Organic Training Course

Participants' Manual

Restoring Community, Protecting the Land
and Informing the Earth's Stewards

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Writer, Editor,
Instructor Team Leader:

Phil Ferraro
c/o Institute for Bioregional Studies Ltd
114 Upper Prince Street
Charlottetown, Prince Edward Island
Canada C1A 4S3
902-367-0390
ibs_pei@yahoo.com

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Mission Statement

To consolidate all resources and stakeholders in the organic food industry in Atlantic Canada; to build a comprehensive organic food infrastructure; and to increase the viability of Atlantic Canadian family farms and their communities.

History

ACORN has been in development since 1998 when members of the four regional organic grower certification groups (PEI/NS/NF and NB chapters of the Organic Crop Improvement Association (OCIA), Nova Scotia Organic Growers Association (NSOGA), and Maritime Certified Organic Growers (MCOG)], along with a number of organic food cooperatives, processors, retailers, educators, inspectors and consumers, determined they needed a regional organization to act on their behalf.

Over the course of two years a series of regional meetings were held to help determine how to organize and implement ACORN. Government officials, impressed by this fledgling organization, hosted a facilitated strategic planning session on PEI in April 2000. From this session a business plan was developed.

By October 2000 ACORN received financial commitments of $20,000 per year, for three years, from PEI, NB, and NS. Newfoundland has yet to commit funding, but ACORN and Newfoundland industry stakeholders hope to have funding in place in the near future.

Looking toward the future, ACORN envisions becoming a primary resource for organic industry development in Atlantic Canada.

To reach ACORN contact:

On the web: www.acornorganic.org

Statement of Need for Organic Education

After decades of being ignored or at best referred to as the back water of agriculture, the "organic movement" has gained significant reputation as a viable way of producing food. Organic is no longer a fringe movement. In fact, organic agriculture is quickly assuming its role as an option within the mainstream.

This change in attitude and perception can be attributed to many circumstances. First of all, the unyielding commitment of the "back-to-the-land" generation of farmers, whom despite their relative lack of experience, in the nineteen seventies and eighties, sensed a better, more ecological way of doing things and learned to farm by just doing it. Unfortunately, despite their commitment, many of these modern day pioneers failed and returned to city life or converted to conventional, chemical agriculture. For the most part their forfeiture was not due to the lack of dedication or potential but a lack of existing infrastructure in education, research, marketing and distribution networks for organic foods.

The second factor in the persistent growth of organic agriculture has been the ever increasing consumer demand. This market was first established by small numbers of people whom developed allergies to the foods and/or perceived the potential threats to environmental sustainability caused by chemical farming. Today, there is an expanding consumer concern over the safety of genetically modified foods. The labelling of "certified organic" has gained wide acceptance as an assurance that food products are pure and wholesome.

A turning point for the development of the organic agriculture industry has been the recent government support for what has now become a major marketing opportunity. Organic agriculture now represents a little over two percent of North American food sales. With an annual growth rate of over twenty-two percent, it represents the fastest growing sector of the industry. In Atlantic Canada, a recent study (The Pulsifer Report) commissioned by the four Atlantic provincial governments identified major opportunities for marketing organic products in New England. Even larger markets exist in Europe, Japan and across North America. Some European countries have mandated a goal of having over 30% organic foods within three years! In Canada, this realization of the changing marketplace has led to national organic standards, the hiring of organic specialists within various agriculture departments, financial support for organic grower organizations and research dollars for growers and scientists.

Farmers have traditionally considered themselves to be true environmentalists. However, the primary beneficial results of twentieth century, industrial agriculture focussed on short-term economic advances. The social, environmental and economic imperatives of the twenty-first century require that society develop a holistic approach to sustainability. Organic practices, while not perfect, move steadily towards this ideal.

Many producers may never choose to make a full transition to "certified" organic agriculture. However, all farmers will benefit from gaining a greater understanding of the benefits of organic agricultural practices for sustaining their industry.

Course Objectives

The objectives of this course are to:

- Provide a definition of what Organic Agriculture is and document the history of the movement from early pioneers to some present day industry leaders,

- Present the Canadian Minimum Standards for Organic Agriculture and review the major requirements that have to be met in order to become certified,

- Examine how to make a transition to Organic Agriculture and to make ongoing management decisions based upon ecological principles,

- Discuss the ecological practices of Organic Agriculture which enhance the long-term stewardship of the land, air and water including:
  - Soil Fertility and Stewardship,
  - Weed Control,
  - Compost,
  - Crop Rotations and Companion Planting,
  - Cover Crops and Green Manures,
  - Insect and Disease Control,
  - Livestock Husbandry,
  - Greenhouse Production,
  - Holistic Farm Planning and Design.

- Assist each participant to evaluate farm practices according to organic standards and to start designing a farm plan according to ecological principles.

Getting Started - Introductions

Name:_____

Farm Operation: Acres:_____
Crops:_____
Livestock:_____
Natural Areas/Forests:_____
Natural Areas/Wetlands:_____

What did the farm look like before it was a farm?
(A farm carved out of a hardwood forest will have different ecological factors than one carved out of a prairie or a drained marsh. Knowing what came before can give insights into what will work well now.)

_____

What native species of animals and plants live on your farm?_____

_____

What crops, livestock or other important changes do you plan to introduce to your farm in the next 5-10 years?

_____
_____
_____
_____

Describe the environmental, social and economic goals that you plan to accomplish within the next 12 months, five years and ten years in order to make your farm operations more successful.
12 months: _____

_____

Five years: _____

_____

Ten Years: _____

_____

What do you hope to gain from participating in this course?

_____
_____
_____

What opportunities and responsibilities do you recognize on your farm as having the potential for making a positive environmental impact?

_____
_____

What is Organic Agriculture?

Organic agriculture is a holistic system with the primary goal of optimizing the health and productivity of interdependent communities of soil life, plants, animals and people. Management practices are carefully selected with an intent to restore and then maintain ecological harmony on the farm, its surrounding environment and ultimately the whole planetary ecosystem. *(Developed by the USDA National Program in 1994 and serves as a general outline of the definition of Organic.)*

Principles

1. Protect the environment, minimize pollution, promote health and optimize biological diversity.
2. Replenish and maintain long-term soil fertility by providing optimal conditions of soil biological activity.
3. Maintain diversity within the farming system and its surroundings and protect and develop plant and wildlife habitat.
4. Recycle materials and resources to the greatest extent possible within the farm and its surrounding community as part of a regionally organized agricultural system.
5. Provide attentive care, that meets both health and behavioural requirements of livestock.
6. Maintain the integrity of organic food and processed products through each step of the process from planting to consumption.
7. Develop and adopt new technologies with consideration for their long range social and ecological impact.

Requirements for Certification:

1. Membership with a recognized Certification Body (OCIA, MCOG, OCPP);
2. Production methods meet regulated standards;
3. Farm must pass an annual inspection; and
4. and audit trail must be maintained with excellent records of purchased inputs, production and sales.

Why do you want to farm organically?

_____

_____

List the benefits and rewards of organic farming.

_____

_____

Who are/were some of the key players in the development of the industry?

Making the Transition to Organic Agriculture

✓ Education is an on-going, never ending process. Read books. Attend conferences. Participate in courses. Visit other organic farms. Join/Form a study group of peers.

✓ Certification Requirements:

Three years from date of first harvest;
A transition plan to certify the entire farm if only part is being certified;
Some certification organizations require a preliminary inspection one year before certification.

✓ Establish a rotation that allows soil time to regenerate before taxing it with heavy demanding crops.

✓ Test the soil and adjust nutrient applications certifiable amendments, such as limestone.

✓ Start on a small scale that you can manage well. Some organic practices can be more labour intensive rather than capital intensive. Monitor results, make adjustments before you expand.

✓ Diversify your crops with a good crop rotation to enhance the long-term sustainability of the farm.

✓ Think outside the box.

"The problem is always the solution." Bill Mollison

"Small is beautiful.....We have yet to determine how small an enterprise can be and still be economically viable." E.F. Shumacher

"Think Long Term. Act Now!"

✓ Nature knows best. Ask and learn from nature and be more humble.

✓ Celebrate! Organic agriculture is a pursuit of a higher self-interest that contributes to a sense of quality of life. Beyond the narrow self-interests of personal concerns (i.e. greed and selfishness) organic agriculture is a pursuit of higher interests that value relationships with other people and

stewardship of the Earth as an important dimension of one's self-interests.

✓ Know your market.....where, price, needs, volume etc.

What is Soil?

"Healthy soil is fundamental to the quality of food it produces and to the health of those who eat the food produced from it."

How do you define what soil is?

_____

_____

_____

What farm practices impact on soil life? (Positive and Negative)

_____

_____

_____

Rank the negative impact practices in the order in which you think they should be eliminated.

1._____
2._____
3._____
4._____
5._____

What are the Physical Properties that make a good soil?

_____

_____

What are the Chemical Properties that make a good soil?_____

_____

_____

_____

_____

What are the Biological Properties that contribute to a healthy soil? _____

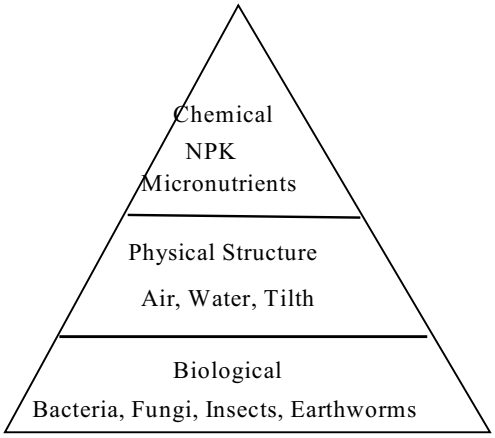
_____

_____

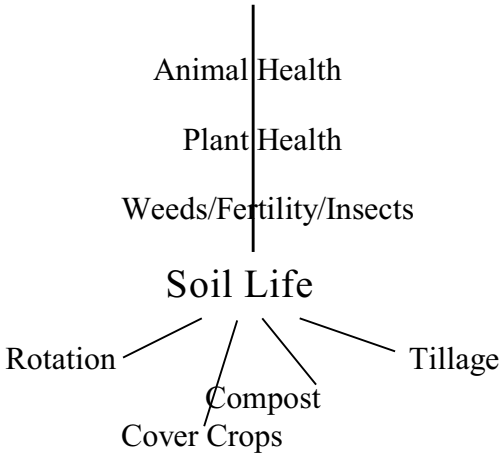
_____

What is one thing that you could do differently on your farm to improve soil health?

Components of Soil Health



Human Health



The Soil's Web of Life

Soil Type	Bacteria/gr. soil	Species
Desert Soil	1 million	100
Grassland	600 million	15-40,000
Forest	100,000 million	1 million

There are several miles of fungi, and perhaps 5000 species of fungi per teaspoon of soil.

Aeration: Lack of air will increase disease causing fungi and invite weed & disease problems.
What causes soil compaction?_____

_____

_____

Nematodes:_____

Bacteria:_____

Fungi:_____

How do we maintain a healthy soil?

_____

_____

_____

_____

_____

_____

_____

Organic Soil Stewardship

The basic premise of organic soil stewardship is that all plant nutrients are available in the soil. The key is to make them available as plant food by maintaining a biologically active soil environment. ie. "Feed the Soil, Not the Plants".

What must we do to maintain fertility and soil structure in a sustainable organic farming system?

_____
_____
_____
_____

What is Organic Matter?_____
What is Humus? _____

What crops add or deplete organic matter in the soil?

_____
_____
_____
_____

How can we build fertility in the soil?

_____
_____
_____
_____

"By creating optimum living conditions for soil organisms, i.e. near neutral pH, moisture, warmth and oxygen, we can increase the rate of mineralization and provide enough fertility for the most demanding crops." Norbert Kungl; Selwood Green Farm, Walton, Nova Scotia

What Soil Amendments are allowed in organic systems? What nutrients do they provide?

_____
_____
_____
_____
_____
_____
_____

Weed Control

What are weeds?

_____
_____
_____

What are your two worst weeds and in which crops do they most often appear? (i.e. lambs quarters in potatoes, thistles in pasture, wild radish in cereals)

1.Weed_____ Crop _____
2.Weed_____ Crop _____

What biological and/or mechanical means do you rely upon most often to control weeds?

_____
_____

What other cultivation practices can organic farmers use to control weeds?

_____
_____
_____
_____
_____
_____

How can weeds be used as indicators of soil nutrients and soil conditions?

_____
_____
_____
_____

What other weeds are indicators of soil conditions and or make good companions for improving soil?

_____
_____
_____
_____
_____
_____

Compost

Why do we use compost?

What materials can you use on the farm to make compost?

How much compost should we use and when should it be applied?

While use of compost is commonly used in organic systems, the actual construction and maintenance of compost piles — including frequency of aeration and length till maturity — may vary among farming operations.

Contrasting viewpoints exist in the compost industry as well as amongst on-farm compost makers as to which method is best. Ultimately, the choice of composting method will depend to a large extent on the scale of farming operation, equipment and financial resources on hand, and intended goals for compost end-use. (USDA Organic Standards require turning five times!)

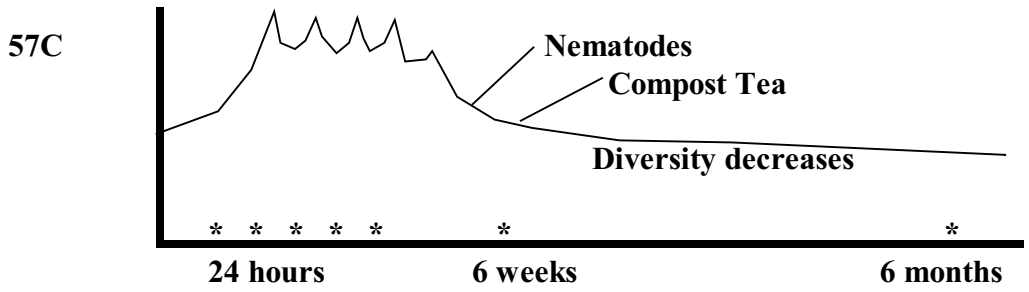
Composting Methods

How do you make compost? What other composting systems can be employed?

What is the source of your manure? What is the value of different types of manure?

Phases of Compost:

Compost that has been turned is best to use in 4-6 weeks. Apply to land before 6 months.



How can we use liquid manure compost and herbal teas? What is their value?

_____

_____

_____

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What are some of the herbs used to make teas?

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_____

_____

_____

What is the purpose of liquid seaweed and fish emulsion?

_____

_____

_____

_____

Crop Rotations & Companion Planting

What is the importance of crop rotations?

_____
_____
_____
_____

What are some of the features of a good crop rotation?

_____
_____
_____
_____

What is the crop rotation you use or are most familiar with?

_____
_____
_____

What is companion planting?

_____
_____

What are some good companion planting strategies that organic farmers could take advantage of?

_____
_____
_____
_____

Heavy Feeders – Medium Feeders – Light Feeders – Legumes/Grass

Heavy Feeders - Examples:

_____

Medium Feeders - Examples:

_____

Light Feeders - Examples:

_____

Legumes and Grasses - Examples

_____

What are the components of a good crop rotation?

Sample Rotations:

Spring **Fall** **Evaluation**

Spring **Fall** **Evaluation**

Spring **Fall** **Evaluation**

Sample Rotations:

Cover Crops and Green Manures

What are the principal uses of cover crops and green manures?

What is the importance of these practices in organic farming?

Green Manures are any crop that is grown in the rotation for the purpose of incorporating its biomass into the soil. Green manures are important for rebuilding soil structure, conserving moisture, controlling erosion and reducing the leaching of nutrients from the soil.

Principal Uses of Cover Crops and Green Manures

Winter cover crop

Summer green manure crop

Living mulch

Catch crop

Forage crop

Cover Crops in Rotation

Spring	Fall	Cover Crop Advantages
Spelt	Oilradish	Relays nutrients to following crop, dies in winter, loosens soil
Oats	Rye	Winters over, Mow when flowering to kill-mulch for soybeans
Soy	Sweet Clover	Undersow in soy, legume for corn
Corn	Clover/Grass	Winter cover, forage/hay 2 years +

Buckwheat can follow lettuce and still be tilled down in time for fall broccoli.
Hairy vetch winters over can be killed by flail mowing and tomato sets planted into the mulch.
Fall rye can be spread into potatoes; Winter Wheat can come after early potatoes

What are some of the limitations of cover crops?

_____
_____
_____
_____
_____

What cover crops would you use in your rotations?

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_____
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_____

Insect Management

What insects are most prevalent on your farm; on which crops are they most often found and what do you do to control them?

Insect_____Crop_____ Control_____

Insect_____Crop_____ Control_____

Insect_____Crop_____ Control_____

What makes people sick? How does this correlate to plant and soil health?

_____
_____
_____
_____
_____

The primary philosophy of organic agriculture is that health is normal and insect species naturally create a harmonious balance. Disease and/or imbalances of insect populations are normally due to interventions that disturb natural life cycles.

What can cause insect and disease imbalances?

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_____
_____
_____
_____

What tools can organic farmers use for managing pests?

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_____
_____
_____
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_____

Plants That Attract Beneficial Insects

Plants that attract beneficial insects can be a valuable contribution to the health of the crop, the soil and the beauty of the farm.

What plants can be used to attract beneficial insects?

_____
_____
_____
_____
_____
_____
_____
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_____

PLANTS FOR POLLEN AND NECTAR

Annuals:

Basils (Ocimum basilicum)
Bachelor's buttons (Centaurea cyanus)
Bee phacelia (Phacelia tanacetifolia)
Birds Eyes (Gilia tricolor)
Blue Lace Flower (Trachymene coerulea
Borage (Borago officinalis)
California poppy (Eschscholtzia californica)
Candytuft (Iberis umbellata)
Chervil (Anthriscus cerefolium)
Coriander (Coriandrum sativum)
Corn (Zea mays)
Corn poppy (Papaver rhoeas)
Cosmos (Cosmos bipinnatus)
Dill (Anethum graveolens)
Lobelia (Lobelia erinus)
Meadow foam (Limnanthes douglasii)
Mexican sunflower (Tithonia rotundifolia)
Pincushion flower, (Scabiosa atropurpurea)
Signet (ŒGem') marigolds (Tagetes tenuifolia)
Sunflowers (Helianthus annuus)
Sweet alyssum (Lobularia maritima)
Sweet marjoram (Origanum majorana)
Tidy Tips (Layia platyglossa)

Perennials.

Asters (Aster alpinus and A. tartaricus)
Angelicas (Angelica)
Anise hyssop (Anastache foeniculum)
Basket of Gold (Aurinia saxatilis)
Bishop's weed (Ammi majus)
Blanketflowers (Gaillardia)
Blue cardinal flower (Lobelia syphilitica)
Bog rosemary (Andromeda polifolia)
Catmints (Nepeta)
Carpet bugleweeds (Ajuga)
Cinquefoils (Potentilla)
Comfrey (Symphytum)
Coneflowers (Echinacea)
Coral vine (Antigonon leptopus)
Coreopsis (Coreopsis)
Crimson thyme (Thymus serpyllum)
Crocus (Crocus)
Cup plant (Silphium perfoliatum)
Evening primrose (Oenothera biennis)
Fennel (Foeniculum vulgare)
Feverfew (Chrysanthemum parthenium)
Garlic Chives (Allium tuberosum)
Golden marguerite (Anthemis tinctoria)
Goldenrod (Solidago)
Jerusalem artichoke (Helianthus tuberosus)
Thrift (Armeria maritima)
Green lace flower, (Ammi visnaga)
Wild Bergamot (Monarda fistulosa)
Wood Betony (Stachys officinalis)
Yarrows (Achillea)
Patrinia (Patrinia)
Korean mint (Anastache rugosa)
Lavenders (Lavandula)
Lavender globe lily (Allium tanguticum)
Lovage (Levisticum officinale)
Lupines (Lupinus)
Milkweeds (Asclepias)
Mountain Mints (Pycnanthemum muticum)
Mints (Mentha)
Mountain sandwort (Arenaria montana)
Peonies (Paeonia)
Pincushion flower (Scabiosa caucasica)
Poppy mallow (Callirhoe involucrata)
Queen Anne's lace (Daucus carota)
Sea lavender (Limonium latifolium)
Sea pink (Armeria alliacea)
Stonecrops (Sedum kamtschaticum, S. album)
Fernleaf Tansy (Tanacetum vulgare)
Teasel (Dipsacus)

Trees and shrubs.

Top choices include willows (for their early spring pollen to provide a food source and get overwintered beneficials off to a strong start),
Forsythia, Firethorn, Potentilla, Ceanothus, Four-winged Saltbush (Atriplex canescens), Euonymous.

Organic Disease Prevention

Plants growing in disease-suppressive soil resist diseases much better than in soils low in biological diversity. Restoring beneficial organisms that attack, repel, or otherwise antagonize disease-causing pathogens will render a soil disease-suppressive.

If health is normal why do we get disease?

_____
_____
_____
_____
_____

Conventional (fungicides, methyl bromide fumigants, etc.)
Focus on taking out the pathogen after its effects become apparent.

Organic
Focus on making the environment less disease-favorable, and the host plant less susceptible.

The general principle of organic production is to add the beneficial soil organisms and the food they need—the ultimate goal being the highest number and diversity of soil organisms.

What strategies can be deployed to control disease?

_____
_____
_____
_____

Specific suppression:

_____
_____
_____

General Suppression, Disease Suppressive Soils:

_____
_____
_____
_____

How can crop rotation be used to suppress disease?

_____
_____
_____
_____
_____

Seven years without any cruciferous (cole) crops for clubfoot to dissipate.
Three years between parsley is needed to avoid damping off.
Three years without tomatoes to avoid Verticillium wilt on potatoes.
Five years to suppress late blight in potatoes.

What role do plant nutrients play in disease control?

Soil pH, calcium level, nitrogen form, and availability of nutrients can play a major role in disease management.

Potato scab is more severe in soils with pH levels above 5.2. Below 5.2 the disease is generally suppressed.
Increasing soil pH or calcium levels may be beneficial for disease management in many other crops.

Calcium

_____

Magnesium

Potassium

_____

Why does compost work to suppress disease?

_____
_____
_____
_____
_____

Three approaches can be utilized to increase suppressiveness of compost.

1. curing the compost for four months or more;
2. incorporating the compost in the field soil several months before planting; and
3. inoculating the compost with specific biocontrol agents.

Compost and Disease Suppression

Compost Treatment and Disease Management

Vegetable	Pathogen/Disease	Treatment	Comments
Alfalfa	"Clover tiredness"	Four years of treating fields with high-quality compost	Stand thickness and yield doubled, weeds crowded out
Barley/Wheat	Powdery mildew	Compost added to soil.	Disease incidence suppressed 95% when 1:1 soil; compost mixes used.
Beans	Rhizoctonia sp.	Compost added to soil at varying rates (36-72 tons/acre).	Disease reduced 80% in areas with highest compost rates, 40% where intermediate rates applied. Control plots yielded 75 bushels/acre, compost plots yielded 200 bu/acre.
Cucumber	Sphaerotheca sp./ Powdery mildew	Young cucmber plants grown in soil/compost mix of variable rates.	1:1 soil:compost mix decreased PM by 20% over control; 1:3 mix decreased infection by 40%
Pea (pisum sativum)	Pythium sp./Damping off	Seed treatment; seeds soaked in dilute compost extract, dried before sowing.	Peas seed-treated with compost extract germinated significantly better than untreated seed in soil artificially inoculated with Pythium ultimum
Peppers	Phythophthora sp.	40 tons of compost per acre.	Compost in combination of hilling plant rows is best practice to reduce Phytophthora
Soybeans	Phythophthora sp.	40 tons of compost per acre.	Control achieved

Livestock Husbandry

How do animals benefit the organic production system?

_____

_____

_____

How can animals create ecological damage if not properly managed?

_____

_____

_____

Certified Organic Livestock Production & Management ensures:

- animals are raised in environments that allow free movement and opportunity to express normal
  patterns of behaviour
- free of hormonal growth promotants and antibiotics
- certified organic feeds and forages free of pesticides and synthetic fertilizers
- opportunity to value add for related certified organic industries such as:
  organically grown grain and oilseed by-products
  forage production markets
  legume seed production - complimenting honey production
  composted manure for soil rebuilding programs

Goals:

1. Environmental and ecological sustainability is the top management goal.
2. Insuring that consumers have available, wholesome livestock products produced and processed without synthetic chemicals, additives or stimulants in order to promote healthier lifestyles
3. Supporting communities with sustainable local employment and economic activity
4. Maintaining a balance in the environment to sustain habitat and ecosystems

Four reasons to support the certified organic livestock industry:

1. It is good for the consumer. Consumers can choose to eat meat that has been raised without the use of pesticides, fertilizer, antibiotics or growth hormones and be assured of this through world class certification standards.
2. It is good for the animal. Animals are raised with their comfort and well being in mind. More room, less stress makes for healthier animals.
3. It is good for the producer. Being an active link in the marketing chain, producers can realize a fair return on their cost of production to ensure sustainability of the family farm.
4. Good for the land. No synthetic pesticides or fertilizer or genetically modified inputs are used.

Animal Husbandry Comparison Models

Factory Farm (< 90% on-farm feed)	Organic Farm
• Highly specialized (large scale)	• Diverse (small scale)
• Intensive confinement to minimize labour	• Environment suited to well being of the animal
• Genetics, nutrition focussed on production	• Genetics, nutrition focussed on health
• No connection to land base	• Land essential link in farm ecosystem
• Animals perceived as production units	• Animals have intrinsic value as fellow creatures
• Marketed as uniform (substandard) commodity	• Specialty markets, often direct sales
• Medicated feed	• Emphasis on disease prevention
• Antibiotics, parasite controls, kill pathogens in animal	• Stimulate animal's immune response
• Hormone stimulants	• Natural remedies
• Short lifespan	• Natural diets
	• Longevity

Ecological Livestock Husbandry Philosophy

1. Health is normal.
2. Disease is preventable.
3. I am responsible.

What areas of your livestock system could be more ecologically sound if managed differently?

_____

_____

Principles of Health Management

1. Recognize that you are responsible for animal health.
2. Provide clean, healthy housing (minimize dust, mud humidity, freezing and wind).
3. Minimize stress (avoid overcrowding, disturbances, unnecessary lighting).
4. Provide adequate, clean water.
5. Avoid starvation. Feed 2% of body weight per day; 20# + dry feed per 1000 pound animal. Minimum 8% protein to adults and minimum 24% protein to <1yr olds.
6. Allow eight hours a day for grazing or eating (1 head per 4-5 acres is ideal capacity).
7. Avoid mineral imbalances (provide diversity of feed and forage and herbal leys).
8. Graze top half of plant then move to avoid foot rot, pink-eye and pneumonia.
9. Minimizing grazing and feeding on ground with excessive manure to avoid parasites, coccidiosis, diarrhea, and pink-eye.
10. Provide access to daily exercise area.

Grass Fed Cattle

1. Market ready beef cattle can be raised on pasture/grass until ready for market. New research evidence shows that adding a lot more grass to cattle's diet will still produce high-quality beef.
2. In the grain-on-grass system, cattle make their own dietary choices, deciding how much grain they need, depending on the grass supply.
3. A high-energy diet composed mostly of corn can be provided in a covered feeder to give cattle additional energy for fattening. In the grain on-grass system, cattle make their own dietary choices, deciding how much grain they need, depending on the grass supply.
4. Under the grain-on-grass system, feed and production costs are lower.
5. With four animals per acre, the producer's grass pasture is worth $100 per acre for finishing cattle.
6. Cattle finished in the pasture reach about the same end weight as those finished in feedlots, but they have about 3 percent less fat.
7. Regulations require farmers to capture, store, and dispose of the animal waste they generate. In the pasture system the cattle distribute the manure over the pasture, where it can be incorporated into the soil and used to fertilize the grass for future growth.
8. From an ecological standpoint, the grain-on-grass system reduces the concentration of animal waste and allows some producers to finish their own cattle without incurring the added cost of waste disposal.

Free Range Chickens

1. Range on sod in rotation with vegetables. Pasture can provide >40% of feed.
2. Keep grass short by mowing or including sheep. (4 sheep + 200 chickens per acre).
3. Use older dual purpose breeds. “Exotic” meat-breed birds do not stay on legs.
4. (White Rocks, Barred Plymouth Rock, Dark Cornish, Mottled Houdans)
5. Movable housing (Chicken tractors) provide shelter at night.
6. Sprout your grains!
7. Provide minerals (oysters shells).
8. Avoid overcrowding; 1.5-2' per bird roosting space. 2-4 sq. ft./bird in winter housing.
9. Permanent pastures and/or borders should have fodder producing trees and shrubs (siberian pea shrub, locust, mountain ash, serviceberry, comfry, stinging nettle, chicory.)

Chicks: Coccidiosis is main concern. Clean litter daily. Keep them warm and dry. Provide constant clean water supply.

Pig on Pasture

Pasture Farrowing Hints
By Greg and Lei Gunthorp

1.Farrow on light ground. The sandier and hillier the better. Trees for shade is a definite plus for warm weather.

2.Select for good mothering genetics. Confinement genetics will need at least 40% culling. Colored breeds tend to work best.

3.Have enough bedded huts for sows to farrow in. Using extra until you understand where they will farrow is definitely recommended.

4.Work with the sow's natural instincts. They want to farrow away from the group. Have a hut anywhere they are going to farrow. They normally start in the corners. They will farrow in the warmest spot in cold weather. The coolest spot in hot weather. They don't like to farrow beside an older litter. They won't farrow in a hut that has had a litter already farrowed in it even if the litter has moved on. Sows require a lot less attention farrowing on pasture. If your lot only has one shady spot expect all the sows to farrow under it if its hot. That would be a disaster.

5.Keep age in the lot very close. The most important thing to remember when raising pigs farrowed on pasture is that little pigs need colostrum. A sure way to fail is to allow pigs to get old enough to be running around robbing milk from young litters. The age that pigs start moving away from the huts depends a lot on the weather. Never, Never farrow in the same lot for more than 14 days! In hot weather you may only be able to get away with 2-4 days. This is the ideal place for hot tape electric fences. I'm not sure if there is an upper number per lot that will give you problems. One hundred farrowing in two days will cause a lot less problems than five that take one month to farrow in the same lot. I don't let groups of sows and pigs together until the little pigs are eating creep feed.

6.Keep huts bedded well enough to stay dry. This takes a lot of bedding in damp rainy weather. Hardly any in hot dry summer. One to 15 square bales of straw per hut from birth to six to eight week weaning is possible depending on weather. I start with a half a bale of straw before farrowing in nice weather. Don't cheat on straw!

7.Use a nice hut. Something that is rain-tight and not drafty. Sides either need to be sloped well or need guards to protect pigs. Of course the choice of hut depends on the time of year you intend to farrow. I know of people in Deep South farrowing Tamworth sows without huts. I also know of guys in Michigan farrowing hogs year around. It takes a very nice hut and a lot of bedding to raise pigs without supplemental heat. They will survive in the coldest weather if they have a dry, draft free hut with enough straw they can get completely covered up.

8.Farrow seasonally. Once a year would be an excellent addition to a crop farm. My pigs that are farrowed in late April make about the right size to hog down corn. If you were going to farrow only once a year you could move that back to late May.

9.Farrow on pasture. Bare dirt is either mud or dust. Dust and mud don't make very healthy environments for animals. Self feed the sows for lower labor requirements especially if they have big litters. A good legume pasture will save a lot on the feed bill.

Pasture Hog Hints
By Greg and Lei Gunthorp

1.Keep costs low. Spend money on only necessary things.

2.Don't cut corners on sow feed. My number of pigs sold per litter is over 90% of the pigs born alive. If they don't have decent litters you can't sell large litters.

3.Don't cheat on minerals. Hogs on pasture have a lower mineral requirement than confinement hogs, but they still need minerals.

4.Have plenty of high quality legume pasture. Frost seed clovers and alfalfas every year if you have to. Pigs love clover, alfalfa, chicory, rape, turnips, and short vegetative grass. Pigs aren't ruminants. They won't bloat on pure stands of alfalfa or clover. Pigs won't gain on pasture without grain. Sows can maintain weight on a very high quality legume pasture without grain. Genetics differ greatly in their ability to utilize forages and fiber. Colored breeds are much better.

5.Select gilts for breeding stock that thrived under pasture finishing.

6.Keep management level of the sows and gilts very high. Gilts should be less than seven months old when selected. They shouldn't farrow at less than one year old. They should weigh around 300 pounds when bred. 400 pounds at farrowing. If you are purchasing replacement gilts don't try to replace grain with pasture immediately. Pigs need time to adapt to a high fiber diet. Monitor condition of gilts closely. Farrowing small gilts is asking for trouble. Don't try breeding them at lightweight and getting them to gain enough to weigh four hundred pounds at farrowing. Your own replacement gilts fed a high forage diet from birth will give you much less problems for two reasons. The first is you have selected gilts that gained well on a high fiber diet in a pasture environment. The second is you are selecting them from genetics that are farrowing on pasture successfully. The best source of replacements is from your older sows that have farrowed successfully for years on pasture. Mothering ability is heritable.

7.Keep your fiber in your sows diet year around. It will increase litter size. The cheapest source is pasture. Hay in the winter is advised.

8.I vaccinate for reproductive diseases. I vaccinate for Parvo/Lepto/Erysiplis and PRRS. I have to catch them at weaning anyway. Giving the shot while I have them caught to ring isn't a lot of work. It costs about $3 per sow per year. I live too close to other pigs to risk not vaccinating them. I think a lot could be done on selecting resistant genetics. I don't vaccinate little pigs. I don't give them any shots. I don't clip teeth. I don't give iron shots. My death loss is non-existent. Shots wouldn't pay!

9.Castrate the little pigs at one-day-old. The sow is still slow from labor. The little pigs can run pretty fast after they are 24 hours old. The mother isn't very cooperative by then either!

10.Use all the available "technology" that is cost effective to lower your labor requirements. Some of this technology includes black plastic pipe, high tensile fence, and low impedance fence chargers, energy free waterers (Mirafont types), four wheelers, and round bales of straw.

11.Sort pigs off pasture by shutting them in their coops while they are sleeping. It saves a lot of time not having to chase them into a pen!

12.Utilize all farm resources. Land, Labor and Capital. Don't forget to use the sows to glean cornfields. Farrow in off-season from crop requirements.

Greenhouse Management

Products derived from algae, liquid seaweed, composted manure and fish emulsion have demonstrated nutrient levels comparable to conventional, synthetic fertilizers used for greenhouse plant production

Liquid fertilizer is not a substitute for a complete soil-based fertility program.

Because greenhouses are a controlled environment, nutrient deficiencies, disease and insect problems are more likely to arise.

Organic Strategies for Nutrient Deficiencies

Element	Deficiency Symptoms	Remedy
Nitrogen (N)		
Phosphorus (P)		
Potassium (K)		
Calcium (Ca)		
Magnesium (Mg)		
Sulfur (S)		
Manganese (Mn)		
Iron (Fe)		
Boron (B)		

How do you control weeds in the greenhouse?

_____

_____

What cultural practices do you use in the greenhouse (i.e. Soil vs. Potting Media Crop Rotations, Disease and Insect Prevention)?

_____

_____

_____

Variety Selection

Variety or cultivar selection plays an important role in greenhouse production.

What are some good cultivars for organic greenhouse production?

_____

_____

Living Machines

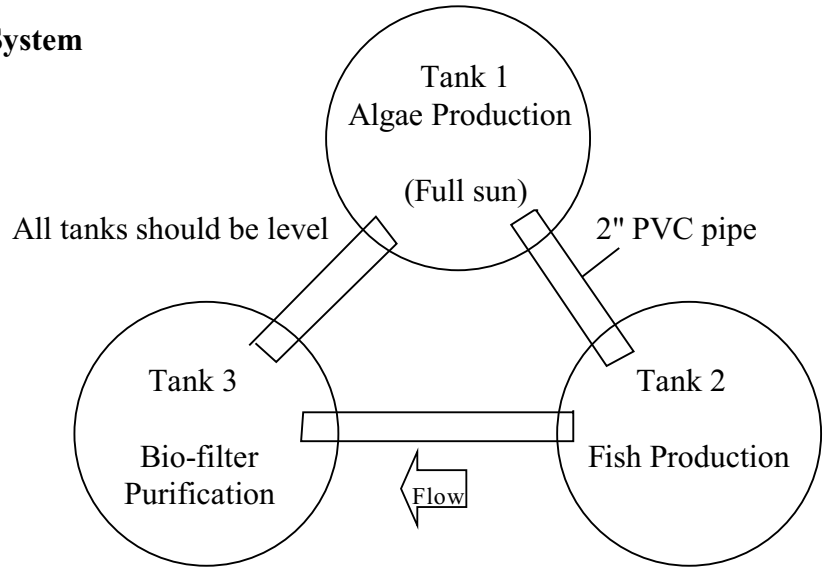
Living Machines®, are revolutionary natural wastewater treatment and reclamation systems that accelerate nature's own water purification process. Drs. John Todd and Bill McClarney developed these systems, in the 1970's, at the New Alchemy Institutes in Cape Cod, Massachusetts and Spry Point, Prince Edward Island; where they were initially created as intensive greenhouse fish and vegetable production units.

Today, Living Machines®, are used extensively around the world in integrated fresh water aquaculture/agriculture systems, as well as for municipal and industrial water purification plants.

Components:

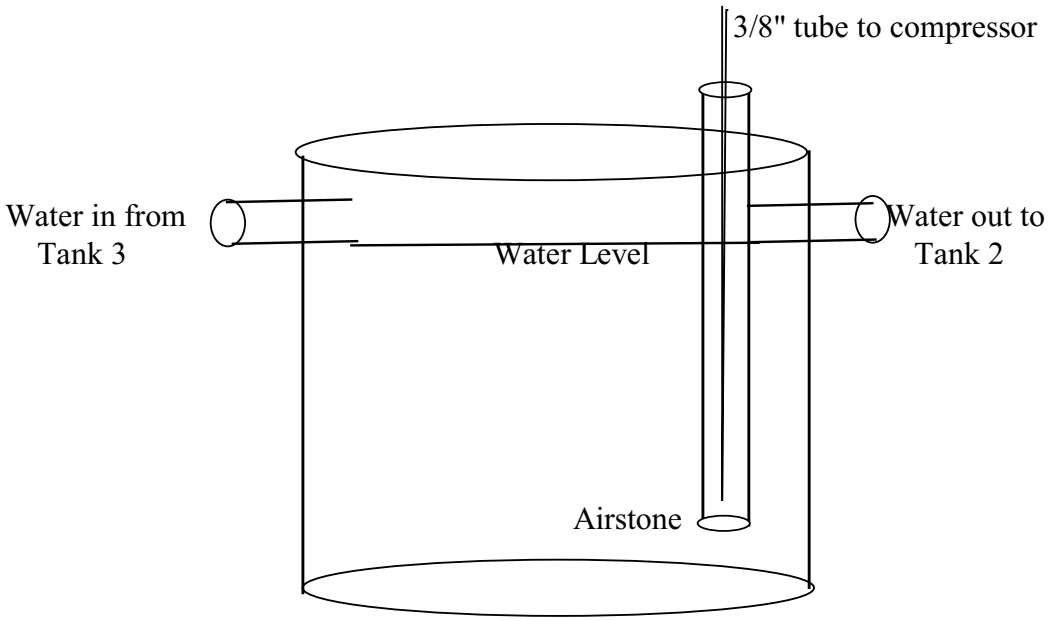
Three transparent water tanks (cells) 55 gallons+ (each)work best
Sunlight (greenhouse, outdoors or south facing windows)
1 air compressor (from an aquarium)

The System



Living Machine - Tank 1

This is primarly an algae production cell. Place in full sunlight. Fill with clean water (no chorine) to the level of the connecting pipes. An airstone in the downspout aerates the water and raises it enough to create flow to Tank 2.

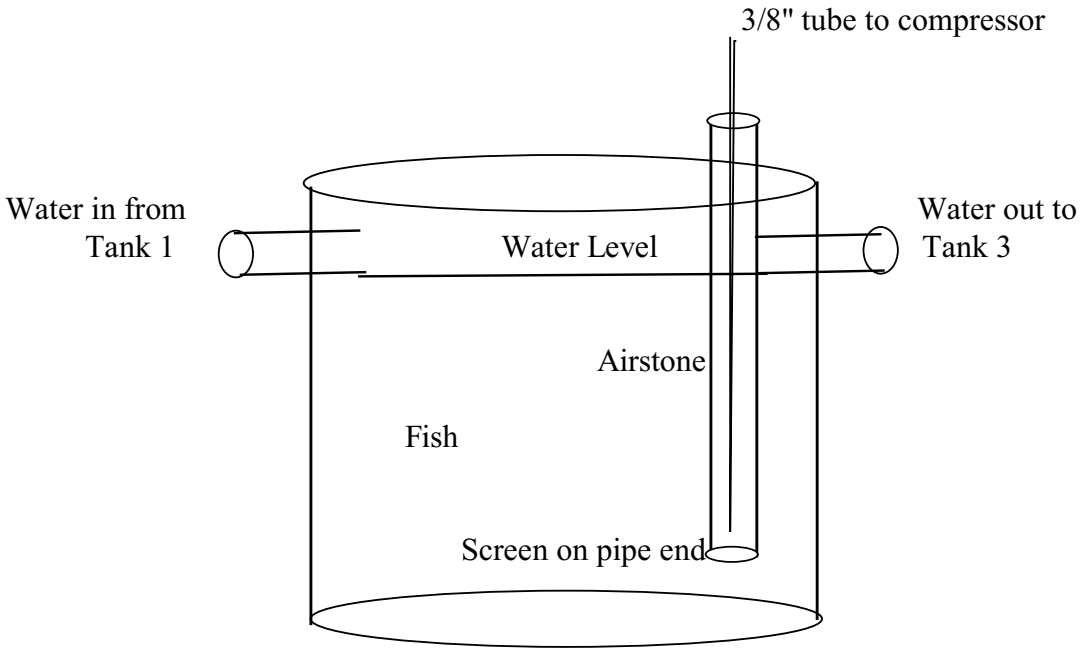


Add water from unpolluted ponds and/or streams to "seed" biological life.

Add duckweed, azolla, snails and other water plants and creatures to surface.

Living Machine - Tank 2

This is the primary fish production cell. Raise or lower airstone to control flow rate. The system should cycle completely in less the one hour.



Tilapia need 25-30° C. Add an aquarium heater if necessary. 50-75% of feed will be algae produced in Tank 1. A 55 gallon tank will hold 300-500 fingerlings. As they grow reduce to 50 fish. Add 1 catfish to keep bottom clean.

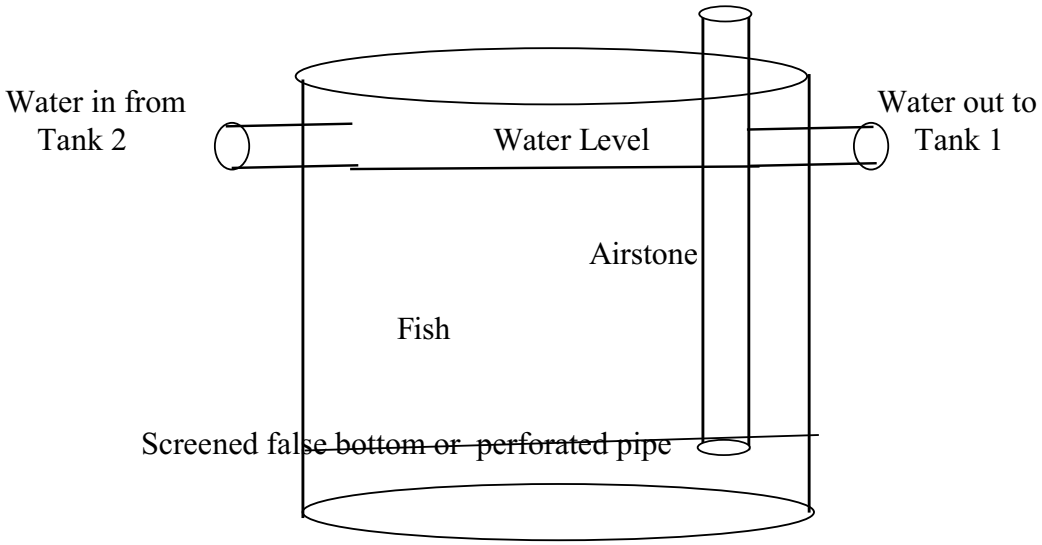
Koi and Goldfish (Carp) can tolerate cold temperatures.

Other species worth investigating: Bass, Catfish, Sunfish, Bullfish

See: *Freshwater Aquaculture*; by Dr. Bill McClarney for more information on species, fish culture and integrated plant and fish recirculating systems.

Living Machine - Tank 3

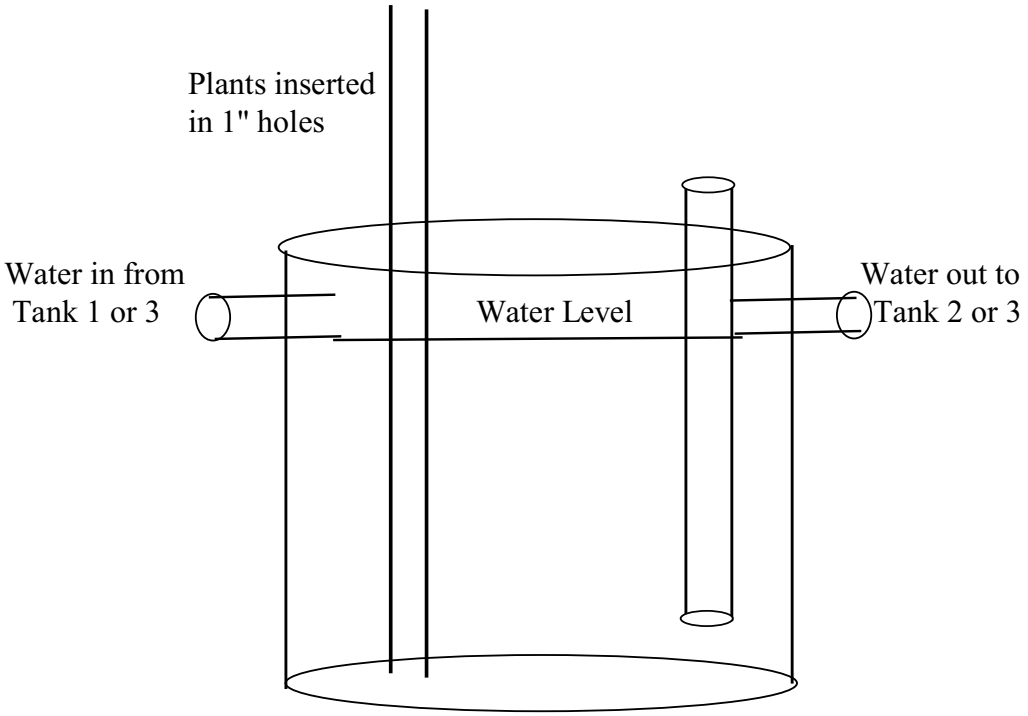
This is the nutrient rich, waste recycling cell. It cleans the water and recycles it back into Tank1. Fill the tank with mussel & oyster shells, and volcanic rock so that you have 50% water and 50% shells and rocks. Add a handful of compost to innoculate with nutrified bacteria to get it started. Add lots of snails (sp. Planorbids, Physa, Lymnea) to surface. If too alkaline reduce % of oyster shells and replace with rock or add baking soda.



Use this water to irrigate greenhouse beds and field and/or add hydroponic, plant production tubes to this cell and cell 1.

Living Machine - Plant Production System; **Tanks 1and/or 2**

Materials: Three 8-12', 4" PVC drain pipes, small pump, foam pads or beads, water distribution pan.



Three pipes can be strapped together for stability and perforated with 1" holes above and below the water surface.

Water is pumped from the tank to a pan on top of the pipes where it then drips down through the pipes. Plants are inserted into the 1" holes and held in place with “Pac Man shaped” foam pads.

Most certification bodies do not certify hydroponics; in which case flowers can be grown or the nutrient rich water can be used for irrigating beds or fields.

References:

Growing Edge magazine; www.growingedge.com
Tilapia Aquaculture International; www.cherrysnapper.com

Freshwater Aquaculture; by Dr. Bill McClarney

Holistic Farm Planning and Design

PERMACULTURE DESIGN PRINCIPLES

Permaculture, is the harmonious integration of landscape and people providing food, energy, shelter, and other material and non-material needs in a sustainable way. “Without permanent agriculture there is no possibility of a stable social order." Mollison 1988

Ethics - Stress positivism and cooperation.

- Care of the earth (all living and non living things),
- Care of people (promote self-reliance and sustainable communities)
- Sharing of surplus labor, food, goods, information and money to promote a caring life support system. “Take Personal Responsibility.”

Context - Ecological design begins with an intimate knowledge of a particular place.

Nature as Model - Mimic nature and accept the landscape rather than control it.

Relative Location - Use natural forces where possible to work for you.

Redundancy - Each element provides several functions; each function is addressed by several elements.

Efficient Resource Planning - Reuse, recycle and maximize resources.

Efficient Energy Planning - Resiliency and sustainability are gained by the use of renewable energy sources.

Comprehension - Technology, social relationships and governance are understandable, responsive and controllable. wins the race

Informed Decisions - Share knowledge, monitor results, respond to change so that observation, knowledge and participation replace power and standardization.

Biological Resources

Appendix

Organic Certification

There Are More Do's Than Don'ts

Though often characterized by what can't be used, such as synthetic fertilizers and pesticides, organic farming is actually more dependent on active improvements in the farm structure, such as crop rotations and green manure crops. Simply removing agrochemical inputs is not enough to turn a conventional farm into an organic farm. Dynamic organic practices which improve the biological activity of the soil and the environment must be undertaken.

Most organic farmers pay careful attention to composting. Quality compost is teeming with soil life. It is the essential soil organisms which are important to organic farms, rather than just the commonly used crop nutrients. Organic farmers believe that soil which has been inoculated with quality compost is itself healthier soil for growing crops. Plants grown in healthy soil will be better able to feed and protect themselves, thus not requiring heavy applications of fertilizers and pesticides. Green manure crops - growing a crop (clover, buckwheat of rye, for example) in order to plough it into the soil before it seeds - provide organic matter and nutrients to following crops. Every organic farm must have a 'Crop Rotation Plan' to ensure that steps are being taken to improve the overall quality of the soil. The statement, "Feed the soil, not the plant," is a familiar refrain among organic farmers.

Animal Welfare Is Important

Similarly, the key to organic livestock management is the health and living environment of the animals. Rather than relying on antibiotics to reduce disease, organic farms prevent disease by ensuring that animals have a healthy lifestyle, with lots of pasture, comfortable and spacious shelter, and opportunity for natural socialization. Many new organic dairy farmers have found their herds have fewer health problems when grazing organic pastures and eating organic feed than when confined and fed heavily concentrated feed. Simply replacing conventional concentrates with organic ones would not be adequate.

Chickens, ducks and turkeys must have access to pasture and (in the winter) covered outside runs. Battery cages are not allowed and poultry must be fed an all-vegetative diet, consisting only of certified organic grains, oilseeds, hay, grass and vegetable matter. Stocking rates inside barns and corrals require animals to be able stand-up, lie down, stretch and move comfortably and engage in normal social behavior for an animal of their species. All livestock must have access to food, water, fresh air, daylight, veterinary care and shelter from inclement weather.

Organic Farms Care For the Environment

Environmental protection is the primary reason most organic farmers become involved in organic agriculture. Concern for the environment is portrayed in many aspects of organic farming:

care in the handling of all animal wastes

protection of stream banks and watersheds

protection and fostering of wildlife including wild bird populations

avoiding the use of agricultural toxins - pesticides, herbicides, fungicides, chemical fertilizers

researching new ways to recycle agricultural nutrients - closed-loop systems

promoting local production for local consumption to reduce the environmental effect of global transportation of food - reducing food air-miles

Certification is the Contract Between Organic Farmers and Consumers

Organic certification is the only guarantee to consumers that organic farmers are doing what they say they are doing. Organic Certification can take many forms, but it is basically a system of site inspection by an independent third party, reviewing of inspection reports and assignment of organic status. It is the process of farming which is inspected and certified, rather than the final product. Thus, many product labels will indicate a food has been "Produced in Accordance", with certain standards. this process is undertaken by a variety of independent societies based in the different regions.

Government Legislation and Control Provides Extra Assurance to the Consumer

Organic certification is governed by regulations in the National Canadian Minimum Standars for Organic Agriculture. Government controlled audit of the certification process is being developed. The phrase, Certified Organic and an accompanying program symbol can be used only by farmers or processors who are certified under a Certified Organic program - there are large penalties under law for their misuse.

Organic Standards are the Basis for Organic Certification

Organic Standards along with the list of materials which are allowed under the Certified Organic program are available from various Certification Bodies. The Organic Management Standards is a living document and is amended yearly as new information about products and practices becomes recognized. The Organic Management Standards are meant to be used as a guide to the minimum standard only and should be accompanied by organic production guides for relevant crops or livestock.

Steps to Organic Certification.

1.Farmer applies for certification to Certification Body.

2.Farmer must complete Certification Application and provide documentation as requested.

3.Farm maps, production records, herd health records, material application records are examples of documents which may be required.

4.The farm must be inspected by a Verification Officer who is a member in good standing of the International Organic Inspectors Association.

5.The farm's organic status (1st, 2nd, 3rd year transition or Certified Organic) is determined by the Certification Body and the farmer receives a Certificate which allows them to use the phrase Certified Organic to market their products.

6.This process must be completed annually to retain organic status.

Organic Certification Applies to Processors, Handlers and Retailers as Well

As organic Certification seeks to provide a discernible audit trail for all organic food, from the farm to the retailer, companies which manufacture or distribute food beyond the farm gate must also be involved in the organic certification process. Organic Certification Standards specify which processes, cleaning materials and ingredients may be used in organic processing. These Standards are constantly changing as more organic foods become available and more environmentally friendly processing products are discovered.

Frequently Asked Questions

Q: Isn't everything really organic?

A: The term, organic, refers to a specific farming system. Ecologique, or Biologique is used in other parts of the world to describe the same process. The words "organic". "spray-free", or "natural", without certification, have no generally recognized meaning.

Q: Doesn't the spray from neighboring farms pollute organic farmer's crops?

A: Organic farms must plant buffer strips alongside neighboring fence lines. Organic crops cannot be harvested from these buffer strips.

Q: Why does organic food cost so much?

A: Organic farms are often smaller and require more labour to replace agro-chemicals. Chemical-intensive agriculture can produce more product faster while animals allowed to live more naturally may not grow as fast or produce as many eggs as those who are confined and fed drugs. As organic production increases and new organic farming methods are discovered, price premiums for organic food will decrease.

Q: If I convert my farm to organic, will I have to replace all my fence posts?

A: The use of fence posts is determined by what they are made of, as detailed in the Materials List. As disposing of prohibited posts would cause more environmental harm than leaving them in place, organic farmers do not have to replace existing fence posts but must use only approved posts on new fencing.

Q: Is organic food sanitary?

A: In addition to the regulations for organic certification, organic farmers must abide by the Government Food Safety Standards just like other farmers. Organic farms are also inspected annually by independent inspectors. Organic farmers are the most heavily regulated farmers in Canada.

Q: What about Genetically Modified Organisms?

A: The use of genetically modified organisms is prohibited by all Standards for organic certification around the world. The U.S. National Organic Standards Board defines a GMO as "made with techniques that alter the molecular or cell biology of an organism by means that are not possible under natural conditions or processes. Genetic engineering includes recombinant DNA, cell fusion, micro and macro-encapsulation, gene deletion and doubling, introducing a foreign gene, and changing position of genes. It shall not include breeding, conjugation, fermentation, hybridization, in-vitro fertilization or tissue culture."

Q: Do I have to use certified organic feed for my livestock?

A: Yes. Certified organic feed is becoming readily available ACORN can furnish information about feed suppliers. Farmers are allowed to use conventional minerals in their feed mixes, provided they do not contain prohibited substances.

Q: Will I not be allowed to treat my animals with antibiotics?

A: Certification standards require treatment of sick animals. However, slaughter animals treated with prohibited products (antibiotics) may never be sold as certified organic.

Q: Are organic farmers allowed to bring manure from their neighbours farm?

A: Manure brought from off-site must be fully composted before it can be used. All inputs brought from off-farm must be documented in farm records.

Resources

Organizations

Atlantic Canada Organic Regional Network (ACORN)
A voice for organic agriculture in Atlantic Canada
RR1 Belfast, Prince Edward Island C0A 1A0
tel: 902.659.2790 toll free: 866.32.ACORN
fax: 902.659.2419 e-mail: development@acornorganic.org

Canadian Organic Growers (COG)
Box 6408, Stn J
Ottawa, Ontario K2A 3Y6
Canadian Organic Growers Inc. is Canada's national membership-based education and networking organization representing farmers, gardeners and consumers in all provinces.
e-mail: info@cog.ca http://www.cog.ca

Ecological Agriculture Projects (EAP)
Faculty of Agriculture and Environmental Sciences
MacDonald College, McGill University
Ste-Anne-de-Bellevue, Quebec H9X 3V9
514-398-7771 http://eap.mcgill.ca

Organic Agriculture Centre of Canada
c/o Nova Scotia Agriculture College
Truro, Nova Scotia

Resource Efficient Agriculture Production (REAP)
Box 125 Glenaladale House
Ste-Anne-de-Bellevue, Quebec H9X 3V9
http://reap.ca

Sustainable Agriculture Network (SAN)
A communications and outreach arm of USDA
National Agriculture Library
10301 Baltimore Avenue
Beltsville, Maryland 20705-2351
301-504-6425 http://www.sare.org

Books

Rodale Institute Bookstore
611 Siegfriedale Road
Kutztown, PA 19530
800-832-6285
610-683-6009
http://www.rodaleinstitute.org

Green Manuring: Principles and Practice of Natural Soil Improvement. 1989. 51 pages.
This publication contains an excellent review of the benefits and uses of green manure cover crops. This 51-page spiral-bound book is largely based on green manuring trials in Switzerland and is supplemented with cover crop data compiled by Woods End Agricultural Institute of Maine and The New Alchemy Institute of Massachusetts. Tables include seeding rates and cost of seed per acre, biomass yields and nutrient contents, and characteristics of selected living mulches. It is available for $15 plus $4.50 shipping and handling, from:

Woods End Agricultural Institute
Rt. 2, Box 1850
Mt. Vernon, ME 04352
207-293-2457
http://www.woodsend.org

Straw-bale Culture of Greenhouse Crops; Loughton, Arthur. 1977. p. 208-215. In:
Merle H. Jensen (ed.) Proceedings of the International Symposium on Controlled-Environment Agriculture. Held April 7-8, 1977, Tucson, AZ.

Four Season Harvest; Coleman, Eliot. 1992. . Chelsea Green, Post Mills, VT. 212 p.
Inspired by Scott and Helen Nearing's garden in the late '60's and based on the author's success with harvesting fresh vegetables year-round in New England, this book contains details on design, construction, and management of the outdoor garden, cold frames, tunnels, and root cellars. It includes growing tips for 50 vegetable crops, a planting schedule for extended harvests and sources of tools and supplies. Available for 19.95 from:

Chelsea Green Publishing
P.O. Box 513
Lebanon, NH 03766
800-639-4099

The New Organic Grower: A Master's Manual of Tools and Techniques for the Home and Market Gardener, 2nd Ed. Coleman, Eliot. 1995. Chelsea Green, White River Junction, VT. 340 p.
Written primarily for the market gardener with 1 to 5 acres, the book is based on over 25 years of study and personal experience. It covers everything from land selection to marketing, including soil fertility management, field layout and spacing, rotations, direct seeding, transplanting, cultivation, season extension, and integration of livestock into the vegetable system. Extensive chapter notes and annotated bibliography. Available for $24.95 from Chelsea Green (see address above).

The Winter Harvest Manual; Coleman, Eliot and Barbara Damrosch. 1998. . Four Season Farm, Harborside, ME. 56 p.
Emphasis is on commercial production of greenhouse vegetables. Available for $15 from:

Four Season Farm
RR Box 14
Harborside, ME 04642

Biodynamic Greenhouse Management; Grotzke, Heinz. 1990. . Biodynamic Farming and Gardening Association, Kimberton, PA. 112 p.
One of the few publications specific to organic greenhousing. Grotzke has chapters on soils, fertilization, and biodynamic preparations, but they are short on technique and mostly contain insights on the biodynamic view of greenhousing. He states that soilless culture systems lack essential microorganism activity and therefore only soil-based potting mixes or ground culture systems can produce biodynamic quality produce. Available for $12 from:

Fertile Ground Books
PO Box 2008
Davis, CA 95617
800-540-0170
http://www.agaccess.com/

How To Grow More Vegetables.....by John Jeavons
Now in its fifth edition and printed in seven different languages, Jeavon's book is considered a classic in the field (literally) and has brought about a kind of green revolution in food production around the world. This book is based on Alan Chadwick's biointensive gardening techniques. Jeavons and the group he heads, Ecology Action, are making a quiet but earth-shaking revolution in how people raise nutritious food. (Widely available.)

Introduction to Certified Organic Farming; Canadian Farm Business Management, 1999.
Canada Farm Business Management Council
75 Albert Street, Suite 908 Ottawa, Ontario K1P 5E7
1-888-232-3262; http://www.cfbmc.com
A learning guide designed to be used in a classroom environment to supplement additional information.

Organic Field Crop Handbook, 2nd edition, Canadian Organic Growers, Box 6408, Stn J
Ottawa, Ontario K2A 3Y6
A practical reference guide for both organic field crop farmers and conventional farmers who are considering making the transition to organic farming. The handbook contains updated information on growing methods, organic certification and the economics of organic farming in Canada.

Organic farming methods are discussed in detail including:

- how to increase and maintain soil fertility using green manures, compost, soil amendments and more,
- how to maintain a healthy soil life using crop rotation, reduced tillage and compost,
- how to compost manure safely and effectively (a detailed troubleshooting guide is included),
- how to control weeds using tillage, intercropping, crop rotation, flame weeding and other methods,
- how to reduce soil erosion and maintain soil moisture in dryland areas,
- how to use green manures and cover crops to add organic matter, fix
- nitrogen, reduce nutrient leaching, control weeds and more,
- how to save seed from field crops,
- how to control pests and diseases, and
- how to ensure that your crop is free from contamination by
- genetically-modified organisms (GMOs).

Organic Livestock Handbook, Canadian Organic Growers, Box 6408, Stn J
Ottawa, Ontario K2A 3Y6
Written and compiled by Anne Macey with contributions from writers and farmers across Canada and the northern U.S. The Organic Livestock Handbook is divided into three sections:

Section 1 explains the principles or organic livestock husbandry and includes chapters on animal welfare, nutrition and health care, and converting to organic methods.

Section 2 provides information on various management tools available to the farmer. Topics covered are health care alternatives, methods to control internal parasites, management-intensive grazing, manure management, fly control, handling to minimize stress, marketing, certification and record keeping.

Section 3 addresses those aspects of management for each livestock type which are particularly significant in an organic farming system. It uses examples from Canada and the northern United States to illustrate the various types or organic livestock enterprises that exist today, from dairy cows to honey bees.

Photographs and figures supplement the text throughout. Appendix materials include a comparison of various organic livestock standards in use today and information on where to find supplies and services.

Soil Biology Primer, Authors: Dr. Elaine Ingham, Andrew R. Moldenke & Clive A. Edwards
Publisher: NRCS Soil Quality Institute,Ames, IA. Format: Full Size Booklet Cost: $6.00 + s/h
For farmers, ranchers, ag professionals, resource specialists, conservationists, soil scientists, students and educators. The Soil Biology Primer is an introduction to the living component of soil and how it contributes to agricultural productivity, and air and water quality. The Primer includes units describing the soil food web and its relationship to soil health, and units about bacteria, fungi, protozoa, nematodes, arthropods, and earthworms.
Included in this Print Publication:

- The Soil Food Web
- The Food Web & Soil Health
- Soil Bacteria
- Soil Fungi
- Soil Protozoa
- Soil Nematodes
- Soil Arthropods
- Earthworms
- Further Reading

To order see www.soilfoodweb.com

Compost Tea Brewing Manual, Author: Dr. Elaine Ingham
Format: Spiral Bound, Vinyl Cover, Lays Flat Cost: $25.00 + s/h
In this comprehensive new publication, Dr. Ingham addresses the following topics complete with diagrams, pictures, charts and tables that can help most any grower address their specific need:
Included in this Print Publication:

- What is Compost Tea?
- When and Why to Use Compost Tea
- Factors Affecting Compost Tea Quality
- Beneficial Organisms in Tea
- Compost Tea Production Methods
- Commercial Brewers
- Application Amounts and Methods
- Making Compost Tea Appropriate to the Plant
- The Kind of Compost Tea Needed for Different Plants, Soil Types
- The Recipes
- Troubleshooting
- Literature Review of Compost Tea Use
- Field Experiences
- Feedback Request
- Glossary of Terms
- Literature Cited for further reference

To order see www.soilfoodweb.com

Organic Resource Kit**;** a compendium of information intended to answer basic questions growers in Atlantic Canada may ask when starting out in organic agriculture
Part 1. What is Organic
Part 2. Resource Guide
Part 3. Directory
The kit comes with membership in ACORN and is intended to be updated regularly.

Atlantic Canada Organic Regional Network (ACORN)
RR1 Belfast, Prince Edward Island C0A 1A0
tel: 902.659.2790
toll free: 866.32.ACORN
fax: 902.659.2419
e-mail: development@acornorganic.org

Growing Food Organically is a 138 pp manual devoted to the beginning organic gardener. The author covers topics such as soil ammendments, pest prevention/treatment, companion planting and much more. $11.95

Down to Earth - Guide to Organic Food in Manitoba is a January, 2002 booklet (40 pp) produced by the Organic Food Council of Manitoba. It is a directory and information source for Manitobans looking for locally grown and raised organic food. The directory includes most organic farmers in the province organized by region, stores and restaurants that sell organic food, non-governmental organizations and government departments -along with helpful websites - that offer information about food and farming in Manitoba. $4.00

Web Resources

http://www.ars.usda.gov; The Agricultural Research Service (ARS) is the principal research agency of the U.S. Department of Agriculture (USDA). ARS, one of the Research, Education and Economics (REE) agencies, is charged with extending the Nation's scientific knowledge across a broad range of program areas that affect the American people on a daily basis.

http://www.sare.org; The Sustainable Agriculture Network SAN is the communications and outreach arm of the Sustainable Agriculture Research and Education (SARE) program. SARE is a U.S. Department of Agriculture-funded initiative that sponsors competitive grants for sustainable agriculture research and education in a regional process nationwide. SAN is dedicated to the exchange of scientific and practical information on sustainable agriculture systems using a variety of printed and electronic communications tools.

http://www.attra.org; ATTRA—Appropriate Technology Transfer for Rural Areas—is the national sustainable farming information center operated by the private nonprofit National Center for Appropriate Technology (NCAT). ATTRA provides technical assistance to farmers, Extension agents, market gardeners, agricultural researchers, and other ag professionals in all 50 states. Topics addressed by ATTRA can be categorized into three broad areas:

sustainable farming production practices
alternative crop and livestock enterprises
innovative marketing

http://www.omri.org; OMRI is a nonprofit organization created to benefit the organic community and the general public. Its primary mission is to publish and disseminate generic and specific (brand name) lists of materials allowed and prohibited for use in the production, processing, and handling of organic food and fiber. OMRI also conducts scientific research and education on the use of materials by the organic industry.

http://www.linksorganic.com ; Links Organic - New Products, Events and Great Organic Links!

http://organic-research.com; an online community for organic farming and food of particular interest to those actively involved in organic farming research and development. It aims to provide
impartial information of high quality, recognizing worldwide interest in organic farming and related sustainability issues.

http://www.etcgroup.org; ETC is dedicated to the conservation and sustainable advancement of cultural and ecological diversity and human rights. ETC group supports socially responsible developments of technologies useful to the poor and marginalized and it addresses international governance issues and corporate power. (Formally www.rafi.org)

http://www.soilfoodweb.com, Dr. Elaine Ingham and company define what a good compost is, discuss how to obtain optimum benefits and give pointers on how to get started making good compost. An excellent resource with free e-zine newsletter, cd's and publications as well as a

composting database and testing services.

Additional Resources: