INADES FORMATION

Simplified Manual on Grow Biointensive Agriculture Farming System

CONTENTS

GROW BIO-INTENSIVE AGRICULTURE (GBIA)

Acknowledgement

We acknowledge John Jeavons Pioneer of Grow biointensive for his critique, Samuel Nderitu of GBIA Kenya for his information and Peter Sifuna for gathering experiences from farmers. We also acknowledge the Managing Director Inades Formation Int. Kenya Office Mr. Bernard Kitonyi for his input during drafting.

Introduction

Bio-intensive agriculture is a system of farming where an ecological unit (plants, animals, edaphic factors etc) work interrelates for sustainability. It embraces use of natural methods for production of crops and animals. This method ensures healthy soil and environment. The system is designed to use natural nutrient for food production. It is ecologically sound, economically viable and socially acceptable.

Sustainable agriculture: Is essential part of building sustainable communities that build up healthy living and effective farming as well as enduring / promoting communities.

The system wishes to re-link / join and cooperate in harmony with the sun, air, rain, soil, moon, insects, plants and animals.

Why GROW BIOINTENSIVE?

For sustainability in:

? Soil fertility
? Growing crops
? Food production
? Environmental conservation
? Income generation projects
? Good health

Challenges that GROW BIOINTENSIVE tries to help resolve include:

? Population increase
? Reduced land availability
? Deforestation
? Less water rain
? Food scarcity / malnutrition
? Chemical fertilizer and pesticides
? Less optimal methods of land preparation

Flow to GROW BIOINTENSIVE Agriculture

1. French intensive technique (1700s, 1800s 1900s in Paris France). It started in Paris France in 1700s by practicing French intensive method.
2. Biodynamic technique (1920s): By Rudolf Stainer
   An Australian philosopher who observed the problem of synthetic fertilizers and pesticides and the deficiency of trace elements in the soil.
3. Biodynamic/ French intensive method synthesized by Alan Chadwick. He developed the organic Biodynamic method.
4. Biologically-intensive organic farming (in China 4,000 years ago).
5. GROW BIOINTENSIVE method Sustainable Farming developed by John Jeavons.

Aims of GROW BIOINTENSIVE Agriculture / importance and advantages

- ? Build, maintain and ensure soil fertility
- ? Ensure continued food production
- ? Create employment
- ? Reduce cost of production
- ? Maximize utilization of the available land

The other technologies applied / practiced

1. Nursery management
2. Compost preparation
3. Natural pest control by use of:-
   - ? Cultural pest control
   - ? Biological pest control
   - ? Genetic pest control
   - ? Botanical pesticide (extracts)

Eight (8) Principles of GROW BIOINTENSIVE Agriculture

1. Composting
2. Double-digging / deep soil preparation
3. Close spacing
4. Companion planting and crop rotation
5. Open-pollinated seeds use and preparation
6. Carbon farming
7. Calorie farming
8. A whole system

COMPOSTING

This is the natural way of turning organic materials into valuable plant food. Compost is mainly used as the base fertilizer during planting. Compost can be made from plant, and kitchen and animal waste. The best way of using these wastes: by composting.

Making a compost pile

Requirements

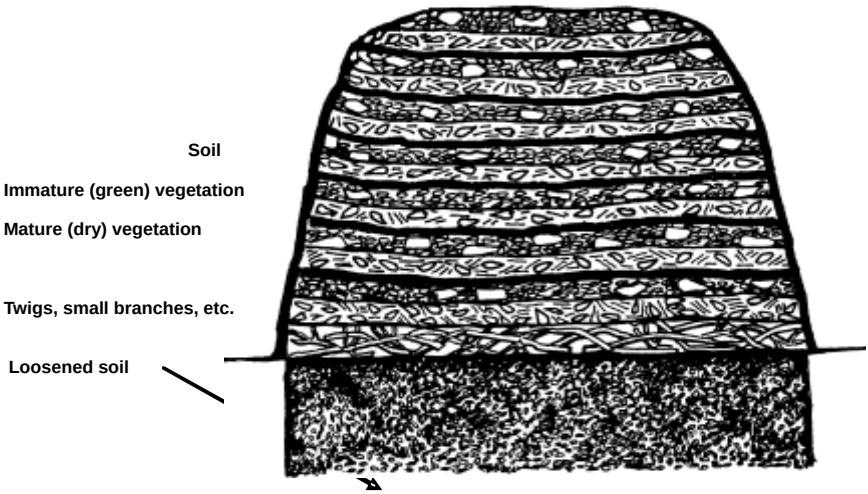
Dry coarse mature materials, dry soft mature materials, immature materials, ash, kitchen waste.

Procedure

- Select a suitable site (under a shade, near the garden)
- Measure the area (1.5x1.5)m
- Loosen the soil 30 cm and sprinkle water
- Arrange the dry mature coarse materials 10 cm high
- Put soft dry mature material on top 5 cm high
- Immature materials 5cm high
- 10 liters soil
- Continue alternating soft dry mature and immature materials until pile is 1 m high
- Ash
- Cover with a 20-40 liters of soil
- Insert a long dry stick across the pile to measure the pile temperature

Note: sprinkle some water on each layer of materials while you are building and water daily. The pile must be inspected to ascertain its progress; the compost takes three months to be ready.

Cross Section of a GROW BIOINTENSIVE compost pile:



Benefits of compost

1. Loosens soils: makes it easy to prepare
2. Conserves soil moisture
3. Improves aeration / air circulation
4. Provide plant nutrients (fungu la kumi to the soil)
5. Reduces erosion / helps hold soil together
6. Helps reduce ph extremes in soil
7. Extends growing season by keeping the soil warm for a longer time.

Materials required

Mature compost or green vegetables(tythonia, sesbania),

i) Gunia / sack
ii) Container
iii) A stick
iv) A rope
v) Water

Procedure

- Chop the materials and put in a sack.
- Tie the sack and hang it in the drum.
- Fill the drum with water to cover the sack.
- Cover with a polythene paper.
- Stir after every seven days (the solution is mature after 21 days
- Dilute at a ratio of 1:2

Note: the solution is rich with nitrogen

DOUBLE-DIGGING/DEEP SOIL PREPARATION

Definition: Is the process of preparing the soil 60 cm deep

Advantages of double-digging

1. Breaking the hard pan (structure formed in between top soil and sub soil.
2. Increases the depth of the top soil.
3. Improves soil aeration / air circulation.
4. Improves soil water retention
5. Prevents soil erosion.
6. Improves soil structure and texture.
7. More plants in a small area up to 4 times more.
8. Use of local resources. Reduction of farming input.

How to double-dig

Procedure (See sketches next page)

- Site selection
- Cleaning of the site selected.
- Measure the beds 6m by 1.5m width

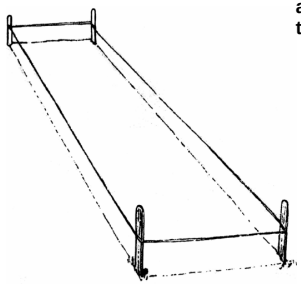
1. Divide the bed temporary into sections of 1.5m wide using wooden stakes as guides.
2. Initiate the first digging. Dig a trench 30cm deep and 1.5m wide at one end of the bed.
3. Loosen the soil in the trench for another 30cm with the use of a jembe etc. Please note that the soil is not removed.
4. Dig a second trench adjacent to the 1st one, cover the 1st with the top soil coming from this trench. Again loosen the bottom of this second trench just like in step 3 above.
5. The process of the second digging continues.
6. This leaves an open trench at the other side of the bed. Fill this with the soil previously dug out from the first trench.
7. The double-digging process is complete. The bed is now leveled using a rake (never step on the bed).
8. Apply compost [or farm yard manure (F.Y.M)] on the bed. The quantity depends on the crop to be planted e.g. 3 wheelbarrows for heavy feeders e.g. grassiminaea family (maize, millet, nappier grass, sorghum etc.) 2 wheelbarrows for lighter feeding crops e.g. brassicaea family (kales, cabbages etc). one wheelbarrow for root crops e.g. carrots, cassava etc).

Measuring of the bed width can be done simply by use of two adults standing facing one another on the opposite side shaking hands. Markings are done at the feet (this measures about 1.5m).

To avoid stepping on the loose soil (2nd foot) timber is placed on the previous trench loosened to be stepped on.

Double-Digging

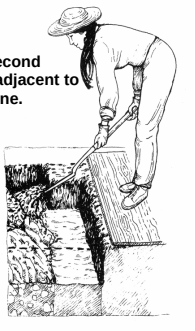
1. Lay out a bed.



2. Dig a trench at the end of the bed.

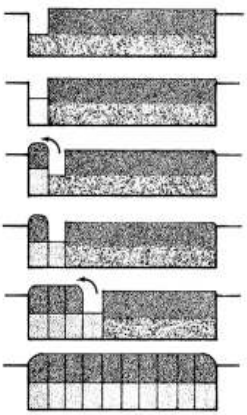
3. Loosen the soil in the trench.

4. Dig a second trench adjacent to the 1st one.

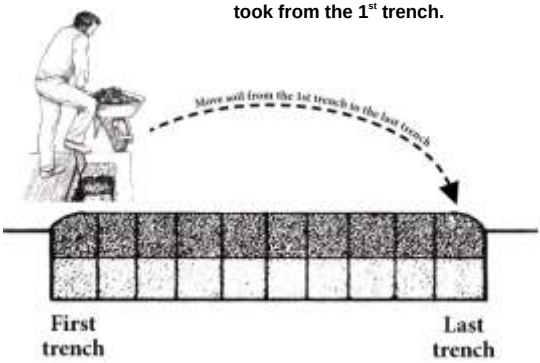


5. Loosen the soil at the bottom of the second trench. Repeat step 4.

Continue the process until you finish the bed.



6. Fill the last trench with the soil you took from the 1st trench.



7. Level the bed

8. Spread compost evenly over the surface of the bed

9. Incorporate the compost in to the upper 5-10 cm (2-4 in) of soil

COMPANION PLANTING

This is planting of crops according to their interrelationship. The goal is to focus on a whole garden to create a thriving mini ecosystem that has beneficial inter-relationship. Just like human being plants likes or dislikes each other. Companion cropping is the constructive use of plant relationships by gardeners and farmers. It is the placing together of plants with complementary demands.

How to determine companions

- Mode of growth for crop
- Diseases that affect the crops.
- Feeding mode (heavy feeder , light feeder, heavy giver)

Plant families

Onion family--garlic leeks chives
Bean family(leguminous-- beans, peas, peanut, groundnuts, sesbania.
Tobacco (solanalea)--tomatoes, potatoes, peppers
Carrot family(umbelliferae)--carrots, parsnips, coriandra
Cabbage (brassicaceae)--cabbage Kales, radish, tulips, cauliflower.
Grass (graminaea)--maize, wheat , millet, sorghum.
Tuber--cassava arrow root

Agro-forestry / trees

Grevelea
Leucanea
Seabania
Caliandra
Markhamia

CLOSE SPACING

Types of spacing

a) GB spacing
B) Conventional spacing

Types of spacing

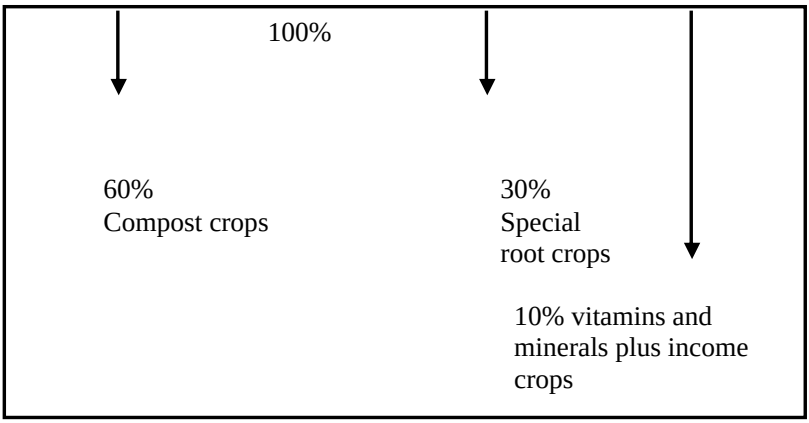
a) Diagonal spacing: GB
B) Row spacing

GB spacing

Cow peas:	15x15 cm	Maize	45x45cm	Beans	15x15cm
Pegion peas	15x15cm	Cassava	1m x 1m	Green gram	15x15cm
Sorghum	15x15cm	Tomatoes	45x45cm	Cabbage	45x45cm

DESIGNING A 50-BED UNIT

50 beds = equal to 100%



Note: 30 beds compost crops
15 beds special root crops
5 beds vitamins and minerals plus income crops (30 beds, 60%)

Compost crops are crops with a lot of biomas residues after harvesting of the main part e.g. maize, sorghum, millet, sunflower, amaranths. Their residues are used for making compost.

Examples of special crops (15 beds, 30%)
Sweet potatoes, potatoes, garlic, leeks

Examples of vitamins and minerals plus income crops (5 beds 10%)
Tomatoes, water melon, pumpkins, carrots, egg plant, onions etc.

Note: 50 bed unit is equivalent to sustainable fertility management.
50 beds unit = sustainable soil fertility.

ORGANIC PEST AND DISEASE CONTROL

Common plants

- Neem - Derries - Hot pepper (tephrosia) - Comfrey
- Marigold - Garlic - Stinging nettle - Lanatana camara

Control of aphids

- 5kg of derries and comfrey
- Add 30 gm of soup.
- Sieve the mixture and spray.
- Dilute the extract with 10- 15 litres of water.
- Let it settle for 24 hrs

Control of maize stalk borers

Use tephrosia ash

Control of caterpillar

Hot pepper + marigold + derries

Control of moles

Plant tephrosia in your farm

FARM PLAN OR FARM PROJECTION

Factor to consider when drawing a farm plan

a) Always have a target.
b) Take farming as business.
c) Have crop diversification in your farm.

Farm planning process

1. Examine the wishes, vision, ambitions, likes and dislikes of the family.
2. Examine the resources available.
3. Evaluate the market environment.
4. Design on the planning period.
5. Draw a physical plan and reconcile it with the resources available.
6. Determine the technology available to be used.
7. Estimate the family income.
8. Draw up a budget.
9. Develop a strategy for implementation.
10. Work smart.

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