GROW BIOINTENSIVESM

SUSTAINABLE MINI-FARMING

CERTIFICATION PROGRAM

FOR TEACHERS AND SOIL TEST STATIONS

A GROW BIOINTENSIVE[®] Publication

Self-Teaching Mini-Series #30

Fifth edition, October 2009

**GROW BIOINTENSIVESM SUSTAINABLE MINI-FARMING
CERTIFICATION PROGRAM
FOR TEACHERS AND SOIL TEST STATIONS**

PREFACE.....	1
INTRODUCTION.....	2
TEACHER TRAINING AND CERTIFICATION PROGRAM DESCRIPTION.....	3
GROW BIOINTENSIVE <i>BASIC-LEVEL</i> TEACHER CERTIFICATION DESCRIPTION.....	4
GROW BIOINTENSIVE <i>INTERMEDIATE-LEVEL</i> TEACHER CERTIFICATION DESCRIPTION...	7
GROW BIOINTENSIVE <i>ADVANCED-LEVEL</i> TEACHER CERTIFICATION DESCRIPTION.....	10
SUMMARY OF TEACHER CERTIFICATION REQUIREMENTS.....	13
TEACHER CERTIFICATION RENEWAL.....	16
SOIL TEST STATION CERTIFICATION.....	17
SUMMARY OF SOIL TEST STATION CERTIFICATION.....	18
APPENDICES	
Appendix 1: Using the Name GROW BIOINTENSIVE [®]	i
Appendix 2: Data Report.....	ii
Appendix 3: Summary Yield Data	iv
Appendix 4: Mini-Farm Design Report.....	vi
Appendix 5: Compost Log Sheet.....	vii
Appendix 6: Compost Pile Summary.....	viii
Appendix 7: Teaching Report Form.....	ix
Appendix 8: Summary Teaching Report.....	xi
Appendix 9: Teacher Certification Candidate Profile.....	xii
Appendix 10: Annual Teacher and Site Goals Example.....	xiii
Appendix 11: Research Design and Report Guidelines.....	xiv
Appendix 12: Ideas for Teaching/Promoting GROW BIOINTENSIVE [®]	xv
Appendix 13: Steps for a GROW BIOINTENSIVE [®] Sustainable Mini-Farm.....	xvi

All rights reserved. No part of this book may be reproduced in any form, except
for brief reviews, without the written permission of the publisher.

© 2009, 2006, 2005, 2002, 2000, 1997
Ecology Action, 5798 Ridgewood Rd., Willits CA 95490-9730

ECOLOGY ACTION

5798 Ridgewood Road, Willits, CA 95490-9730
Phone: (707) 459-0150 Fax: (707) 459-5409
www.growbiointensive.org

Ecology Action is a non-profit environmental research and education organization, focusing on sustainable ways of living in general and GROW BIOINTENSIVE® mini-farming in particular.

Memberships (including quarterly newsletter):

Supporting \$40/year; Family \$60/year;
Sustaining \$100/year; Outreach \$250/year;
Research \$400/year (sponsors a 100-sq-ft growing bed for 1 year);
Program \$1,000/year; Benefactor \$4,000/year;
Legacy \$10,000+.

BOUNTIFUL GARDENS

18001 Shafer Ranch Road, Willits, CA 95490-9626
Phone: (707) 459-6410 Fax: (707) 459-1925
www.bountifulgardens.org

Write for a FREE Bountiful Gardens Catalog that contains a listing of all Ecology Action publications and products, including seeds.

COMMON GROUND STORE

559 College Avenue, Palo Alto, CA 94306-1542
Phone: (650) 493-6072
www.commongroundinpaloalto.org

A garden supply store and educational center with hundreds of seed varieties by the spoonful, or more; beautiful organically grown vegetable seedlings, including heirloom tomatoes; natural pest-control products; fine gardening tools; organic fertilizers; books, library, classes – and much more!

GROW BIOINTENSIVESM SUSTAINABLE MINI-FARMING CERTIFICATION PROGRAM FOR TEACHERS AND SOIL TEST STATIONS

PREFACE

Thank you for your interest in the GROW BIOINTENSIVE teacher and/or soil test station certification program. As we strive to recreate the cultural and biological foundations for the resurgence of a human-scale agriculture, our success ultimately lies with those who decide not only to practice, but also to teach. Integral to our vision at Ecology Action is an ethic in which we as individuals and as members of human and ecological communities feel responsibility toward and take an active role in the stewardship of soil, water, energy and genetic resources which make our lives possible. The cultural shift implied by this ethic begins with the soil beneath our feet, as it is from such a rooted foundation of personal action that our efforts can resonate outward to the world at large to address issues related to resource equity, food security, and ecological sustainability for all. Through the practice and promotion of human-scale, biologically intensive food-raising, we work to preserve and enhance soil fertility and revive and build upon a millennia-old base of knowledge.

As a gardener or mini-farmer, you have felt the personal satisfaction that stems from engaging in an intimate relationship with the cycles of life in your garden. Through the GROW BIOINTENSIVE Teacher Certification process, we hope that you also gain satisfaction in that we are working together to create a cultural model of human sustainability and a more abundant future for us all.

In the description of this program, you will find all the information and materials needed to initiate and pursue the certification process. Various GROW BIOINTENSIVE teaching formats are described. Anyone can teach GROW BIOINTENSIVE by using Ecology Action's publications. Sometimes we find that people want to modify GROW BIOINTENSIVE practices and/or teach GROW BIOINTENSIVE practices in ways other than those described in this booklet. Either of these can be done, but neither meets the requirements to be certified through this program.

We look forward to working with you. Do not hesitate to contact us if you have any questions.

INTRODUCTION

As population and land degradation increase, it becomes more and more difficult for the world's people to grow enough food for themselves and their families and to develop and maintain sustainable soil fertility. GROW BIOINTENSIVE® Sustainable Mini-Farming offers hope as a low-input organic form of food production with a capacity to build soil fertility.

GROW BIOINTENSIVE Sustainable Mini-Farming is not just an organic farming technique, but a *system* that combines nutrition-based food production with closed-system soil fertility management, emphasizing reduced space.

The elements of GROW BIOINTENSIVE Sustainable Mini-Farming include:

- Deep soil preparation,
- Compost,
- Close plant spacing,
- Companion planting,
- Carbon-farming (the growing of mature compost crops to produce sufficient compost for the maintenance of sustainable soil fertility on a closed-system basis as well as a significant amount of calories),
- Calorie-farming (the growing of crops for calories on a small-scale basis with an emphasis on special root crops which produce a large amount of calories per unit of area),
- Open-pollinated seeds (using and saving), and
- Treating all of the elements as parts of a *whole system* with a focus on long-term, 'closed-system' sustainable soil fertility.

GROW BIOINTENSIVE allows each of its practitioners to acquire the skills and dedication to take responsibility to grow sufficient food with a fraction of the water, energy and purchased nutrients in the form of organic fertilizer required compared to chemical mechanized agriculture. GROW BIOINTENSIVE provides the tools needed to grow food in a way that is truly sustainable: requiring no nonrenewable resources and capable of maintaining and improving soil fertility within a closed system.

Ecology Action's dream is to assist in soil regeneration by transforming veritable deserts into life-giving gardens and mini-farms. To achieve our vision, Ecology Action is dedicated to certifying GROW BIOINTENSIVE teachers and soil test stations. Food production is not only a technical skill and an art, it is a culture, and requires people to pass it on.

In 2008, we began to work on updating our certification program with two key goals in mind: 1) Simplifying the process, 2) Creating certification standards for both teachers and soil test stations.

The certification program described is a result of this effort.

Please join us!

TEACHER TRAINING AND CERTIFICATION PROGRAM DESCRIPTION

GROW BIOINTENSIVE teacher training equips the teacher not only with the practical knowledge and skills of GROW BIOINTENSIVE Sustainable Mini-Farming, but also with the ability to teach others. GROW BIOINTENSIVE teachers combine lectures with demonstrations to illustrate key aspects of the method.

People will understand the principles of GROW BIOINTENSIVE mini-farming more readily if they can see a well-designed, thriving mini-farm. The prospective certified GROW BIOINTENSIVE teacher should set up a demonstration garden with contiguous beds, narrow paths, optimal orientation, space for compost piles (compost may be built on the growing beds), etc. A demonstration garden also ensures that the certified teacher is continually learning from experience. Design aspects related to sustainability are illustrated in Appendix 13.

The Teacher Training and Certification Program strives to provide recognizable learning goals so that teachers can identify progress in the depth and quality of their learning and teaching.

GROW BIOINTENSIVE *Basic-Level* Teacher Certification

Description

Basic-Level Teacher Certification recognizes those teachers and trainers capable of teaching others the Basic techniques of GROW BIOINTENSIVE Sustainable Mini-Farming.

Prerequisites to Attend Five-Day Basic-Level Teacher-Training

- √ Attend a Three-Day **GROW BIOINTENSIVE Sustainable Mini-Farming Workshop** presented by an Ecology Action-approved instructor
- √ Set up a **GROW BIOINTENSIVE demonstration garden** with a minimum of 300 square feet in contiguous beds
- √ Spend at least one year after the Workshop using the 8 components of GROW BIOINTENSIVE and the design concept '60/30/10' in the demonstration garden
- √ Maintain records on at least five crops, using **Data Reports**
- √ Gain familiarity with Ecology Action books and booklets
- √ Submit:
 - **5-Day Teachers Workshop Application**
 - **Map** of garden showing all beds and corresponding crops, areas, bed numbers, paths and other distinguishing factors
 - **Data Reports** for five crops
 - **Summary Yield Data Report** with at least five crops
 - **Timberleaf soil test** or alternative approved by Ecology Action

Requirements for Ecology Action *Basic-Level* Teacher Certification

- √ Attend:
 - **Five-Day Workshop** for GROW BIOINTENSIVE Basic-Level Teachers or equivalent
- √ Do:
 - Maintain a 300-sq-ft or larger demonstration area that incorporates the 8 components of GROW BIOINTENSIVE and the design concept '60/30/10'
 - Produce at least 50% of compost from materials generated from the garden
 - Maintain records on all main-season crops, using Data Reports
 - Master Basic-Level topics
 - Teach and document 20 hours of GB-related teaching, including One-Day Basic-Level GROW BIOINTENSIVE Workshop
- √ Submit annually:

After main growing season (within 3 months)

- **Photos** of the beds with crops at or near maturity, with captions
- **Data Reports** for main season crops
- **Summary Yield Data Report**, including crop failures
- **Teaching Report Forms**
- **Summary Teaching Report**
- **Certification Candidate Profile**
- **Annual Teacher Goals Report**

At least two months prior to main growing season (to assure feedback for planning)

- **Garden Plan**
- **Map** of garden showing all beds and corresponding crops, areas, bed numbers, paths and other distinguishing factors
- **Annual Teacher Goals**
- **Timberleaf soil test** or alternative approved by Ecology Action

A teacher certified at the Basic level should feel comfortable presenting the following topics. The Ecology Action Workshop Manual, *How to Grow More Vegetables, The Sustainable Vegetable Garden* and EA publications serve as the basis for this curriculum. Teachers are encouraged to use these materials actively in their classes and develop materials that are appropriate for their audiences.

TOPIC	BASIC LEVEL
History / Philosophy	-History of Biointensive Agriculture -Conventional Agriculture vs. Biointensive and Organic Agriculture -Creating a Philosophy of Food Production
Biointensive and Natural Resources	-Land/Population Connection -Connections between Biointensive and Conserving Natural Resources
Components of a GB System	-Basic Introduction to 8 Components -60/30/10 Design Concept -Basic Design Including Carbon- and Calorie-Efficient Crops
Bed Preparation	-Bed Preparation Explanation and Demonstration -Soil Texture -Soil Structure -Body Techniques for Easy Double-Digging -Advantages of Double-Digging and Surface Cultivation over Rototilling and Plowing -The Role of Roots
Compost	-Compost Explanation and Demonstration -Basic GB Compost Recipe -Basic Compost Pile Management -Growing Compost Crops for Compost -GB Compost vs. Other Composting Techniques
Close Plant Spacing	-Off-set Spacing Explanation and Demonstration -Pricking Out Techniques -Transplanting Techniques
Carbon-Efficient Crops	-Carbon-and-Calorie Crops: Reasons Why GROW BIOINTENSIVE Includes Carbon-and-Calorie Crops -Familiarity with Local Carbon-and-Calorie Crops -Immature vs. Mature Compost Crops -Use of “60%” as a Design Concept (Area of Garden in Such Crops)
Calorie-Efficient Crops	-Role of Calorie Crops: Why GROW BIOINTENSIVE Emphasizes Inclusion of High-Calorie Crops that are Area- and Weight-Efficient -Use of “30%” as a Design Concept (Area of Garden in Such Crops)

Companion Planting/ Rotations	-Definitions and Examples -Plant Families in Rotations -Criteria for Companion Planting
Open-Pollinated Seeds	-Descriptions of Open-Pollinated, Hybrid, Green Revolution and GMO seeds -Treated vs. Untreated Seeds -Self- vs. Cross-Pollination -Self-Pollinating Seed Collection
Whole System	-Importance of all 8 components of GROW BIOINTENSIVE
Diet	-Vegetarian vs. Animal Product Diets (Area) -Area Needed to Grow Different Diets -Diet Choices and their Environmental Impact
Soil/Sustainable Fertility	-Basic Interpretation of Soil Tests (Macronutrients and Organic Matter) -Organic Soil Amendment Options -Importance of Closed-System Goal
Income	-Income-Producing Crops in GB Systems: Exporting Minimum from Closed System
Planning	-Calendar of Garden Activities -Planning Using Area -One-Bed Unit Exercise -Mastery of <i>How to Grow More Vegetables</i> Master Charts

Basic-Level Certification will be awarded on the basis of Five-Day Teachers Workshop participation and activities detailed under Do: and Submit: above. The certificate is valid for one calendar year from the date on the certificate. Renewal of certification should be requested in advance of the expiration of the existing certificate. All requested data and teaching reports should be submitted annually to maintain and renew certification. If certification lapses, the teacher is considered inactive until documentation is submitted. In the interim, workshops are not considered GROW BIOINTENSIVE.

GROW BIOINTENSIVE *Intermediate-Level* Teacher Certification

Description

Intermediate-Level Teacher Certification recognizes those teachers who not only have mastered the basic techniques of GROW BIOINTENSIVE growing and teaching, but are also well-versed in food-production design based on diet and soil fertility.

Prerequisites to Attend Seven-Day Intermediate-Level Teacher-Training or equivalent

- √ **GROW BIOINTENSIVE Basic-Level Teacher Certification**
- √ Maintain a **500-sq-ft or larger demonstration area** that uses the 8 components of GROW BIOINTENSIVE and '60/30/10' concept for at least one complete growing season

Requirements for Ecology Action Certification

- √ Attend:
 - **Seven-Day Workshop** for GROW BIOINTENSIVE Intermediate-Level Teachers or equivalent
- √ Do:
 - Complete and submit Form 7 (Diet Design) and Form 9 (Compost Design) of Mini-Farm Design (Designing a GROW BIOINTENSIVE Sustainable Mini-Farm, Self-Teaching Mini-Series #31)
 - Apply Mini-Farm Design to minimum 500-sq-ft area of contiguous beds
 - Use only compost created from the Mini-Farm Design 5-Bed Unit
 - Maintain records on all crops in Design, using Data Reports
 - Document compost piles in Mini-Farm Design
 - Master Basic- and Intermediate-Level topics
 - Teach and document 40 hours of GROW BIOINTENSIVE-related teaching, including Basic-Level workshops and topics related to diet and compost design planning and implementation
- √ Submit annually:

After main growing season (within 3 months)

- **Photos** of the beds with crops at or near maturity
- **Summary Yield Data Report** for Mini-Farm Design, including crop failures
- **Compost Pile Summary Reports**, including at least one measured pile
- **Teaching Report Form**
- **Summary Teaching Report**
- **Certification Candidate Profile**
- **Annual Teacher Goals Report**

At least two months prior to main growing season (to assure feedback for planning)

- **Annual Garden Plan**
- **Map** of garden showing all beds and corresponding crops, areas, bed numbers, paths and other distinguishing factors
- **Annual Teacher Goals**

- **Timberleaf soil test** or alternative approved by Ecology Action
- **Mini-Farm Diet Design (Bklt 31, Forms 7 and 9)** with adjustments based on experience from previous growing season

A teacher certified at the Intermediate level should feel comfortable presenting the following topics, as well as the topics listed at the Basic level. The Ecology Action Workshop Manual, *How to Grow More Vegetables, The Sustainable Vegetable Garden* and EA publications serve as the basis for this curriculum. Teachers are encouraged to use these materials actively in their classes and develop materials that are appropriate for their audiences.

TOPIC	INTERMEDIATE LEVEL
History / Philosophy	-Biointensive Agriculture vs. Other Organic Agriculture Practices/ Tendencies
Biointensive and Natural Resources	-Specific Natural Resources Statistics (Water, Fertilizers, Energy) -World Situation and Land per Capita Data in Relation to GROW BIOINTENSIVE Sustainable Mini-Farming
Components of a GB System	-Interactions among 8 Components -Mini-Farm Design including Complete Diet and Compost
Bed Preparation	-Interrelationship of Air, Water, Organic Matter and Biointensive Practices -Bed Preparation in Different Soils and Conditions: Trade-offs
Compost	-Carbon: Nitrogen -Proportions of Different Compost Recipes and Components -Compost Management (Temperatures, Processes, Stages) -Green Manure Use vs. Compost Crops and Compost -Growing Compost Crops -Importance of Carbon in Closed System -Role of Microbial Life -Organic Compounds in Compost -Role of Animal and Human Waste
Close Plant Spacing	-Advantages of Close Spacings -Variables that Influence Spacing Choices including Climate
Carbon-Efficient Crops	-Compost Design for Garden -Different Benefits of Various Compost Crop Materials -Understanding Importance of Grain and Seed Crops for Diet and Soil Sustainability
Calorie-Efficient Crops	-Advantages/Disadvantages of Different Crops Related to Efficiency
Companion Planting/ Rotations	-Advantages/Disadvantages of Different Planting Combinations and Rotation Practices
Open-Pollinated Seeds	-Cross-Pollinating Seed Collection -Selecting for Strain -Seed Processing -Seed Storage
Whole System	-Basic Pest and Plant Disease Issues and Relationship to Whole System
Diet	- <i>One Circle</i> and Diet sections of Ecology Action's Self-Teaching Mini-Series Booklets #14, #15, #25 and #26
Soil/Sustainable	-Interpretation of Soil Tests, Including Micronutrients

Fertility	-Basic Concept of Humanure
Income	-Sustainable Income Design (Bklt 31, Form 8 and Form 9) (optional)
Planning	-Year-Round Planning -Use of Catch Crops and Out-of-Season Crops -Season Extension -Kitchen vs. Area Efficiency -Understanding of Bed-Crop-Months Concepts (Efficiency of Space) -Planning Compost Crops for Sustainability -Planning using Mini-Farm Design

Intermediate-Level Certification will be awarded on the basis of Seven-Day Workshop and activities detailed under Do: and Submit: above. The certificate is valid for three calendar years from the issue date on the certificate, based on annual submission of all requested data and teaching reports. Renewal of certification should be requested in advance of the expiration of the existing certificate.

Intermediate-Level teachers are authorized by Ecology Action to give Five-Day Basic-Level Teacher-Trainings to persons who have fulfilled the requirements as listed in the certification process.

If a certified Intermediate-Level teacher chooses to accompany Basic- Level Teacher candidates, they must comply with the following:

- Inform Ecology Action of plans to conduct Training workshops. In the case of their first workshop, submit workshop plans to Ecology Action at least two months in advance for feedback and approval. If changes are proposed to future trainings, revised Workshop proposal should also be submitted to Ecology Action in advance.
- Collect and maintain documentation that participants meet the pre-requisites to participate in the Workshop. Supply said documentation to Ecology Action if requested.
- Accompany Basic- candidates. Collect all documentation as required by Ecology Action. Review candidate's documentation before submitting application to Ecology Action Headquarters.

GROW BIOINTENSIVE *Advanced-Level* Teacher Certification

Description

*GROW BIOINTENSIVE Advanced-Level teacher-training is for those who want to dedicate their lives to learning, **living** and sharing GROW BIOINTENSIVE Sustainable Mini-Farming. At this level, the teacher fully understands the interconnectedness and mutual benefits of GROW BIOINTENSIVE Sustainable Mini-Farming techniques and how they can best be used together to maximize production and soil fertility maintenance and improvement.*

Prerequisites to Attend 10-Week Advanced-Level Teaching Training or equivalent

- √ **GROW BIOINTENSIVE Intermediate-Level Teacher Certification**
- √ Maintain a 1000-sq-ft or larger demonstration garden in contiguous beds based on Mini-Farm Design for at least one complete growing season

Requirements for Ecology Action Certification

- √ Attend:
 - **Ten-Week Advanced-Level Teaching Training** for GROW BIOINTENSIVE Advanced-Level Teachers or equivalent
- √ Do:
 - Maintain a demonstration garden with a minimum of 1000 sq ft of growing area
 - Maintain records on all crops using Data Reports
 - Document compost piles in Mini-Farm Design
 - Master Basic-, Intermediate- and Advanced-Level topics
 - Teach and document 60 hours of GB-related teaching, including Basic- and Intermediate-Level, topics related to diet and compost design implementation and planning, and training of trainers

Submit annually:

After main growing season (within 3 months)

- **Photos** of the beds with crops at or near maturity
- **Summary Yield Data Report** for Mini-Farm Design, including crop failures
- **Compost Data Reports**, including at least 3 measured piles
- **Teaching Report Form**
- **Summary Teaching Report**
- **Certification Candidate Profile**
- **Annual Teacher Goals Report**

At least two months prior to main growing season (to assure feedback for planning)

- **Annual Garden Plan**
- **Map** of garden showing all beds and corresponding crops, areas, bed numbers, paths and other distinguishing factors
- **Annual Teacher Goals**
- **Timberleaf soil test** or alternative approved by Ecology Action
- **Modifications of Mini-Farm Diet Design (Bklt 31)**, if necessary

A teacher certified at the Advanced level should feel comfortable presenting the following topics, as well as the topics listed in the Basic and Intermediate levels. The Ecology Action Workshop Manual, *How to Grow More Vegetables*, *The Sustainable Vegetable Garden* and EA publications serve as the basis for this curriculum. Teachers are encouraged to use these materials actively in their classes and develop materials that are appropriate for their audiences.

TOPIC	ADVANCED LEVEL
Components of a GB System	-Complete Nutrient Analysis (Form 10)
Bed Preparation	-Documented Bed Preparation Tests
Compost	-Documented Research Regarding Compost and Local Compost Crops -Compost Production Design including Specific Carbon, Nitrogen and Biomass Amounts -Hot, Cool vs. Cold Piles -Understanding Different C:N Ratios in Compost -Comparison of Soil vs. Soil-less Compost Piles -Compost Cropping Patterns and Varieties for Short-Season Climates
Close Plant Spacing	-Documented Research Regarding Spacings
Carbon-Efficient Crops	-Complete Compost Designs with Local Crops
Calorie-Efficient Crops	-Nutritional Values of Crops
Companion Planting/ Rotations	-Documented Research on Specific Rotation and Companion Plantings
Open-Pollinated Seeds	-Transforming hybrid to an OP variety
Soil/Sustainable Fertility	-Plant Soil Testing -Humanure Recycling
Income	-Choosing Most-Profitable Crops -Income Production Design -Marketing/Evaluation of Market Possibilities: Advantages and Disadvantages of Different Markets -Growing and Saving Seeds for Sale
Planning	-Designing for All Needs (Food, Soil Fertility, Medicinal, Energy Sources, Fiber, etc.)

Advanced-Level Certification will be awarded on the basis of **Ten-Week Advanced-Level Teaching Training** (or equivalent) participation and activities detailed under Do: and Submit: above. The certificate is valid for five calendar years from the date on the certificate, based on annual submission of all requested data and teaching reports. Renewal of certification should be requested in advance of the expiration of the existing certificate.

Advanced-Level teachers are authorized by Ecology Action to give Five-Day Basic-Level Teacher-Training to persons who have fulfilled the requirements as listed in the certification process.

If a certified Advanced-Level teacher chooses to accompany Basic-Level Teacher candidates, they must comply with the following:

- Inform Ecology Action of plans to conduct a Five-Day Basic-Level Teacher Training or Seven-Day Intermediate-Level Teacher Training workshop. In the case of their first workshop, submit workshop plans to Ecology Action at least two months in advance for feedback and approval. If changes are proposed to future trainings, revised Workshop proposal should also be submitted to Ecology Action in advance.
- Collect and maintain documentation that participants meet the pre-requisites to participate in the Workshop. Supply said documentation to Ecology Action if requested.
- Accompany Basic- and Intermediate-Level candidates. Collect all documentation as required by Ecology Action. Review candidate's documentation before submitting application to Ecology Action Headquarters.

**Summary of GROW BIOINTENSIVE Sustainable Mini-Farming
Teacher Certification Requirements:
Basic Level**

Prerequisites	<ul style="list-style-type: none"> • Attend a Three-Day GROW BIOINTENSIVE Sustainable Mini-Farming Workshop presented by an Ecology Action-approved instructor. • Set up a GROW BIOINTENSIVE demonstration garden of a minimum of 300 sq ft of contiguous beds • Spend at least one year following the Workshop using the 8 components of GROW BIOINTENSIVE and ‘60/30/10’ concept within the demonstration garden • Maintain records on at least five crops, using Individual Data Reports • Gain familiarity with Ecology Action books and booklets
Requirements	<p>Attend:</p> <ul style="list-style-type: none"> • 5-Day Teachers Workshop or equivalent <p>Do:</p> <ul style="list-style-type: none"> • Maintain data for main-season crops in 300-sq-ft demonstration garden, using Data Reports • Produce at least 50% of compost from materials from garden • Master Basic- Level topics <p>Teach:</p> <ul style="list-style-type: none"> • 20 hours of GROW BIOINTENSIVE-related teaching, including at least 1 GROW BIOINTENSIVE One-Day Workshop
To Be Submitted	<p><i>After main growing season (within 3 months)</i></p> <ul style="list-style-type: none"> • Photos of the beds with crops at or near maturity • Individual Data Reports for main season crops • Summary Yield Data form, including crop failures • Teaching Report Forms • Summary Teaching Report • Certification Candidate Profile • Annual Teacher Goals Report <p><i>Two months prior to main growing season (~one month)</i></p> <ul style="list-style-type: none"> • Garden plan • Map of garden showing all beds and corresponding crops, areas, bed numbers, paths and other distinguishing factors • Annual Teacher Goals • Timberleaf soil test or alternative approved by Ecology Action

**Summary of GROW BIOINTENSIVE Sustainable Mini-Farming
Teacher Certification Requirements:
Intermediate Level**

Prerequisites	<ul style="list-style-type: none"> • Maintain a minimum 500-sq-ft demonstration area that uses the 8 components of GROW BIOINTENSIVE for at least one complete growing season
Requirements	<p>Attend:</p> <ul style="list-style-type: none"> • 7-Day Teachers Workshop or equivalent <p>Do:</p> <ul style="list-style-type: none"> • Develop a GROW BIOINTENSIVE Sustainable Mini-Farm Design based on Self-Teaching Mini-Series #31 (Forms 7 & 9) • Apply the Diet and Compost design to a 500-sq-ft growing area. • Maintain data for all crops in Mini-Farm Design • Record data on Compost from Mini-Farm Design • Master Basic- and Intermediate-Level topics <p>Teach:</p> <ul style="list-style-type: none"> • 40 hours of GROW BIOINTENSIVE-related teaching, including Basic-Level topics related to diet and compost design, implementation and planning
To Be Submitted	<p><i>After main growing season (within 3 months)</i></p> <ul style="list-style-type: none"> • Photos of the beds with crops at or near maturity • Summary Yield Data Report for Mini-Farm Design, including crop failures • Compost Pile Summary Report, including 1 measured pile • Teaching Report Form • Summary Teaching Report • Certification Candidate Profile • Annual Teacher Goals Report <p><i>Two months prior to main growing season (~one month)</i></p> <ul style="list-style-type: none"> • Annual Garden Plan • Map of garden showing all beds and corresponding crops, areas, bed numbers, paths and other distinguishing factors • Annual Teacher Goals • Timberleaf soil test or alternative approved by Ecology Action • Mini-Farm Diet Design (Forms 7 & 9, Bklt 31)

**Summary of GROW BIOINTENSIVE Sustainable Mini-Farming
Teacher Certification Requirements:
Advanced Level**

Prerequisites	<ul style="list-style-type: none"> • Extend the GROW BIOINTENSIVE Sustainable Mini-Farm Design based on Self-Teaching Mini-Series #31 to a 1000-sq-ft growing area for at least one complete growing season.
Requirements	<p>Attend:</p> <ul style="list-style-type: none"> • Attend a 10-Week Teaching Class or equivalent <p>Do:</p> <ul style="list-style-type: none"> • Maintain data for all crops in Mini-Farm Design in 1000-sq-ft growing area • Document compost piles from Mini-Farm Design • Master Basic-, Intermediate- and Advanced- Level topics <p>Teach:</p> <ul style="list-style-type: none"> • 60 hours of GROW BIOINTENSIVE-related teaching, including Basic- and Intermediate- Level Workshops and topics related to diet and compost design implementation and planning
To Be Submitted	<p><i>After main growing season (within 3 months)</i></p> <ul style="list-style-type: none"> • Photos of the beds with crops at or near maturity • Summary Yield Data Report for Mini-Farm Design, including crop failures • Compost Pile Summary Report, including 3 measured piles • Teaching Report Forms • Summary Teaching Report • Certification Candidate Profile • Annual Teacher Goals Report <p><i>Two months prior to main growing season (~one month)</i></p> <ul style="list-style-type: none"> • Annual Garden Plan • Map of garden showing all beds and corresponding crops, areas, bed numbers, paths and other distinguishing factors • Annual Teacher Goals • Timberleaf soil test or alternative approved by Ecology Action • Mini-Farm Diet Design (Bklt 31), if changes proposed

TEACHER CERTIFICATION RENEWAL

After an individual has qualified and been certified as a GROW BIOINTENSIVE Basic-, Intermediate- or Advanced-Level Teacher, the individual will receive a certificate. This certificate authorizes the individual to teach GROW BIOINTENSIVESM Sustainable Mini-Farming classes and/or workshops (with the servicemark designation) at the level stated on the certificate:

- for one year after certification at the Basic Level,
- for three years after certification at the Intermediate Level, and
- for five years at the Advanced Level.

The certificate will specify the period for which it is valid, based on annual submission of documentation.

Renewal of teaching certification, if requested, will be decided by Ecology Action. The decision to renew certification will be based primarily on the individual's degree of involvement, past accomplishments and future goals. Demonstration of determined and highly motivated mini-farming and teaching will heavily favor renewal.

GROW BIOINTENSIVE® SUSTAINABLE MINI-FARMING/ SOIL TEST STATION CERTIFICATION

Like a certified teacher's demonstration area, a Soil Test Station serves as a living model of GROW BIOINTENSIVE. However, a Soil Test Station must comply with more-rigorous record-keeping and research requirements. The goal of a Soil Test Station is to clearly demonstrate diet/compost designs and implement a research plan. Unlike a demonstration site, which is not certified (the associated teacher is), a Soil Test Station is certified.

A Soil Test Station is envisioned to produce solid research in specific areas: soil fertility and nutrient cycling over time; use of plant-based composting materials necessary to maintain/increase organic material and available nutrients in the soil; complete diets that provide sufficient calories and nutrients, and the minimum space to provide said diet; as well as income generation.

The goal is to measure progress over time toward sustainability and to model GROW BIOINTENSIVE as a closed system of diet/soil fertility within a reduced space.

For a site to be recognized as a Soil Test Station, Ecology Action requires these basic criteria be met:

- √ Minimum of 1000 sq ft in production using Mini-Farm design, ideally with the possibility of expansion to 4000 sq ft
- √ Sufficient infrastructure to accommodate Education/Training Plan (tools, garden area, etc.)
- √ Mini-Farm Design
- √ Planned Research
- √ Education/Training Program
- √ Annual Evaluation
- √ The active participation of a certified Basic-Level GROW BIOINTENSIVE teacher as defined by Ecology Action in process of Intermediate-Level certification
- √ Annual submission of the following:

Within 3 months after the growing season

- **Summary Yield Data Report** for Mini-Farm Design, including crop failures
- **Mini-Farm Design Report**
- **Annual Site Goals and Report**
- **Research Report and Conclusions**

At least two months prior to main growing season (to assure feedback for planning)

- **Research Designs**
- **Teacher Certification Materials** for certified teacher involved with Soil Test station
- **Timberleaf soil test** or alternative approved by Ecology Action
- **Cumulative Soil Test Results**
- **Current Mini-Farm Design** implemented on site

Ecology Action will provide:

- √ Technical Assistance
- √ Advice on Income-Generating Possibilities and Project Funding
- √ Opportunities for Further Training for Certified GROW BIOINTENSIVE Teachers and Identified Key Players
- √ Coordination of Networking with Other GROW BIOINTENSIVE Practitioners

Over the course of time, the Soil Test Stations' dedication to careful record-keeping will document/demonstrate the sustainability and feasibility of each design. Soil Test Station certification will be valid for a period of one year. Renewal is based on submission of annual reports, requested materials and accomplishment of requirements.

Summary of GROW BIOINTENSIVE Sustainable Mini-Farming Soil Test Station Certification Requirements

Prerequisites	<ul style="list-style-type: none"> • Minimum of 1000 sq ft in production based on Mini-Farm Design, ideally with the possibility of expansion to 4000 sq ft. • The active participation of a certified GROW BIOINTENSIVE teacher as defined by Ecology Action.
Requirements	<p>Do:</p> <ul style="list-style-type: none"> • Maintain data for all crops in Mini-Farm Design • Record data on Compost from Mini-Farm Design • Execute and Record Planned Research • Maintain Accumulative Soil Test Results <p>Teach:</p> <ul style="list-style-type: none"> • Execute Education/Training Program
To Be Submitted	<p><i>Within 3 months after the growing season</i></p> <ul style="list-style-type: none"> • Summary Yield Data Report for Mini-Farm Design, including crop failures • Mini-Farm Design Report • Annual Site Goals and Report • Research Report and Conclusions <p><i>Two months prior to growing season</i></p> <ul style="list-style-type: none"> • Research Plans • Teacher Certification Materials for certified teacher involved with Soil Test Station • Timberleaf soil test or alternative approved by Ecology Action • Accumulative Soil Test Results • Current Mini-Farm Design implemented on site

APPENDIX 1: USING THE NAME GROW BIOINTENSIVE®

In order to distinguish Biointensive Sustainable Mini-Farming processes developed over almost three decades from the practices of other organizations using the term (Bio-Intensive Integrated Pest Management, for example), Ecology Action has decided to use the name GROW BIOINTENSIVE®. In effect, GROW BIOINTENSIVE is the "brand name" of Ecology Action's publications and educational services, and also for the certifying of seeds and produce complying with GROW BIOINTENSIVE® guidelines. This term, **always in capital letters**, can be used for the system as a whole, the component parts of the system (e.g. GROW BIOINTENSIVE composting), publications and classes describing and teaching the system, and gardens/mini-farms using the system.

The ® mark indicates GROW BIOINTENSIVE is registered with the U.S. Trademark Office. In Mexico, CULTIVE BIOINTENSIVAMENTE^{MR} has been similarly registered.

GROW BIOINTENSIVE®, CULTIVE BIOINTENSIVAMENTE^{MR} and the following may be used only with the written authorization of Ecology Action:

- GROW BIOINTENSIVE® or TM — A *trademark* for Ecology Action publications and those authorized by Ecology Action. ® or TM is used where GROW BIOINTENSIVE is in front of the word 'publication', e.g., a GROW BIOINTENSIVE® publication or a GROW BIOINTENSIVETM publication.
- GROW BIOINTENSIVE® or SM — A *service mark* for workshops, trainings, and classes taught by Ecology Action staff and **certified** GROW BIOINTENSIVE teachers. ® or SM is used if GROW BIOINTENSIVE is in front of the word 'workshop', e.g., a Three-Day GROW BIOINTENSIVESM Workshop or a Three-Day GROW BIOINTENSIVE® Workshop.

A *certification mark* —GROW BIOINTENSIVE APPROVED^{CM}—for produce and seeds grown according to methods established by Ecology Action is being considered for registration; upon full registration, ® or ^{CM} may be used.

SPECIAL NOTES:

If any of the GROW BIOINTENSIVE terms is used in a title or other situation where the surrounding text is also in capital letters, the words GROW BIOINTENSIVE should be typeset at least 2 points larger than the surrounding text, e.g. A GROW BIOINTENSIVESM WORKSHOP.

Note that in an article about Ecology Action, the ® needs to be used after GROW BIOINTENSIVE only the first time GROW BIOINTENSIVE is used unless the ® is needed elsewhere for special emphasis.

In Mexico, CULTIVE BIOINTENSIVAMENTE^{MR} is used in place of TM, SM and ®.

— If you are considering including ®, please check with the Ecology Action office. —

APPENDIX 2: DATA REPORT (continued)

⁴ Quantity: Use for countable crops only, e.g. cucumbers, squash, etc.; not for beans, chard, etc.

⁵ We generally measure volumes in five-gallon buckets (5gB). Optional for Biomass Harvest.

⁶ The crop may produce two edible yields, as is the case for beets and beet greens, for example. Also, it may be useful to keep track of marketable, edible but unmarketable, and inedible yields. If you wish, you may use these spaces for such column headings as may be relevant for a particular crop.

BIOMASS

Biomass can include a crop grown for biomass (e.g. alfalfa, sorghum, fava beans) or residue from an edible crop (e.g. carrot tops, outside cabbage leaves, bean plants at the end of the season). We would prefer an **air-dry** weight for serious compost crops (e.g. alfalfa, sorghum, fava beans). This means thoroughly dried in a low-humidity environment, whenever possible.

Steps

If the harvest is small, 1. Weigh crop at harvest. 2. Record harvest weight.
3. Allow crop to air-dry. 4. Weigh it again. 5. Record air-dry weight.

If the harvest is large, 1. Weigh crop at harvest. 2. Record total harvest weight.
3. Select a representative sample weighing at least two pounds (one kilo).
4. Record weight of sample. 5. Allow sample to air-dry. 6. Weigh sample again.
7. Record air-dry weight of sample.
8. Divide air-dry weight of sample by original weight of sample (= % air-dry).
9. Multiply total harvest weight by % air-dry (= total air-dry weight).
10. Record total air-dry weight.

PROCEDURE [Convert all ounces in raw data to pounds (lb).]	EXAMPLE
1. Harvest the crop. Weigh, and record the total harvest weight (H).	H = 60 lb
2. Take a representative sample of material that weighs at least two pounds. Weigh, and record weight of sample (S).	S = 2 lb
3. Let this material air-dry thoroughly.	
4. Weigh and record air-dry weight of sample (SD).	SD = 0.5 lb
5. Calculate air-dry percentage (AD%): $AD\% = SD / S$	$AD\% = 0.5 / 2 = 0.25$
6. Calculate air-dry weight of the total harvest (TADW): $TADW = H \times AD\%$	$60 \text{ lb} \times 0.25 = 15 \text{ lb}$

YOUR NAME AND ADDRESS

OBSERVATIONS: Please note any particular observations or additional yield information.

Return this form to: Ecology Action, 5798 Ridgewood Road, Willits CA 95490-9730

APPENDIX 3: SUMMARY YIELD DATA (continued)

Please photocopy both sides of this form.

Crop failures: Be sure to include information in Columns A, B, C, D, E, F, and R for crop failures.

Column I = Col. H / Col. C x 100 **Column K** = Col. I / Col. J **Column M** = Col. L / Col. C. x 100
Column O = Col. N / Col. C. x 100 **Column Q** = Col. O / Col. P

ABBREVIATIONS USED:

BMS YLD = Biomass yield or inedible portion yield DRY = Air-dry
 ED. YIELD = Edible yield GRN = Green or at harvest point
 US AV = U.S. Average (from Col. G in HTGMV)
 INDX = Index (how your yield compares to the U.S. Average)

For **DATE**, use month / day: April 7 = 4/7. **HARVEST DATES** = First date — last date (e.g. 4/7–8/16)
 For **WEIGHT**, use **pounds - (dash) ounces** or a decimal (e.g. 5 pounds 12 ounces = 5-12 or 5.75) OR **kilograms**
 (e.g. 2.6 = 2.6 kg). Please be consistent. Express amounts to one decimal place; round up at 0.05.

FERTILIZERS APPLIED: List fertilizers used, other than compost. It would be useful to include a copy of your Soil Test Report.

COMPOST APPLIED:

Please list ingredients in compost. Also, estimate the percent of soil in your **cured** compost, if possible.

BIOMASS:

Biomass (inedible yield) can include a crop grown for biomass (e.g. alfalfa, sorghum, fava beans) or residue from an edible crop (e.g. carrot tops, outside cabbage leaves, bean plants at the end of the season). We would prefer an **air-dry** weight for serious compost crops (e.g. alfalfa, sorghum, fava beans). This means thoroughly dried in a low-humidity environment, whenever possible. If material is not thoroughly dry, please indicate in the COMMENTS column: “partially dry” or “mostly dry”, for example. See below.

CALCULATING THE AIR-DRY WEIGHT:

PROCEDURE	EXAMPLE
1. Harvest the crop. Weigh, and record the total harvest weight (H).	H = 60 lb
2. Take a representative sample of material that weighs at least one pound. Weigh, and record weight of sample (S).	S = 2 lb
3. Let this material air-dry thoroughly.	
4. Weigh and record air-dry weight of sample (SD).	SD = 0.5 lb
5. Calculate the air-dry percentage (AD%): AD% = SD / S	AD% = 0.5 / 2 = 0.25
6. Calculate the air-dry weight of the total harvest (TADW): TADW = H x AD%	60 lb x 0.25 = 15 lb

Convert all ounces in raw data to pounds (lb).

To calculate yield/100 sq ft:
Actual Yield/Sq Ft x 100

APPENDIX 6: COMPOST PILE SUMMARY REPORT

Pile #	Dates (Construction - Cured)	Proportions Used (Mature, Immature, Soil)	Principal Materials Used	Compost Volume Cured	Max. Temp. (optional)

MEASURED PILE

BUILT		
	5gB	cu ft or cu m
TOTAL MATURE		
TOTAL IMMATURE		
TOTAL SOIL		
TOTAL BLT. VOLUME		
CURED		
DECOMPOSED		
UNDECOMPOSED		

Instructions: For measured piles, submit Compost Pile Log Sheet.

Conversion of 5gB to cu ft= 5gB/0.67

Conversion of 5gB to cu m = 5gB/0.02

APPENDIX 7: ECOLOGY ACTION TEACHING REPORT FORM

Please photocopy and submit one form for each class/workshop.

Name: Address: _____	Date:
_____	Purpose/Goal of Class:
Date(s) of Class:	
Hours of Actual Teaching:	
Name of Group or Organization, if any:	
Number of People Taught: _____ Percent Women: _____	
Level of Class: ___ Basic ___ Intermediate ___ Advanced	
Profile of participants, including affiliations whenever possible:	
Topics Covered: Please attach Class Outline/Schedule and any non-Ecology Action handouts used.	
How did your teaching of this class meet your expectations? ___ far exceeded ___ exceeded ___ met ___ did not meet Comments:	

APPENDIX 7: ECOLOGY ACTION TEACHING REPORT FORM (continued)

What is your perception as to how this class met your students' expectations?

___ far exceeded ___ exceeded ___ met ___ did not meet

Comments:

Potential impact of participants:

Other comments/reflections (did it go well? challenges? what would you do differently?):

Please send this form to Ecology Action, 5798 Ridgewood Road, Willits CA 95490-9730.
Be sure to include your outline and copies of announcements/posters/flyers
and any non-Ecology Action handouts used for this workshop.

APPENDIX 8: ECOLOGY ACTION SUMMARY TEACHING REPORT

Please photocopy and submit with certification application.

Name:	Date:
-------	-------

FOR CERTIFICATION REQUIREMENTS

DATE OF CLASS	LEVEL OF CLASS <small>Circle one.</small>	NUMBER TAUGHT	HOURS OF TEACHING		REMARKS
			Structured	Unstructured	
	B I A O				
	B I A O				
	B I A O				
	B I A O				
	B I A O				
	B I A O				
	B I A O				
	B I A O				
	B I A O				
TOTALS					

OTHER TEACHING, PRESENTATIONS, ETC.

DATE	LEVEL <small>Circle one.</small>	NUMBER PRESENT	HOURS		REMARKS
			Structured	Unstructured	
	B I A O				
	B I A O				
	B I A O				
	B I A O				
	B I A O				
TOTALS					

B = Basic-Level; I = Intermediate-Level; A = Advanced-Level; O = Other

**APPENDIX 9: ECOLOGY ACTION TEACHER CERTIFICATION
CANDIDATE PROFILE
FOR INITIAL / RENEWAL (circle one) CERTIFICATION**

Please make a photocopy of this form and send it to Ecology Action
with the other documents supporting your application for Teacher Certification.

Name: _____	Date: _____
Address: _____ _____	Phone: _____
	Fax: _____

Level of Certification Requested: <u> </u> Basic <u> </u> Intermediate <u> </u> Advanced
Date(s) and Location(s) of Three-Day Workshop(s) attended:
Date of Teachers Workshop attended: Basic <u> </u> Intermediate <u> </u> Advanced <u> </u>
Date(s) of other workshop(s) attended: Please specify:

DEMONSTRATION GARDEN PROFILE
for _____ (time period)

	Area (sq ft)	% of Total	BCM & % Total
Carbon/Calorie Crops			
Special Root Crops			
Vegetable Crops			
TOTAL			

BE SURE TO INCLUDE
ALL INFORMATION REQUESTED
IN HARD COPY. PLEASE ALSO
INCLUDE DOCUMENTS SAVED IN
ELECTRONIC FORMAT IF POSSIBLE.

Int & Adv

Area that was double-dug for the season(s) covered by this report:
Percentage of cultivated area in demonstration garden that was double-dug:
Amount of cured compost used per 100 sq ft:

APPENDIX 10: ANNUAL TEACHER/SITE GOALS AND REPORT EXAMPLE

Directions: List annual teacher or site goals at beginning of year/growing season. Goals should have indicators that are as “SMART” as possible (Specific, Measurable, Attainable, Realistic, Time-bound). Report results at the end of the year. Include supporting documentation, if pertinent.

Example of Annual Site Goals to be submitted:

1. Develop region-specific recommendations for open-pollinated seeds. Within the year, create a list of varieties and sources of crops in diet design to be available by hard-copy or internet.
2. Increase available tools for workshops and “lending library.” Purchase 15 new sets of forks and spades and garden tools. Write \$1000 grant for purchase by May 15th. Obtain tools by July 31st.
3. Expand demonstration garden from 20 beds to 40 by August 31st.

Example of Annual Site Goal Report:

1. Develop region-specific recommendations for open-pollinated seeds. Within the year, create a list of varieties and sources of crops in diet design to be available by hard-copy or internet.

Find attached list of varieties of open-pollinated seeds of the crops in the site’s diet design that have been found in the area and their possible sources. Note that the list does not include a local source for tomatoes. We are remedying this by experimenting with a number of varieties and saving our own seed.

2. Increase available tools for workshops and “lending library.” Purchase 15 new sets of forks and spades and garden tools. Write \$1000 grant for purchase by May 15th. Obtain tools by July 31st.

We had hoped to invest \$1000 through a grant by a local foundation. The foundation approved \$500, which we dedicated to buying 8 new sets of forks, etc. Tools were obtained by July 1st and have been in use in lending library since August.

3. Expand demonstration garden from 20 beds to 40 by August 31st.

The site currently has 30 beds in operation with 10 marked to be double-dug and sown with compost crops in the next weeks.

APPENDIX 11: RESEARCH DESIGN AND REPORT GUIDELINES

Each certified site is responsible for creating and executing specific research related to GROW BIOINTENSIVE. The complexity of research will vary according to the goals and situation of each site and should be established after consulting with Ecology Action. This research is above and beyond the record-keeping (primarily yields) required for teacher certification. Research examples: spacing, effects of interplanting, varieties, bed preparation, fertilizers, different applications of composted organic matter, etc.

Basic Guidelines:

- 1) Establish baseline data.
- 2) Include a control whenever testing is done. Once baseline data is established, testing should be done with reference to previous parameters. Only one variable should be tested in a given test.
- 3) Keep careful records on a standardized log sheet. Use the Ecology Action log sheet preferably.
- 4) Repetitive tests (simultaneously or over the course of time) are key to measuring the validity of conclusions. Create cumulative reports of test repetitions.
- 5) Draw possible conclusions based on test results. Describe conclusions in Annual Research Report.

APPENDIX 12: IDEAS FOR TEACHING/PROMOTING GROW BIOINTENSIVE®

- √ Lead a study group. Suggested topics include:
 - Crop storage
 - Crop preparation
 - Grain harvesting, threshing and winnowing
 - Sharing actual experiences with growing and eating *One Circle*-type diets
 - Composting tips
 - Growing vegetables
 - Growing special root calorie crops
 - Growing carbon/calorie crops
 - Success with companion planting
 - Weeds and insects in the garden
 - Successful yields of compost crops in terms of "x" (U.S. average) and carbon
 - Successful yields of calorie and income crops in terms of "x" (the U.S. average)
 - Short-season calorie, carbon and/or income crops
 - Ways of increasing the ease of marketing crops
 - Season-extending techniques
 - Income crop processing to increase value
 - Advantages and disadvantages of different markets
 - Trouble-shooting on the basis of actual experiences
- √ Develop a stand-alone sustainable income unit
- √ Start a GROW BIOINTENSIVE CSA and/or Educational Center in your community
- √ Start a GROW BIOINTENSIVE Mini-Ag Research, Demonstration and Education Center in your area
- √ Write an article for the Ecology Action newsletter or website sharing your experience
- √ Start your own newsletter describing your discoveries and experience
- √ Display food grown and an educational table at a county fair, farmers' market or local gathering.
- √ Research topics related to biointensive agriculture (See Bibliography for suggested readings; *How to Grow More Vegetables* has an extensive bibliography)
- √ Design additional research projects (Example: Amount of water consumed per unit of area for different crops)

APPENDIX 13: STEPS FOR A GROW BIOINTENSIVE® SUSTAINABLE MINI-FARM

To be a **GROW BIOINTENSIVE® Sustainable Mini-Farmer or Mini-Farm**, the garden, mini-farm or farm of an individual, project, program or organization must be using the following practices. These practices are grouped in three levels of increasing involvement:

- **“GROW BIOINTENSIVE MINI-FARMER”**
 - **“TRANSITIONAL GROW BIOINTENSIVE SUSTAINABLE MINI-FARMER”**, and
 - **“FULL GROW BIOINTENSIVE SUSTAINABLE MINI-FARMER”**.
- Check off practices which apply to your garden, mini-farm or farm at this time. -

GROUP 1: CRITERIA FOR “GROW BIOINTENSIVE MINI-FARMER”

SOIL PREPARATION

- o Manual double-digging (24 inches/60 cm deep), to establish or reestablish good soil structure.
- o Surface cultivation (2 inches/5 cm deep) once good soil structure is established, to maximize preservation of soil structure.
- o Permanent growing beds a minimum of three feet (1 meter) wide, to ensure an optimal mini-climate.

COMPOST

- o Regular use of cured compost in the GROW BIOINTENSIVE growing area, to maximize soil water retention, soil structure building, and microbial diversity for soil health.
- o Non-use of green-manuring practices, to avoid depletion of significant amount of soil humus.
- o Minimal use of composted animal manure (less than one-sixth by volume of organic matter inputs), to avoid salt build-up and to minimize carbon lost through animal metabolism and curing process.

FERTILIZER

- o Use of only organic fertilizers (on a one-time-only basis whenever possible).

PLANT PROPAGATION AND SPACING

- o Close GROW BIOINTENSIVE off-set spacing, to protect soil with a “living mulch” of plants.
- o Use of flats or nursery beds for raising of seedlings and transplanting of seedlings into beds for most crops, to minimize “in-bed” time, and water and seed used for each crop.

PLANTING COMBINATIONS

- o Crop rotations, to minimize “singular” nutrient depletion.
- o Companion planting, to encourage dynamic beneficial insect life.

APPENDIX 13: STEPS FOR A GROW BIOINTENSIVE® SUSTAINABLE MINI-FARM (continued)

SEEDS

- o Use of open-pollinated seeds, to preserve plant genetic diversity and mini-farm sustainability.
- o Non-use of hybrid, green-revolution and/or genetically engineered seeds, because of their general incapacity to reproduce true to type and for their narrowing of the global agricultural germplasm base.

WHOLE SYSTEM

- o Growing of compost crops, for closed-system sustainability.
- o Growing of calorie crops (i.e., root and grain crops).

GROUP 2: CRITERIA FOR “TRANSITIONAL GROW BIOINTENSIVE SUSTAINABLE MINI-FARMER”

(Prerequisite: “GROW BIOINTENSIVE Mini-Farmer” Criteria)

SUSTAINABLE SOIL FERTILITY AND DIET CALORIES (30%-65% of the GROW BIOINTENSIVE area)

- o Growing 30%-65% of the GROW BIOINTENSIVE area in *carbon crops* high in carbonaceous material to be used for composting (e.g. wheat, maize/corn, oats, barley, amaranth, cereal rye, quinoa, sorghum or local equivalents). These crops should also produce significant amounts of calories for the human diet.

ENSURING A COMPLETE DIET IN A SMALL AREA (15%-50% of the GROW BIOINTENSIVE area)

- o Growing 15%-50% of the GROW BIOINTENSIVE area in *special root calorie crops* for the production of large amounts of calories for the human diet (e.g. potatoes, sweet potatoes, garlic and parsnips or local equivalents). A small proportion of this area can be in crops with a medium level of caloric “area efficiency,” such as onions, turnips and leeks.

VEGETABLES AND/OR INCOME

- o Growing not more than 20% of the GROW BIOINTENSIVE area in *vegetable crops* normally used in salads, salsas and sauces (e.g. tomatoes, carrots, cucumbers and lettuce), for balancing out dietary vitamins and minerals, and/or *income crops* to minimize export of soil nutrients.

**APPENDIX 13: STEPS FOR A GROW BIOINTENSIVE®
SUSTAINABLE MINI-FARM (continued)**

**GROUP 3: CRITERIA FOR “FULL GROW BIOINTENSIVE
SUSTAINABLE MINI-FARMER”**

(Prerequisite: “GROW BIOINTENSIVE Mini-Farmer” and “Transitional GROW BIOINTENSIVE Sustainable Mini-Farmer” Criteria)

SUSTAINABLE SOIL FERTILITY AND DIET CALORIES (Approx. 60% of the GROW BIOINTENSIVE area)

- o Growing 50%-70% of the GROW BIOINTENSIVE area in *carbon crops* high in carbonaceous material to be used for composting (e.g. wheat, maize/corn, oats, barley, amaranth, cereal rye, quinoa, sorghum or local equivalents). These crops should also produce significant amounts of calories for the human diet.

ENSURING A COMPLETE DIET IN A SMALL AREA (Approx. 30% of the GROW BIOINTENSIVE area)

- o Growing 20%-40% of the GROW BIOINTENSIVE area in *special root calorie crops* for the production of large amounts of calories for the human diet (e.g. potatoes, sweet potatoes, garlic and parsnips or local equivalents). A small proportion of this area can be in crops with a medium level of caloric “area efficiency,” such as onions, turnips and leeks.

VEGETABLES AND/OR INCOME (Not more than 10% of the GROW BIOINTENSIVE area)

- o Growing not more than 10% of the GROW BIOINTENSIVE area in *vegetable crops* normally used in salads, salsas and sauces (e.g. tomatoes, carrots, cucumbers and lettuce), for balancing out dietary vitamins and minerals, and/or *income crops* to minimize export of soil nutrients.

OVERALL NATURAL SYSTEM SUSTAINABILITY

- o Leaving 50-75% of the farm property wild (protected, if necessary), to ensure ecosystem plant and animal diversity and water replenishment.