

NATURE BASED SOLUTIONS

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Ecological Orchestration:

- Biointensive planting techniques to intensify and diversify the soil micro-biome
- Developing Regenerative small-scale tropical management methods to improve soil health and function
- Agroecological system design strategies to maximize utilization of sun, soil, and water resources



NEW FLOWER REGENERATIVE GARDEN

NATURAL FARMING DEMONSTRATION AND LEARNING CENTER

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WHAT ARE NATURE BASED SOLUTIONS?

TWO categories of nature-based solutions to be covered:

1. Agricultural solutions based on the utilization of elements derived from natural sources
2. Agroecological orchestration based on synthesized biomimicry

ASSUMPTION 1.

INCREASING STABLE 'SOIL ORGANIC MATTER' (SOM) IS THE BEST WAY TO IMPROVE AGRICULTURAL SOIL AND WATER MANAGEMENT



ASSUMPTION 2.

MOST OF THE PRODUCTION CHALLENGES FARMERS FACE ARE A DIRECT RESULT OF THE **LOSS OF SOIL AND THE LOSS OF SOIL QUALITY**

- Protecting the soil surface is of critical importance to soil degradation/erosion prevention



ASSUMPTION 3.

AGROECOLOGICALLY ORCHESTRATED SYSTEMS
CAN MATCH OR EVEN OUT-PERFORM THE
RELEVANT NATURAL SYSTEMS THEY REPLACE



SOLUTIONS TO INCREASE SOIL ORGANIC MATTER

Natural systems increases SOM through plant root systems in symbiotic relationship with the soil microbiome



HOW TO INCREASE SOM

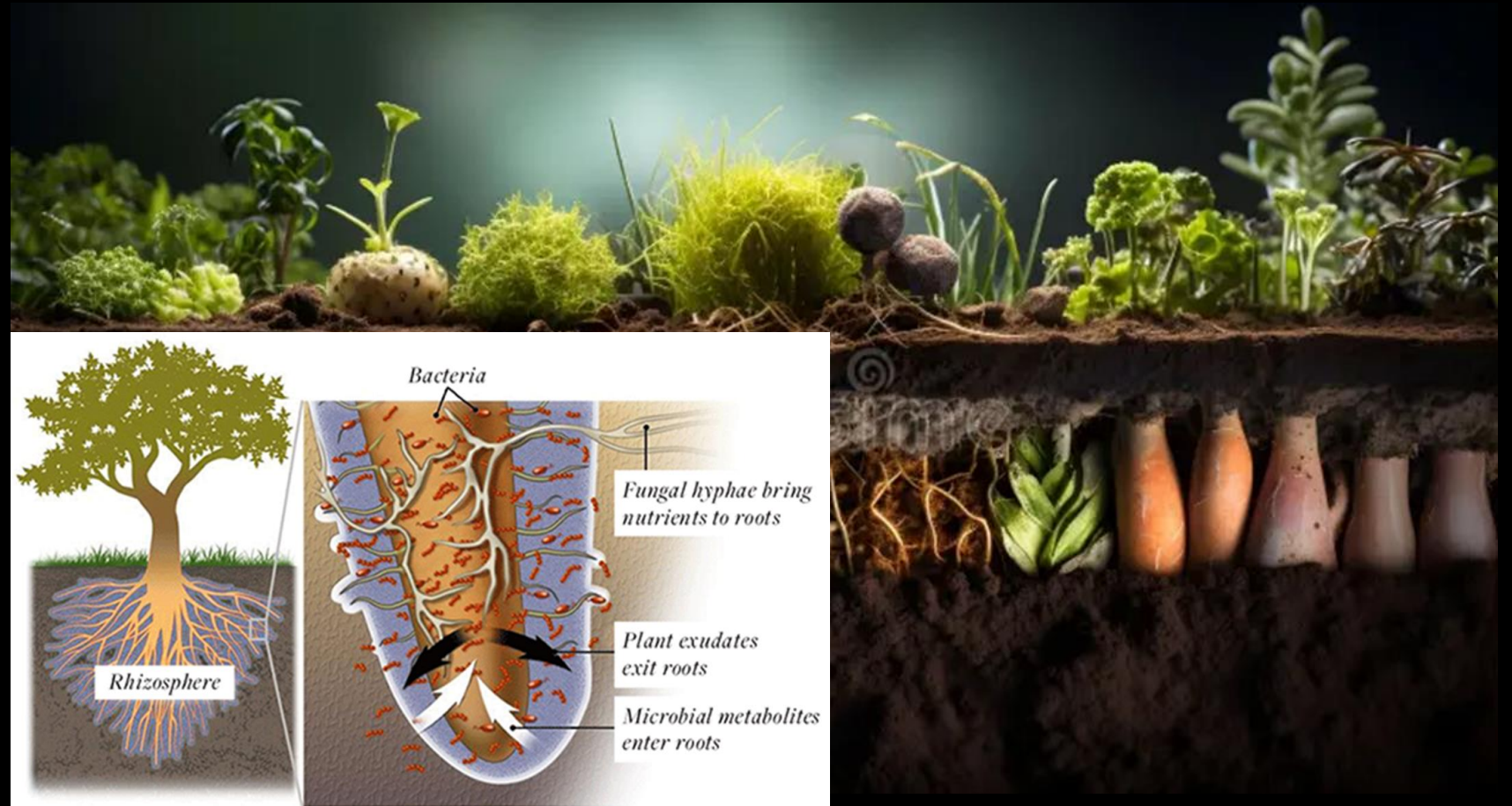
- More roots in the ground!
- Reduce soil disturbance
- Create areas of SOM accumulation and microbial sanctuaries
- Rethink weed management strategies
- Improve the soil microbiome
- Grow healthier plants!

MORE ROOTS IN THE GROUND!

MAXIMIZE THE TOTAL AMOUNT AND DIVERSITY OF PLANT ROOT SYSTEMS

Biointensive planting:

- Reduced plant spacing
- Intercropping
- cover-cropping
- relay-planting



BIOINTENSIVE PLANTING PATTERNS!

CROP ORCHESTRATION – CROPS FOLLOW TIME SIGNATURES & THE CONDUCTOR

Biointensive planting:

- Reduced plant spacing by intercropping shorter and longer standing crops
- There are 5 cabbage, 6 pac choi, 5 Callaloo, 1 dill in this picture



REDUCE SOIL DISTURBANCE & CULTIVATION

Regenerative cultivation methods:

- No-till or minimal tillage
- Use of planting holes and furrows without disturbing previous crop or weed root systems
- strip planting with permanent vegetation in inter-row spaces



CREATE AREAS FOR SOM ACCUMULATION & MICROBIAL SANCTUARIES

Agroforestry,
Agroecology,
& Permaculture: All
focus on perennials
and long-standing
trees, shrubs, vines,
& other versatile
diverse species to
mimic the interface
between forest and
grasslands



RETHINK WEED MANAGEMENT

Weeds as Ecosystem Service Providers:

- Orchestrated weed incursion
- Source and establish a diverse range of native (and alien) 'weed' species from various families
- Take time to deeply understand each weed species and why they are there

IMPROVE THE SOIL MICROBIOME

- Inoculation with IMO and EMO (Indigenous or effective micro-organisms)
- Save your own seeds!
- The best fertilizer for any plant is that plant, as it has the right nutrient profile and microbiome



GROW HEALTHY PLANTS!

- A healthy plant with an expansive root system and photosynthetic surface area produces a proportional amount of root exudates / SOM
- Provide plants with liquid fertility solutions focusing on providing micro-nutrients and biostimulants at key stages, especially early growth



SOLUTIONS TO PROTECT THE SOIL SURFACE NATURALLY

In nature the soil is rarely exposed (Only after landslides and fire)



FOCUS FIRST ON ESTABLISHING LIVING CANOPIES OR LIVING MULCHES

- Why is a living mulch is better than a decaying mulch?
- Living mulches are creating root exudates, they convert solar energy into soil carbon
- Living mulches also shed roots depositing SOM as they are cutback
- Photosynthesis converts solar energy through a chemical process that in effect removes heat from the atmosphere (evapotranspiration has a cooling effect)



BROWN MULCHES

USING PLANT LEAVES AS MULCH IS A TIME TESTED AND PROVEN BENEFICIAL PRACTICE

- Reducing soil surface temperature and increasing soil surface moisture increases plant root development near the soil surface
- Encouraging the proliferation of mycorrhizal filament network establishment, increasing the availability of water, nutrients and atmospheric gas exchange for plant roots
- Rigid and long lasting mulches are better for the soil microbiome



BROWN MULCHES PLANT LEAVES AS MULCH IS PROVEN BEST PRACTICE

- Vetiver – produces the longest lasting mulch utilizing the least amount of photosynthetic area, its mulching efficacy is unmatched in nature

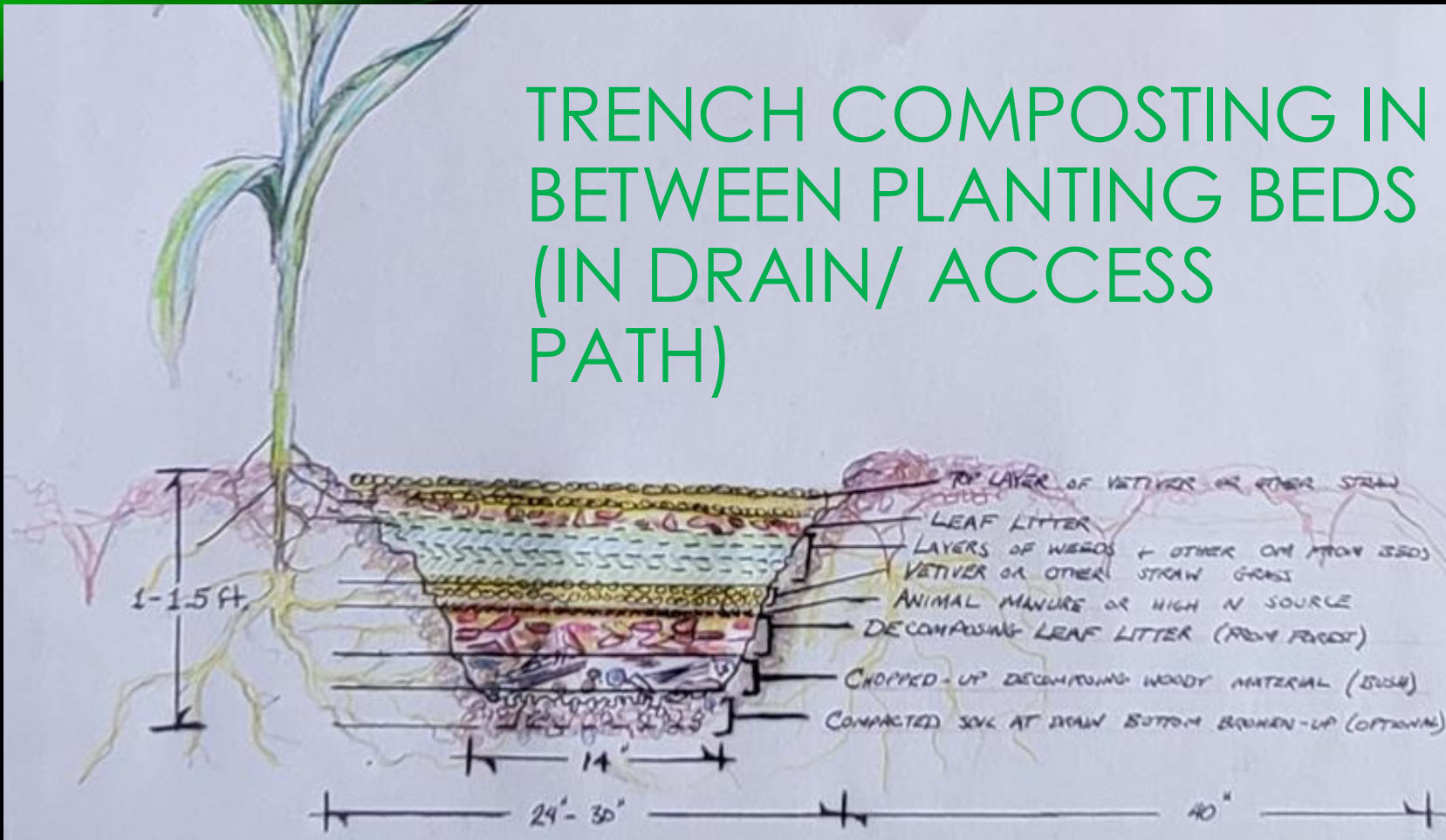


RELAY PLANTING A COVER CROP

- As a crop is maturing allow preferred weed species to establish themselves
- Sow cover crop species including: Cow pea Mucuna bean, Sunn Hemp, Jack Bean, wild vining legumes, Pois sem, Callaloo, Castor bean, & wild herbs etc.
- Forb species including: Plantain, Chardonbenie, Dandy-lion, Daikon radish, even Malunga divert most of their energy to their root systems to feed the Rhizobiome
- Manage by selecting out noxious pioneering species like Water-grass and Nut-grass



TRENCH COMPOSTING IN BETWEEN PLANTING BEDS (IN DRAIN/ ACCESS PATH)



This method keeps the nutrients that plants and 'weeds' uptake from the area in the area. Has huge labor saving implications!



1. Clean area using
hoe, cutlas, weed-eater



2. Chop and drop large
harder material 1st



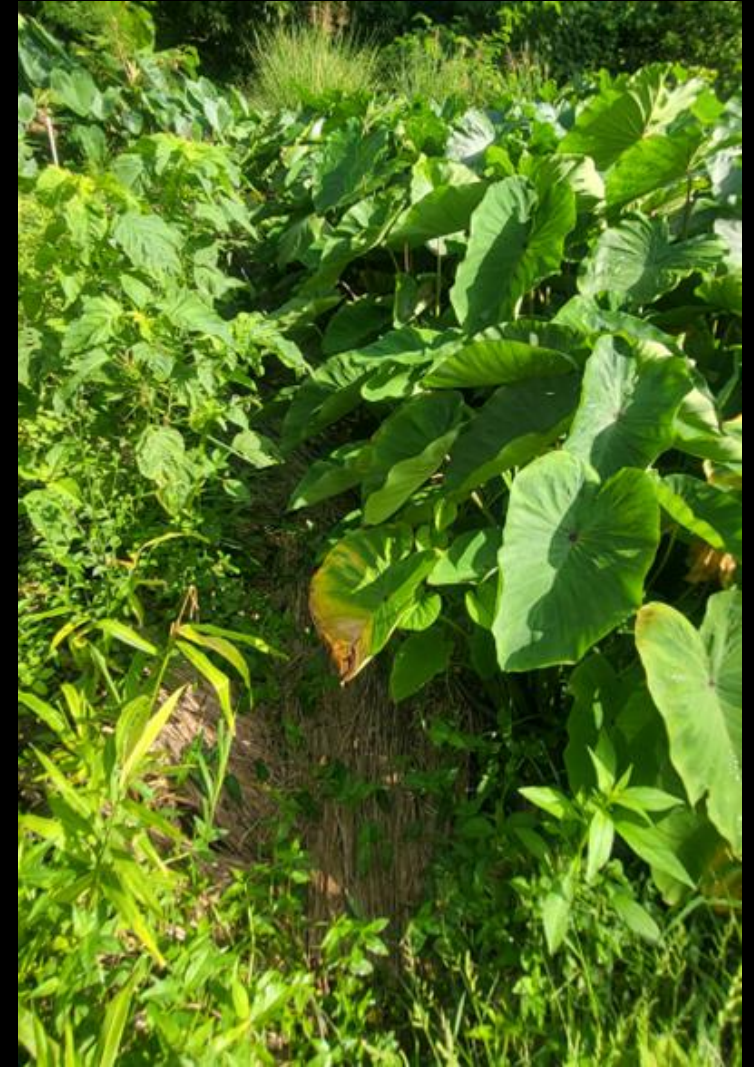
3. Gather weeds from
surrounding area



4. Cover with thick layer of leaves and leaf mold



5. Add animal manure, & mulch with Vetiver



6. Five weeks after procedure



AGROECOLOGICAL ORCHESTRATION

Pushing the limits!

AGROECOLOGICAL ORCHESTRATION

- Through a deep understanding of complimentary ecological niches we can orchestrate systems that maximize diversity and population density to levels that surpass most natural systems
- Thereby creating the potential to out-perform most natural systems in terms of both SOM percentage increases, and aboveground plant biomass productivity



ORCHESTRATING FOR SOLAR RESOURCE MAXIMIZATION

- Think layers within a mature rainforest
- More layers means more energy utilization and SOM increase
- Orient your planting patterns to the path of the sun – Our ancestors meticulously tracked the migration of sun's path and angle based on the season

ORCHESTRATING TO CREATE SOM RESERVOIRS IN & AROUND CROPPING AREAS

- Within a forest there are biomass collecting zones where huge amounts of OM collect most often where trees fall and/or die and decompose in-place
- Synthesize or simulate by using inter-bed spaces (drains or paths), bed-ends, or agroforestry tree breaks as in-field cold composting areas
- Add woody material to these areas to create mycorrhizal oases

ORCHESTRATING SYSTEMS TO STORE WATER

- Critically important to maximizing soil productivity is being able to supply enough water at the appropriate times, to best utilize the solar resources
- Slow water down! Create drains that are on contour and direct water to areas that can store it or greatly slow it down
- Increasing water storage on your farm should be your number one priority in terms of infrastructure development

ORCHESTRATING THE SYSTEM LAYOUT TO BEST UTILIZE BOTH CROPPING NON-CROPPING AREAS

- In permaculture there is an emphasis on edges
- Use farm paths, access roads, swales, embankments, as biomass and ecosystem service providing factories to supplement production areas



The background features a black field with abstract, wavy, translucent shapes in shades of green and yellow, creating a sense of motion and depth. The shapes are layered, with some appearing to flow from the top left towards the right.

THANK YOU!