Koanga Institute Growing Soil Food and Health

Biointensive Gardening
3 day workshop

Course Outline

In this workshop we will show you what BIointensive gardening is.. why it is the most efficient system we know of and how, using this system, you can grow high quality food, in a super efficient way, whilst also growing soil.
This workshop is a combination of theory and practical. You will get to practice everything yourself, and go home inspired… and equipped ready to go!

Learning Objectives

- why are we gardening and what are our goals
- what is Biointensive gardening
- history of BIointensive gardening
- potential of Biointensive gardening.. does it fit our goals?

- understand Biointensive growing includes the following techniques
  1. Deep Soil Preparation/Double Dig, U-Bar, Roebuck fork
  2. Composting/Nutrient Maintenance/Carbon Efficient Crops
  3. High quality seeds and seedlings /planting by the moon
  4. Bed preparation/composting and fertilizing/Close plant spacing
  5. Watering
  6. Companion Planting
  7. Calorie Efficient crops
  8. Planning/Rotation
  9. whole system approach
  10. Koanga adds Biological agriculture andfuse of ramial wood chip

- actually 'doing' all of the biointensive techniques as above

- to understand How to Earn a Living Using Bio-intensive Growing
- to learn to plan your garden so that you get maximum return, for least inputs, whilst building soil, and growing high BRIX food

Teaching outline

Books /Resources
The Sustainable Home Garden - John Jeavons
How to Grow More Vegetables Than You Ever Imagined Possible - John Jeavons
Koanga Garden Guide - Kay Baxter
Dig It DVD
*Koanga Booklets * Beginner Gardener * The Art of Composting**
The Koanga Garden Planner
Ecology Action Booklet Grow Your Own Fertilizer

***Tools and Equipment** to have ready before beginning this workshop*
-the proper tools will make the work easier and more productive

for seedling propagation
* transplanting trowel*
* dibber/widger*
* seed trays (following sizes in Books above)*
* seed raising mix that does not contain fungicides, does contain high quality*
* compost vermicast minerals and microbes*

for soil preparation and bed maintenance
* D handled flat spade*
* D handled fork*
* hula hoe*
* rake*
* digging board*
* U Bar optional*
For compost making
* finished compost (to see what we are aiming for)*
* fertilizer according to soil test (to raise Brix's)*
* high carbon plant material (grain stalks, sunflower stalks, Jerusalem artichoke stalks,*
* globe artichoke stalks, oats, grain stalks, lupins sawdust etc)*
* nitrogen (all weeds and green material)*
* plant material chosen for it's accumulated minerals eg oats (calcium and phosphate)*
* seaweed (contains a full range of minor minerals enzymes and growth promotants etc.)*
**bone dust (burnt bones and shells)*
**lime (calcium carbonate)*
* iodine (stock iodine from Farmlands etc ½ cup diluted through each heap)*
* Nature's Garden (right minerals in right relationships in commercial form)*
* other possible fertilizers*
* thermometer*

Introduction

What are we looking for in a gardening method.. what are our needs, our goals , our vision… why are we gardening?

- I'm in this to grow food capable of fully nourishing us, in an efficient regenerative way.. how about you???/

Principles Involved

What are some of the Laws of Nature relating to growing food, and patterns that help us understand how to work with the natural world.

- Humans require a nutrient dense diet to maintain the integrity of our DNA.. our health through generations
- Nutrient dense food production of any kind is dependant on a strong biological community to support growth
- Biological communities require a supportive habitat, high and balanced levels of nutrient flows and environmental support
- In living systems that all of life co evolved in it is humus that holds the key to life, holds the water, the minerals, and is home to the microbes who in turn feed the plant roots
- Recycling deficiencies will not grow high brix food, not maintain or reclaim our health or regenerate soil

- Compost is created from decomposition and recombination of organic material Inseparable from decaying organic matter are living micro-organisms, bacteria, and fungi Decomposing process creates warmth Decomposition involves formation of carbon dioxide and water As available energy is consumed (Recomposition) microbial activity slows pile cools Left with humus compounds which include living and dead bodies of microbial life As humus is formed nitrogen becomes part of its structure. Stabilizing nitrogen, because humus compounds are resistant to decomposition Humus worked on slowly by soil microorganisms Humus also acts as a site of nutrient absorption, negative charge.

- Calcium, sodium, magnesium, potassium and most trace minerals, have positive charge

- As plant roots grow in search of nutrients they feed on humus
- Roots bargains with humus exchanges hydrogen for other minerals , via microbes

- Active exchange operates with plants choosing the minerals they need to achieve all 84 minerals in right relationships

- Humus is the most reliable plant food.

- The growth of a healthy cell of all living things requires 84 minerals
- ramial wood chip contains balanced levels of nutrients

What is Biointensive gardening

- Bio-intensive is a strategy based on a set of quite specific techniques, suited to those looking for a super efficient, low input, high output system of growing food in any situation, that were developed over 1000's of years by indigenous peoples originally who understood the patterns in nature (Laws of Nature) and how to work with them to achieve long term regenerative results, and more recently the science of how the laws of nature work

- Biointensive gardening seeks to work with the laws of nature…. .

- discussion around other techniques methods we know about and whether they also achieve our goals, eg No Dig, Sq Ft gardening

- Bio-intensive Growing relies on natural continual slow releasing biological process for nutrient release rather than chemical mainlining option

- Goal to minimize outside fertilizer and to cycle what is brought in, and to grow soil and high brix food

- Biointensive recognizes that recycling the deficiencies will not grow soil or nutrient dense food and that we must begin by getting a soil test and and bringing in the minerals needed to balance and raise the levels of minerals

- Techniques include.. deep soil preparation, close plant spacing, specific bed preparation, growing carbon crops , composting, growing specific calorie crops, crop rotation and using heritage seeds

- everybody can do it

History of Biointensive Growing, and World situation today

- Ancient civilisations that grew soil and were great civilisations

- story of Bio-intensive growing goes back 4,000 years to China, 2,000 years to Greece, (noticed how well plants grew in landslides, loose soil allows more air, moisture, warmth, nutrients and root penetration) 1000 years ago Mayans, .. French Intensive 1700's 1800's in France, and the work of Rudolf Steiner, and Allan Chadwick in more recent times and so…….

- Allan Chadwick.. developed system in France.. combination of French Intensive and Biodynamic

- John Jeavons Chadwick Student 1960's.. over 40 years of research now

- In a world where we are losing 6 lbs of top soil for every lb of food we eat, where we have around 33-40 years' farmable top soil left,

- in a world where we have lost over 85% of the minerals in the soil since 1920's, and where the nutrition in our plants is related to the minerals in the soil

- In a world of peak everything, and an age when individualism is king we are challenged to be working together to find solutions.

- In a world where human health is seriously challenged

- In a world where Gardening is a bit like eating, we have grown up thinking we can do what ever we like, we know best, and if the food is not in the garden we can always buy it.

Potential of Biointensive Growing

- The Bio-intensive system has potential for
- 67-88% reduction in water consumption
- 50+%reduction in fertilizer costs
- 94-99% reduction in energy costs
- 100% increase in soil fertility
- 200-400% increase in caloric production per unit of area
- 100% increase in income per unit area

Not a panacea must be used properly as a whole system… using parts of the system can destroy soil very fast
Has been designed so that everybody can practice it

Bio-intensive Gardening is based upon the following

1. Deep Soil Preparation/Double Dig U-Bar
2. Composting/Nutrient Maintenance/Carbon Efficient Crops
3. High quality seeds and seedlings /planting by the moon
4. Bed preparation/composting and fertilizing/Close plant spacing
5. Watering
6. Companion Planting
7. Calorie Efficient crops
8. Planning/Rotation
9.whole system approach

1. **Deep Soil Preparation**

When laying out beds keep in mind full sun shelter water contour
1m x 1m ensures minimum mini climate
Dig only when soil is evenly moist (early morning or evening which is best for less loss of soil organic matter) Too wet the soil will be compacted with loss of soil life too dry and structure will be lost also losing soil life Check by holding soil in your hand and squeeze, if it crumbles too dry if too hard to penetrate with spade or sticky, too wet Double digging

*classic double dig
* complete texturing double dig
* U Bar Dig only when you need to… to maintain soil structure whilst growing soil health finishing bed preparation, shaping, feeding, composting,

2. Compost/ Plant Nutrition/ Carbon Efficient Crops

* if you feed a chicken 80% of it's nutritional requirements probably get very few eggs if you plant 100 fruit trees and take care of their needs 60% will get less fruit than 1 tree taken care of well .. same with vegetables…. Get it all right but 1 thing and it won't work well.
Bio-intensive compost making is about aerobic composting with the aim of maintaining maximum carbon in the form of humus and maximum microbe populations Koanga adds to that and highly mineralized humus capable of growing nutrient dense food

soil testing, lab tests, using plants, etc.

Carbon Efficient Crops
Plan to plant half of your garden each season in carbon efficient crops such as mature corn, sorghum, grains, sunflowers Jerusalem artichokes, lupins, alfalfa, broadbeans cardoon, globe artichokes (e.g. 10 bed garden - 5 beds in summer in carbon crops and 5 beds in winter in carbon crops total 10 crop beds of carbon crops refer to

Composting Booklet for details on carbon crops

Compost

You will produce more cured compost per unit of material with which the pile is built when follow 45:1 or 60:1 mature (plants that have gone to seed and then gone brown) :immature (green) ratios, rather than 30:1. A 60:1 ratio provides far the most efficient results in terms of humus production.

At 60:1 the pile may heat to 57oC in first two weeks but then goes from 49oC to ambient and cures slowly

These heaps have more efficient decomposition, less oxidization, and up to 30% more cured compost than in a 30:1pile

They also have in the end a wider range of microbial life present

45:1 2-2.5parts mature; 1 part immature; 1/3 part soil

60:1 2 ½ -3 parts mature;1/2 part immature; ¼ part soil Use composting materials higher in lignon (found in plants with tough stems that will withstand high wind) (e.g. cardoon, sorghum, sunflower, corn, mature lupins because they are the most carbon efficient decomposers)

* when lignin decomposes it is transformed into complex structures that protect and store carbon, nitrogen and other structures that are then gradually released

* piles built with highly lignaceous materials will have greater amounts of slower releasing carbon and nitrogen in them Compost made using 45:1 ratio achieves twice the vegetable production of 30:1 and 60:1 twice as high again

Making Compost: Patterns

a.. Size of heap… minimum size ensures you have volume to insulate the heap so that curing is possible. o minimum volume 1m x 1m x 1m o optimal 1.6 x 1.6 x 1.2 high o maximum 3m x 1.6 high and any length you like

b.. Immature vegetation contains metabolic carbon

c.. Mature vegetation structural carbon together these two kinds of carbon make 90% of the volume of the heap

4.. Top soil is 10% of the volume of the heap using soil increases the effectiveness of the heap.. holds temperature down, helps prevent temperature spiking and release oxidation of carbon/nitrogen and microbes. Helps hold minerals in the humus produced

Making Compost: Process

a. Mark the edges of your heap with bamboo or similar poles to keep the sides of the heap straight up and measurements accurate

b. Ensure the ground is moist, not bogy or hard as concrete

c. Use a fork to loosen the soil. (facilitates proper drainage/moisture levels/aeration)

d. Make yourself a stick with marks up it to 1.3 m high, to use as a gauge when building the heap. This will save you measuring everything that goes on the heap in volume amounts (buckets) to get the ratios right. It is far easier to use a stick to measure the thickness of the layers going on. For a 45:1 heap mark the stick at the following distances above ground level. 10cm, then in layers of 8cm, 3cm 1cm 8cm 3cm 1cm repeated until you reach 1.2m high. For a 60:1 heap begin again with a mark 10cm above ground then in layers of 12cm, 2cm, 1cm 12, 2, 1

repeated until 1.2 m high.

e. Place a 10cm layer of rough vegetative material eg corn stalks, sunflower stalks, parts from last heap that didn't decompose like corn end stalks with roots on them, over the moist forked loose ground

f. 5cm layer of mature vegetation then moisten when you ring with two hands 1 drop of moisture comes out no more!

g. 7. 5cm layer of immature vegetation and moisten

h.8. 1 cm layer of soil and minerals moisten

i. Continue until 1.2 m high

j. Watch moisture levels, super carefully after every layer added, moist as a wrung out sponge, a drop or two too much moisture means less air flow and anaerobic.. not enough makes decomposition difficult... getting the moisture wrong could ruin the heap so take your time to get it right!!

k. Cover compost in wet or hot weather

l. Measure/monitor temp, moisture levels aeration, colour and smell watch heap go through two stages.. heating then cooling and curing,

m. Stop before stage 3 mineralisation takes place..
*when most of original material and ingredients unrecognizable
* smell fresh and woodsy like spring water
* material dark brown or black soft and crumbly Our heaps are looking very good, we kept the temperatures slightly over 50o C maximum and going through the stages compost goes through. We had to water them over the summer, to keep the moisture levels right. We will continue monitoring our heaps and keep you in touch.

3. High quality seeds and seedlings /planting by the moon

Discussion around differences between open pollinated, heritage, high brix, F1 , CMS, GE and gene edited seed
How to find one's own best seeds to begin with
High Brix seeds .. understand difference between regenerative and degenerative model
Raising high quality seedlings, depth of seed trays, seed raising mix, glue on roots, seedling spacing, watering feeding

4. Bed Preparation/ Composting/Fertilizing/Close Plant Spacing

* Shape of bed, arc of a circle, no steep sides gives an integrity that makes a big difference, or flat top with compacted sides.. very specific process and steps to create
* 1-2cm compost every time a bed is planted.. if compost is not highly mineralized add fertilizer as well.

* See seed packets or master charts in Kay's Garden Planner, or Koanga garden Guide 2015 edition, for appropriate diagonal spacing 1. Watering Always water with hose or rose etc. pointing into the air Water falling under gravity has negative charge like rain and does far less damage to soil, more easily absorbed by plants Look for shine to know when you have put on enough water Amount of water that needs to go on in relation to amount of carbon in the soil

Synergistic Planting vetch under winter brassicas flowers herbs squash beans corn lettuce carrots beetroot onions lettuce on shady side of bean trellis's rotations natural guilds use pendulum use intuition observation

5. **Calorie Efficient Crops**

Jerusalem Artichoke, parsnip, kumara, potato, onion, garlic, salsify, scorzonera, leeks

6. **Planning/Rotation of Crops**

Summer heavy feeders pumpkins, tomatoes, peppers, greens, etc light feeders /givers roots and legumes carbon heavy feeders corn carbon light feeders amaranth, millet, barley,

Winter light feeders givers roots and legumes carbon oats, winter grains etc. carbon lupins tic beans, broad beans heavy feeders all brassicas, celery, lettuce, greens

Garden Planner

7. **Whole System Approach critical** to apply this system in all it's parts, not just use parts of it, could lead to degrading soil very fast … discuss all the ways that make this system efficient

How to Earn a Living Using Bio-intensive Growing

NB: 40 sq m is not a big enough area to grow enough compost materials to make a minimum size compost heap. You would need to be able to collect extra material from outside the garden to do this.
Alternatively you could plant all 4 beds in heavy feeders and roots and legumes, and use ramial wood chip as your carbon source.. either through a chicken system or directly into /onto your beds

Examples Summer

· 40 sq m garden · 10m in Odell's lettuce, transplant 1/6th of bed each week plant at 4 weeks old,
· begin harvesting at 10 weeks' old from seed, i.e.6 weeks in bed
· harvest 1.6 m each week
· replant 1.6 metres each week with new seedlings
· 160 sales per week @ $1.50…….. $5,760 over 6 months
· plant 10 sq. m with beetroot at 10cm sp, 5 weeks from seed
· begin harvesting 1m each week at week 15 from seed and replant 1m each week
· rainbow beetroot bunches 30 per week at $3:00……... $2160 over 6 months of sales.. .. includes edible quality tops

· plus, the 20sq m of carbon crops
· could be corn at 9 per sq m 2 cobs each at $1 total 720 cobs at $1 ……..... $720
· Total return on 40 sq. m and a few tools and a part time job could be…….. $8,640

120 sq m Garden

For a full time quality job, without the need to invest in huge $ for infrastructure I wouldn't go higher than 120 sq m.. all simple hand held quality tools. In urban area can easily put flyers yourself, in local mailboxes, and approach cafes, for marketing.
RWC should be easy to access from council contractors, maintain good rotation practices, add to range as you see what your clients buy and what works best for you.. Choose carefully, check out the list below. Vege that are seconds can be sold as ferments potentially as well, also seedlings could be sold. For 120 sq m you would require passive solar cloche as in Koanga Gardening Masterclass online workshop design, and a stand at the gate, or potentially sell salad boxes to preorders..You could potentially set up scrap bucket return system so you collect peoples scraps when they buy vege .

Costs and Income

- initial set up cost excluding any land costs
  * hose + sprinkler…… $150

  * hoops + shade cloth, bird netting, row crop cover, plastic …… $500
  * spade, fork, niwashi, shark, rake, hula hoe, watering can, seedling raising trays ..$700
  * passive solar cloche to raise seedlings ……$500
  *fertiliser .. all brought in from EF at maximum levels $20 sq m first year only……..…$800

  Total $2,650
- 10 hours a week @$20.. $200 week x 52 …….. $10,400
- income 6 months $8640 x 2 $17280 annual income 40 sq m ……..$17,280
- profit of $4,230 in first year

Seems clear that could be doubled if RWC was used.
For approx 20 hours a week, including harvesting and direct marketing (choose options carefully) a potential income of up to approx $30,000 per year could be achieved

- in an urban situation a sales box at the gate with good marketing words describing nutrient dense, and ecological regeneration, with regular open days and workshops could all be part of that

Comparative Values Of crops per 10 sq m

coriander	$4,000
basil	$1000
carrots	$1000
beans	$1000 5kgs sq m @ $20
popcorn	$800 (sold on cob in special bags)

leeks	$1,500 $1.50 each
kale	$640 252gm bunches @$4 4kgs sq m
flaxseed	$100
quinoa	$130
tomatoes	$1,600 200 kgs @ $8
amaranth	$100
Jap spinach	$25000 1000 plants @ $2.50
celery	$1250 250@ $5
odells lettuce	$6,000 1000 @ $1.50 x x4