

Soils – Perspective in Natural Farming

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How much can we scrape through from what is being left of the dying soils?

Leaving the 'Dirt' behind!

What is the difference
between Dirt & Soils?

What is life in Soils?

How does it matter, if there is
no life in soils?

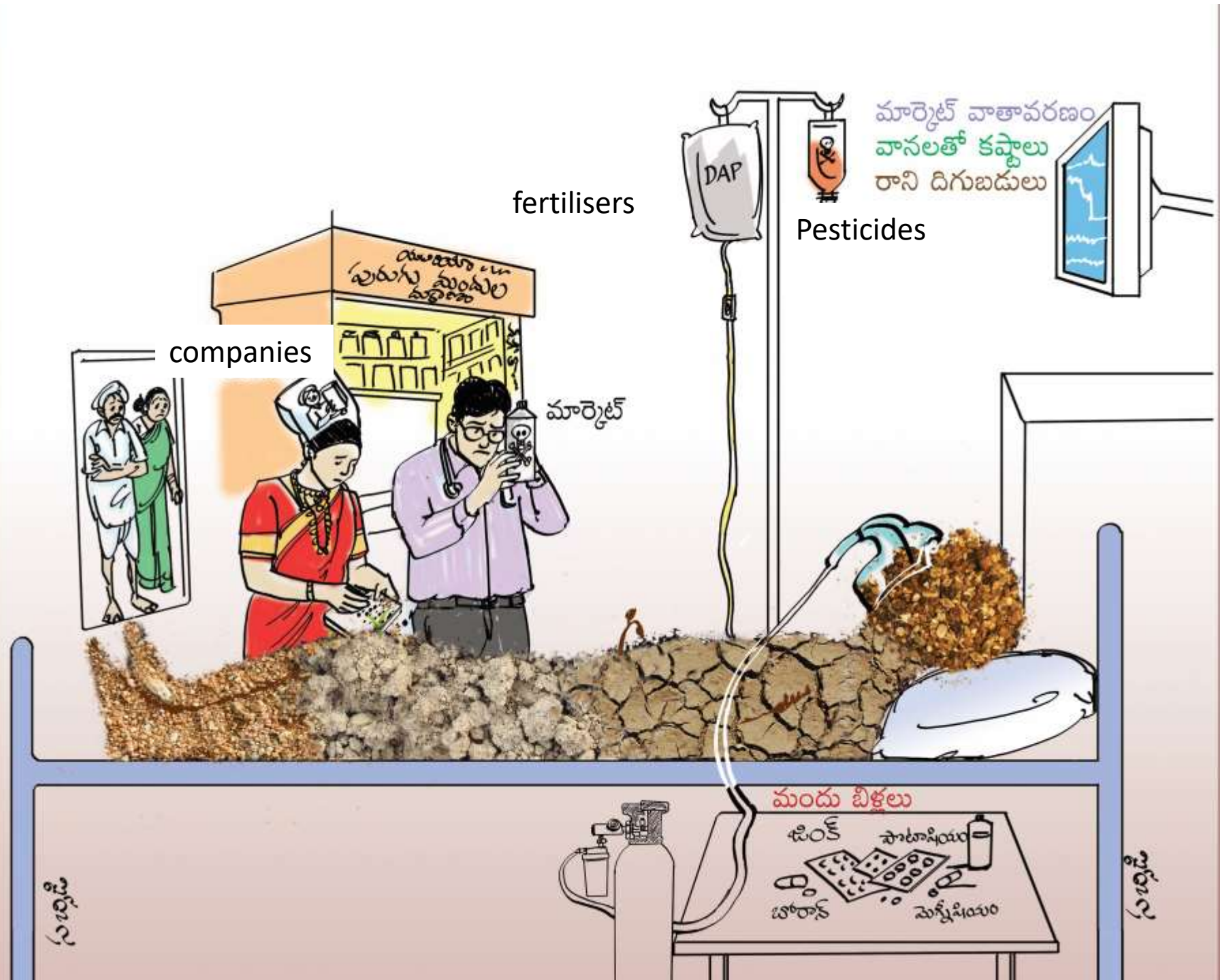


Soils are Dying !!



Large part of India's soils, are in the "ICU"!!

How long Soils "in the ICU" – can sustain Agriculture?



How to bring 'life' back into soils?

Type your answers in the 'chat'.

Conventional Solutions ..

- Compost application
 - FYM
 - Vermicompost
 - NADEP compost
 - Industrial compost
- Green manure
- Soil conservation
- ..

But, issues remain of ..

- Adequacy
- Spread



Are we able to apply to all lands?

Are the quantities applied adequate?

**Without livestock we can not address the
soils issue .. ?**

Do you think we can not



3M

1

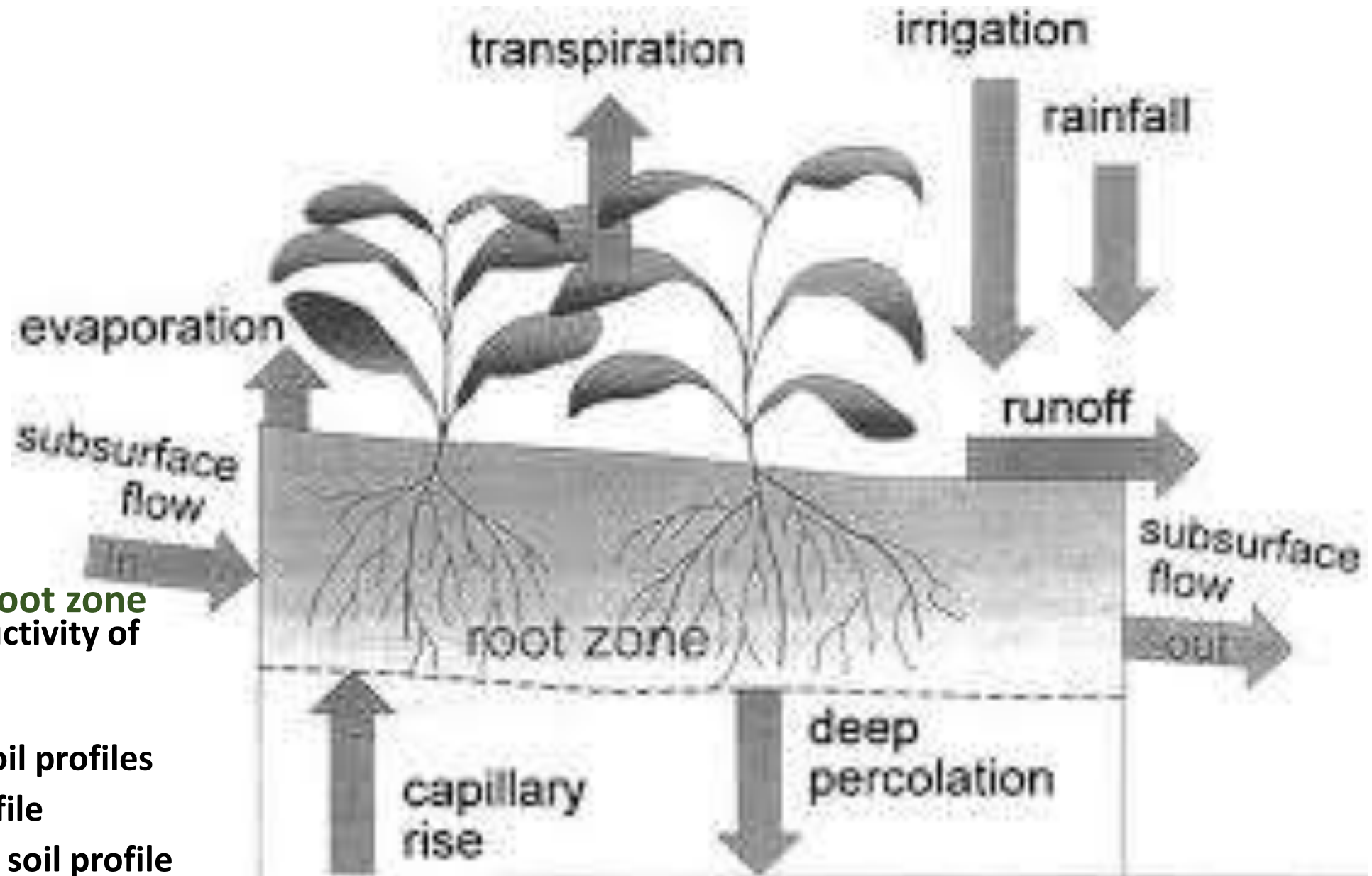
- What's the difference among the three Layers?

2

3

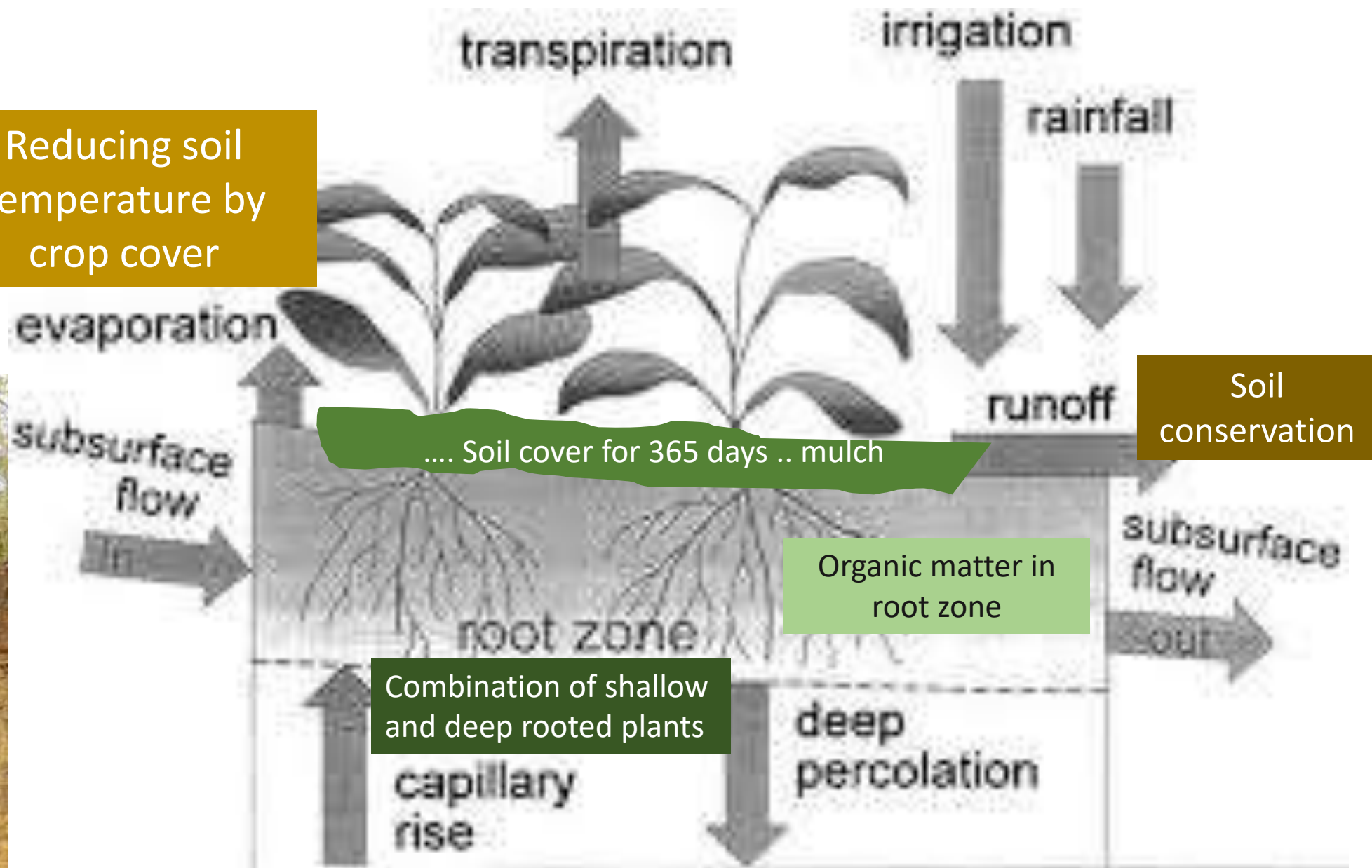
Life in rainfed areas depend on the few inches of soil on the top!

Why & What.. of Soils



- **Nature of Soil in the root zone** holds promise of “**Productivity of Rainfed Agriculture**”
- **Organic Matter** in the soil profiles
- **Moisture** in the soil profile
- **Microbial activity** in the soil profile
- **Soil Cover** for 365 days

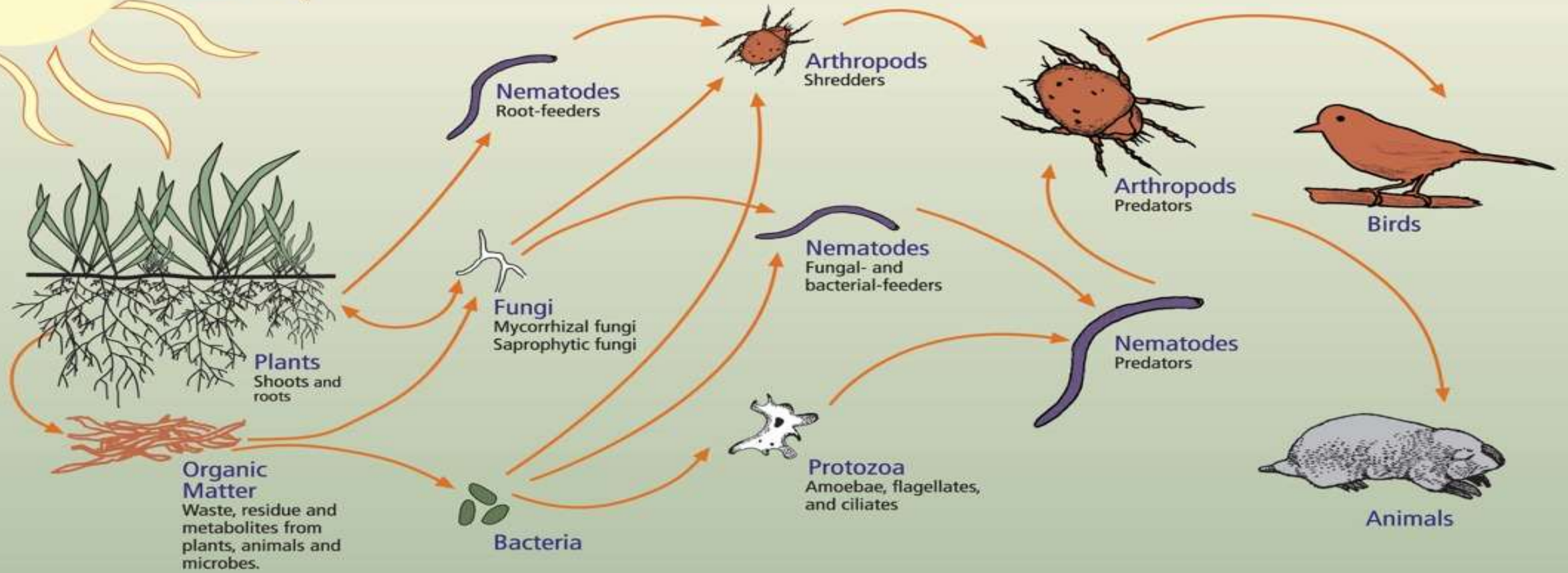
Reducing soil temperature by crop cover



Role of Life.. In .. soils

The Living Roots

The Soil Food Web



First trophic level:
Photosynthesizers

Second trophic level:
Decomposers
Mutualists
Pathogens, Parasites
Root-feeders

Third trophic level:
Shredders
Predators
Grazers

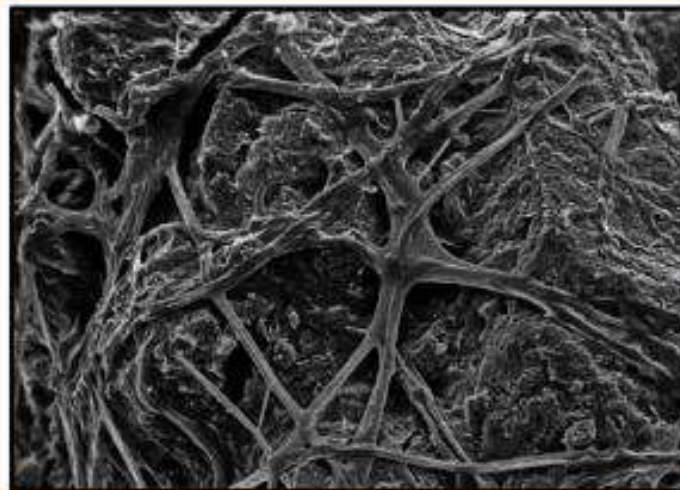
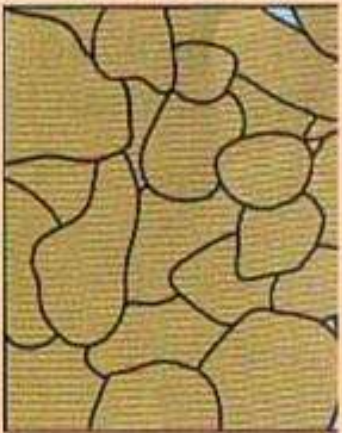
Fourth trophic level:
Higher level predators

Fifth and higher trophic levels:
Higher level predators

Role of Microbes in Soil Aggregation

Soil aggregation

Non porous and non-permeable



Porous and permeable with connected pore spaces



Fungal hyphae, bacteria & root exudates glue together the soil particles
(Electron microscopic image)



Soil Aeration

- Water infiltration
- Water holding
- **Water vapour harvested for irrigation**

Rivers of water in the air – air contains 10 times the water in the rivers – 50,000 ppm

Structural integrity of soil

Less wind erosion

Less water erosion

Cleaner air and water due to less erosion

Cleaner water due to structural filtration

Protection from mudslides



Water resistant soil aggregates



Source: Dharmendar, 2022

Nutrient Cycling in Natural Farming

Nature's Sophisticated
Carbon Capture Mechanism

PLANT CONVERTS

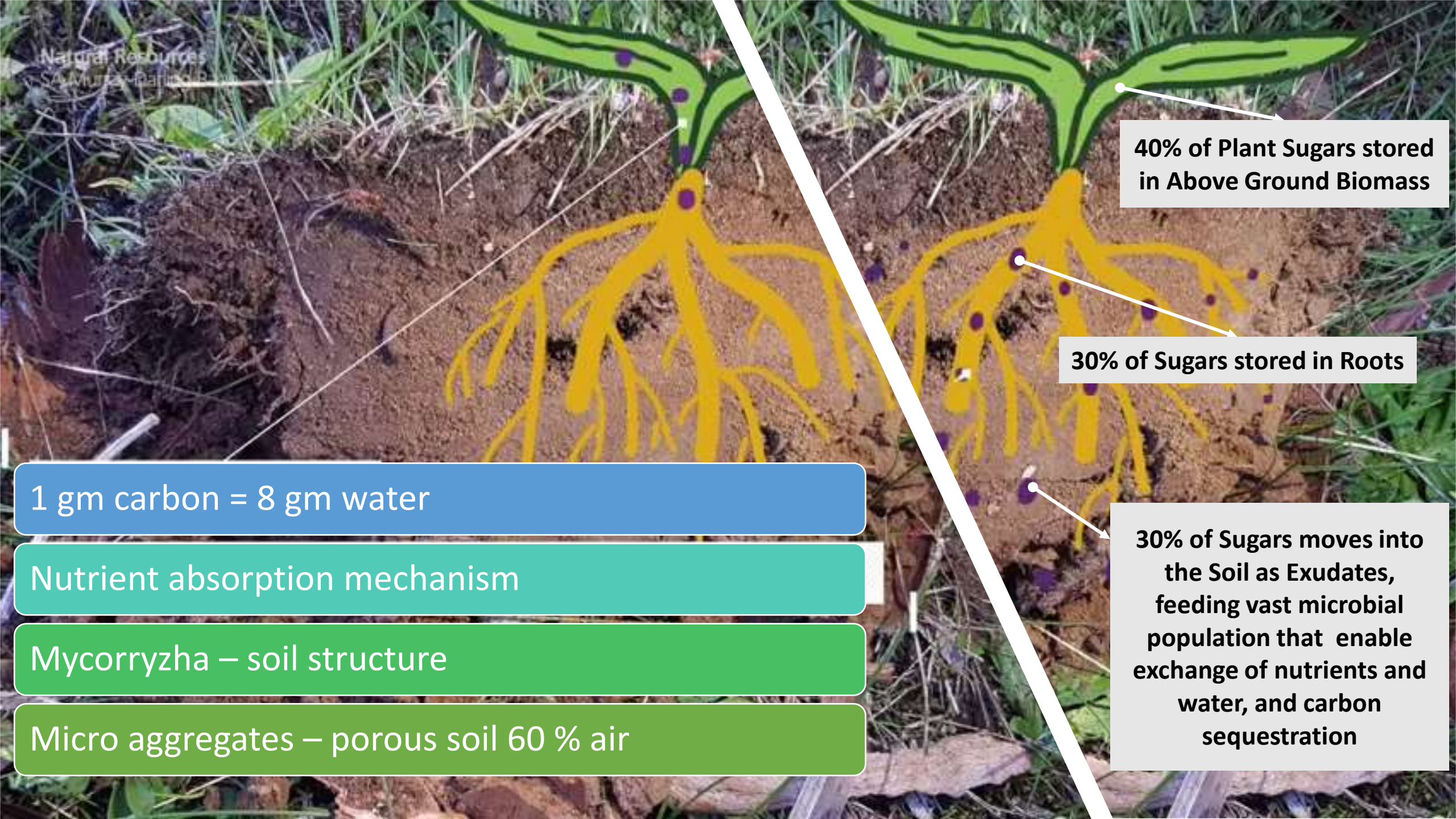
SUNLIGHT, WATER and CO2 into SUGARS

**40% of Plant Sugars stored
in Above Ground Biomass**

30% of Sugars stored in Roots

**30% of Sugars moves into
the Soil as Exudates,
feeding vast microbial
population that makes
plant healthy**

Image courtesy: Natural Resources SA Murray-Darling Basin YouTube channel



40% of Plant Sugars stored in Above Ground Biomass

30% of Sugars stored in Roots

30% of Sugars moves into the Soil as Exudates, feeding vast microbial population that enable exchange of nutrients and water, and carbon sequestration

1 gm carbon = 8 gm water

Nutrient absorption mechanism

Mycorryzha – soil structure

Micro aggregates – porous soil 60 % air

POLY CROPS

Above ground diversity >> Below ground diversity of soil microbiome

Recommendation: >4 plant groups >> 8-12 species.

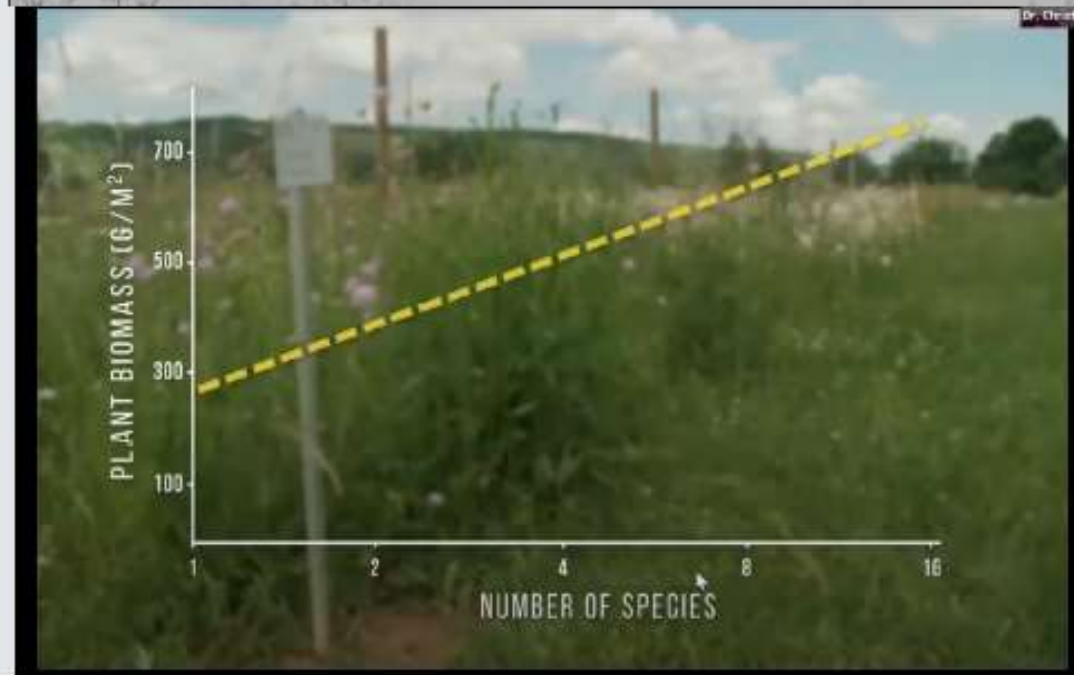
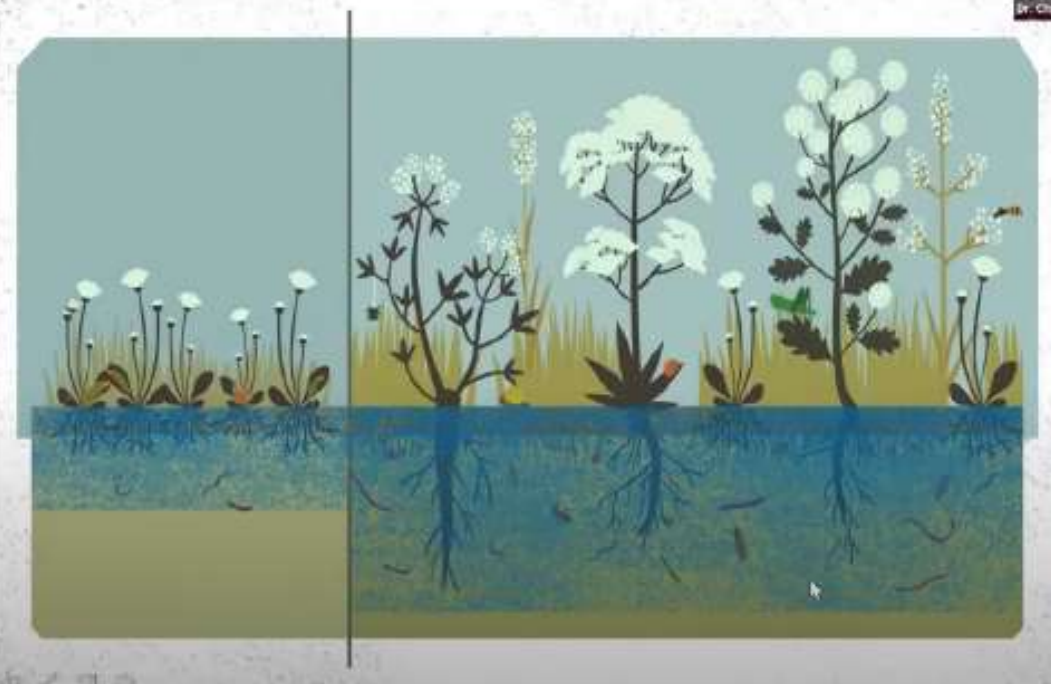
Diversity >> Crop productivity

Jena Experiment

Association of dissimilar plant groups >> More plant productivity

Risk management

Natural barriers against pests & diseases



| Requirement | Strategy |
|--|---|
| Increase in soil organic matter (soil sponge) | <i>In situ biomass generation through crop system</i> |
| Reducing evaporation, hardening of soil surface | Soil cover, mulch, surface not exposed to direct sunlight |
| Reducing soil temperature and desiccation of organic matter | Soil cover 365 days |

| Requirement | Strategy |
|---------------------------------------|--|
| Enhanced biological activity in soils | <i>Living Roots</i> ; Of Diverse crops, deep & shallow rooted, |
| Enhanced microbial activity | Bio-Stimulants : <ul style="list-style-type: none">• Beejamrutam• Jeevamrutam, (Ghana / Liquid) – soil & foliar applications |
| Less disturbance to soil | Light/ no till |

| Requirement | Strategy |
|------------------------|--|
| Erosion through runoff | <i>Soil conservation - measures</i> |
| | Harvesting soils – stream terraces |
| | Earthen/ pebble – Bunds |
| | Lower velocity of runoff- safe discharge |













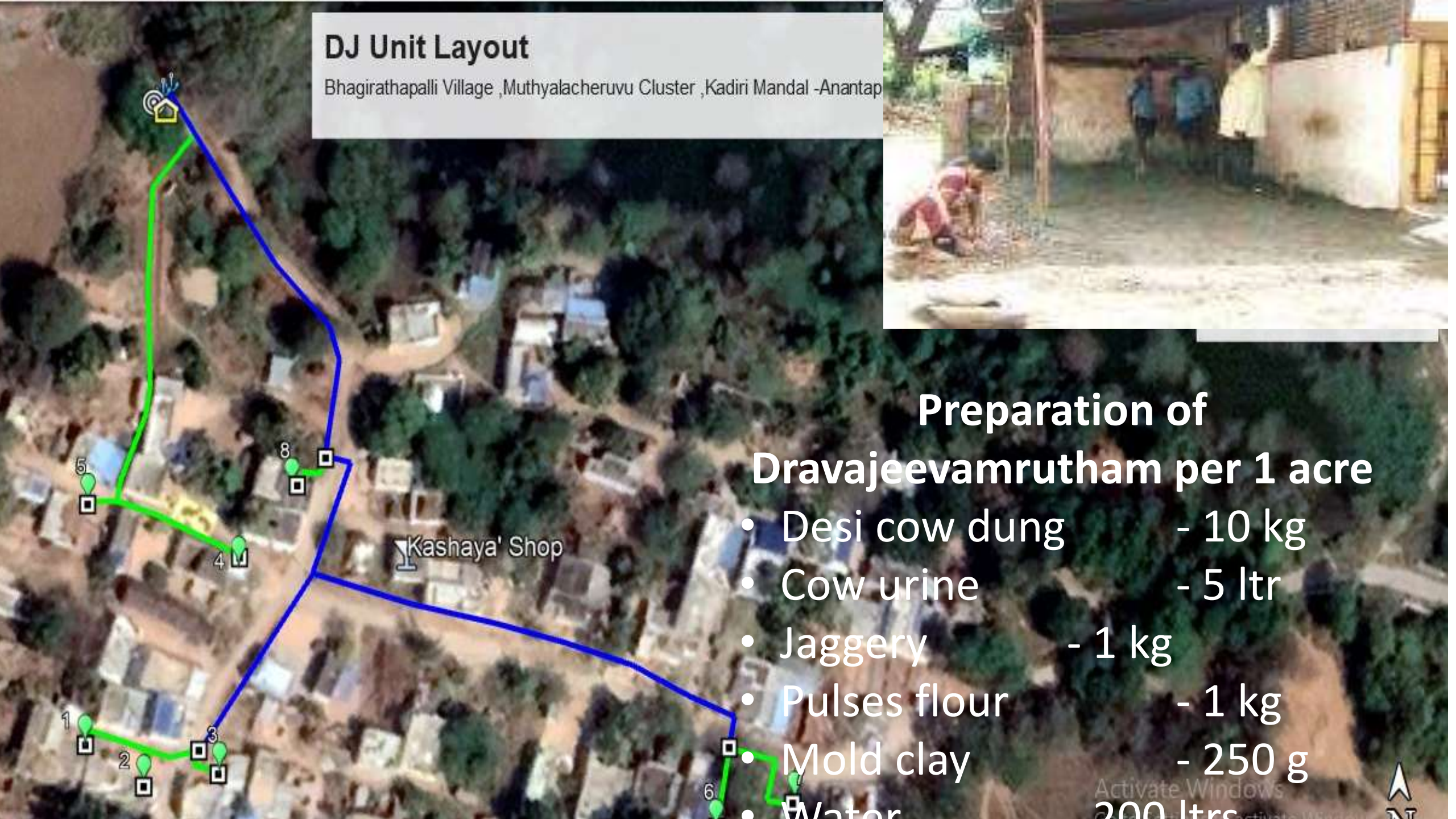






DJ Unit Layout

Bhagirathapalli Village ,Muthyalacheruvu Cluster ,Kadiri Mandal -Anantap



Preparation of

Dravajeevamrutham per 1 acre

- Desi cow dung - 10 kg
- Cow urine - 5 ltr
- Jaggery - 1 kg
- Pulses flour - 1 kg
- Mold clay - 250 g
- Water - 200 ltrs



Summing up...

- Do you still think?
 - .. Improving soils is compost application?
 - .. Improving soils is increasing livestock and making Gobar available?
- **Natural farming Perspective :**
 - Soil cover 365 days (do not expose soils to sun)
 - Crops – Poly Crops (above ground and below ground diversity)
 - Bio-stimulants
 - Do not allow soil to run-off
 - Soil aggregation & aeration through enhanced biological activity

9 Principles of Regen Ag - APCNF

1. **Crop cover – aim towards having 365-day green cover**
2. **Crop diversity (including trees) – include at least 8 – 12 species in any one cropping area.**
3. **No/low till – keep tillage disturbance to a minimum, ideally not at all.**
4. **Integrate animals – have livestock as an integral part of the farming system**
5. **Use of bio-stimulants – select and use appropriate bio-stimulants to speed up life returning to soils**
6. **Organic matter addition – Increase OM through addition of dry mulches.**
7. **Local seeds – preference to local/traditional seeds**
8. **Pest management (prevention/monitoring/curative/no pesticides) – understand pest life cycles and use non-poisonous methods to address the weakest link in pest life cycle.**
9. **No chemical stress. – avoid all chemical pesticides, herbicides and fertilizers.**