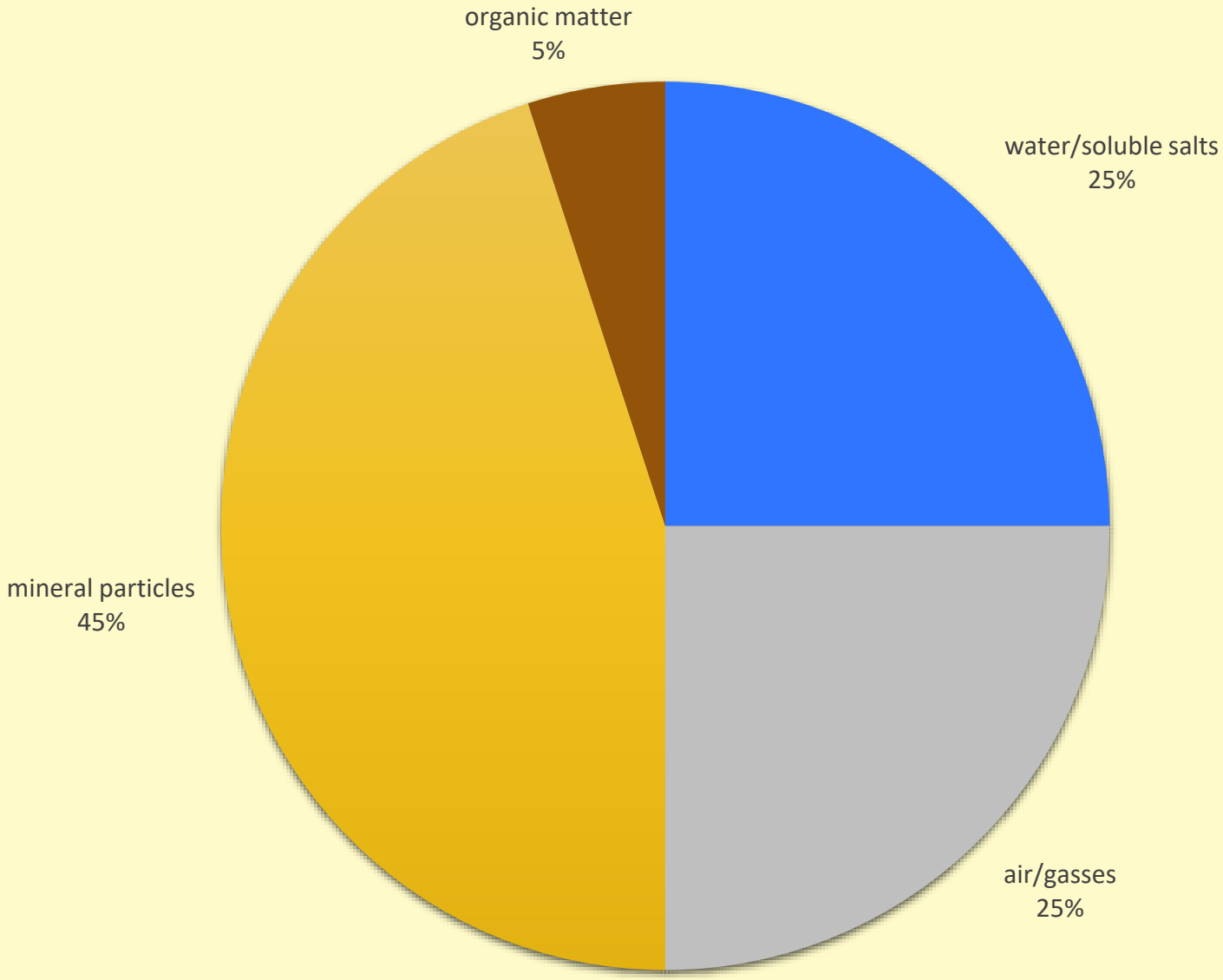
# Soil, compost and no-dig in organic gardening

Stephen Bostock

# Outline

- What is soil?
- “No dig” – minimum tillage
  - Mulching
- Garden composting
  - Bins
  - Liquid fertilizer
  - Leaf mould

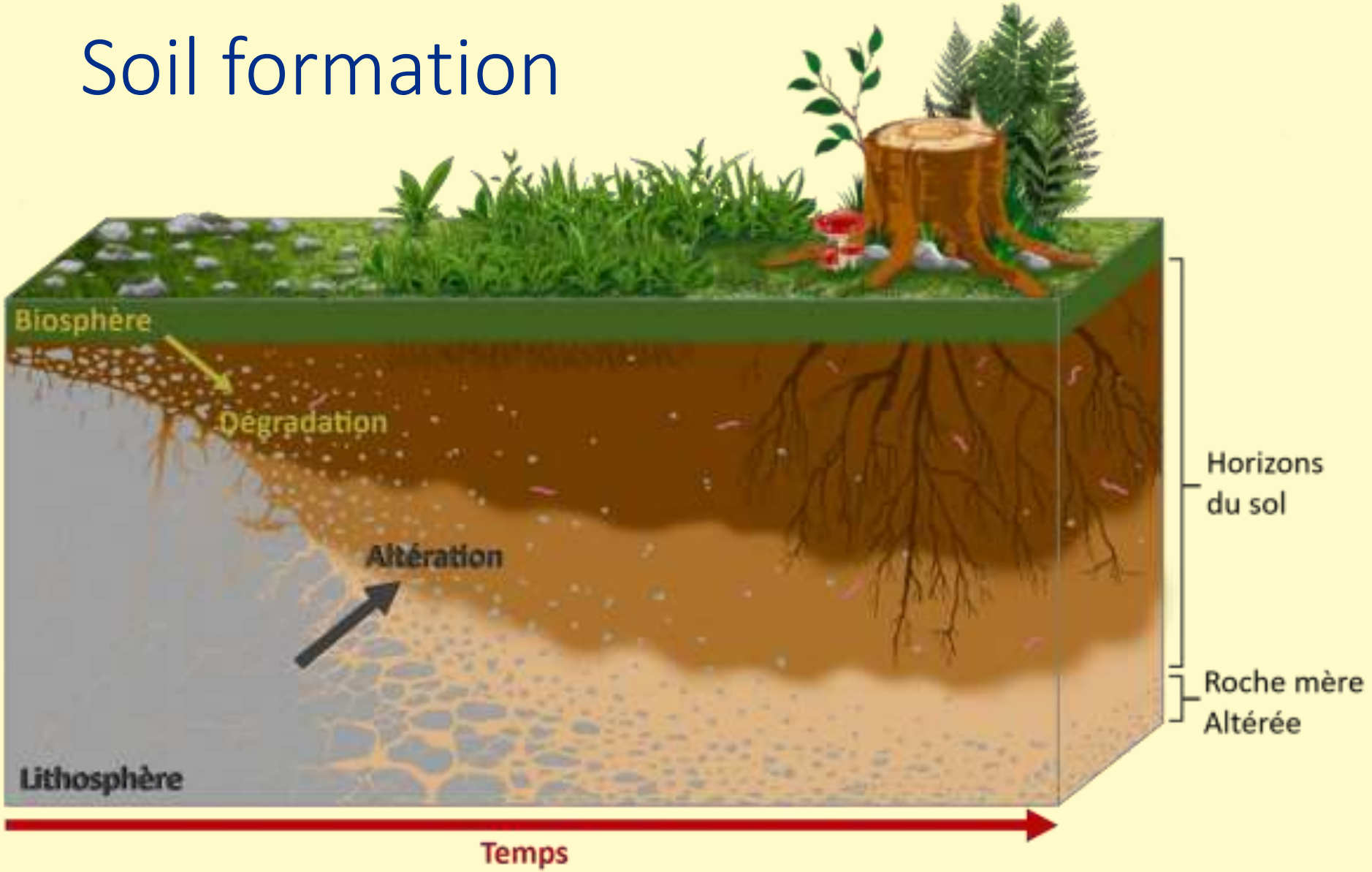
# “Typical” soil composition



# What is soil?

- A mix of *inorganic* minerals (rock, gas, water, dissolved minerals) and *organic* (carbon-based life: plants, animals, fungi, bacteria)
- Taking hundreds or thousands of years to develop in one spot
- Earthworms are particularly important, pulling vegetation into the soil, digesting it to create *humus*, making tunnels that improve drainage

# Soil formation




Source: CC-By-SA4 https://wiki.tripleperformance.fr/images/thumb/8/83/Les_types_de_sols.png/600px-Les_types_de_sols.png

# Vertical soil “profile”

- Layers (*horizons*) of different colours and textures  from dark organic (mostly plant) material down to rock (or sand, clay etc.)
- In temperate regions, *Brown Earths* develop under forests without surface waterlogging, producing a gradation of dark organic layers down to underlying rock
- Good for agriculture, cultivation

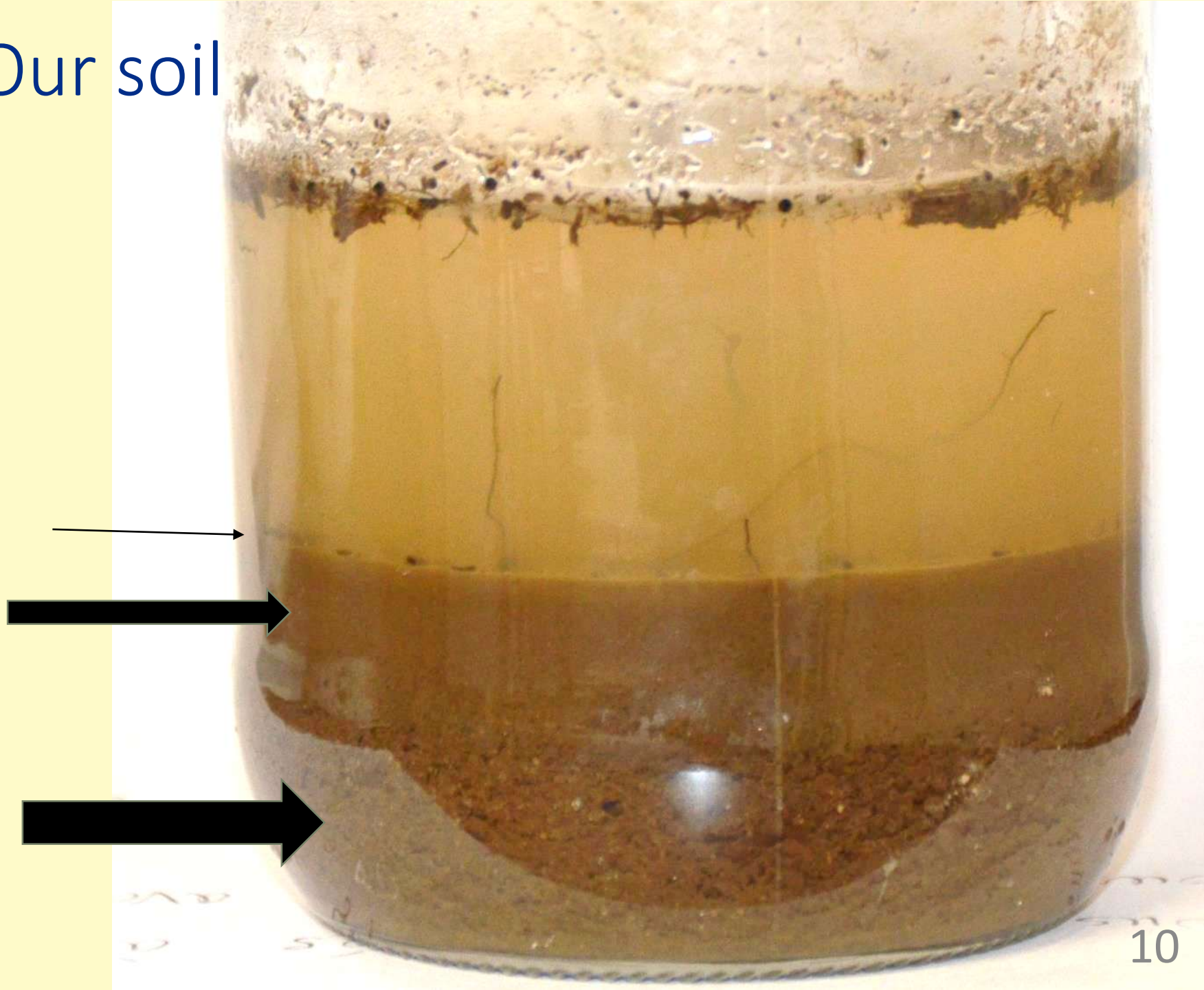
# Mineral components: types of soil

- Sand – rough to touch
- Silt - smooth
- Clay – slippery, will mould into a ball
- Plus larger pebbles and rocks

- Most soils are a mix of all three but generally are *heavy* (clayey) or *light* (sandy). An ideal garden soil is even mix (*loam*) but with less clay than sand or silt).


Permanent Marker

# Our soil



topsoil

subsoil

# Humus and soil fertility

- Fertility depends on organic (carbon) content (dark, minute plant material, *humus*)
- Digging/ploughing soils exposes the buried organic content to the air, it oxidizes, carbon is lost as $CO_2$, fertility is reduced
- (Globally soils are losing fertility. Inorganic/ chemical fertilizers do not replace carbon.)
- Adding organic content (e.g. garden compost) traps carbon, increases fertility, improves drainage on heavy soils and improves water retention on light soils

# To increase fertility

- Add compost or manure as a *mulch* of 2-5 cm on top, never leave soil uncovered
- Grow vegetables (or flowers or cover crops) to protect the soil and add roots. Leave roots in the ground when harvesting if possible.
- Let the soil structure develop

# Earthworms

Eat vegetable matter and soil, grind it, create humus
Permanent burrows aerate the soil and improve drainage
Several types, many species



publicdomainpictures.net

# Earthworm casts and burrows

Earthworm casts © Christine Adams CC-BY.  Earthworm burrows © Sarah Patton CC-BY.

# No-dig, minimum tillage
# Retire your spade

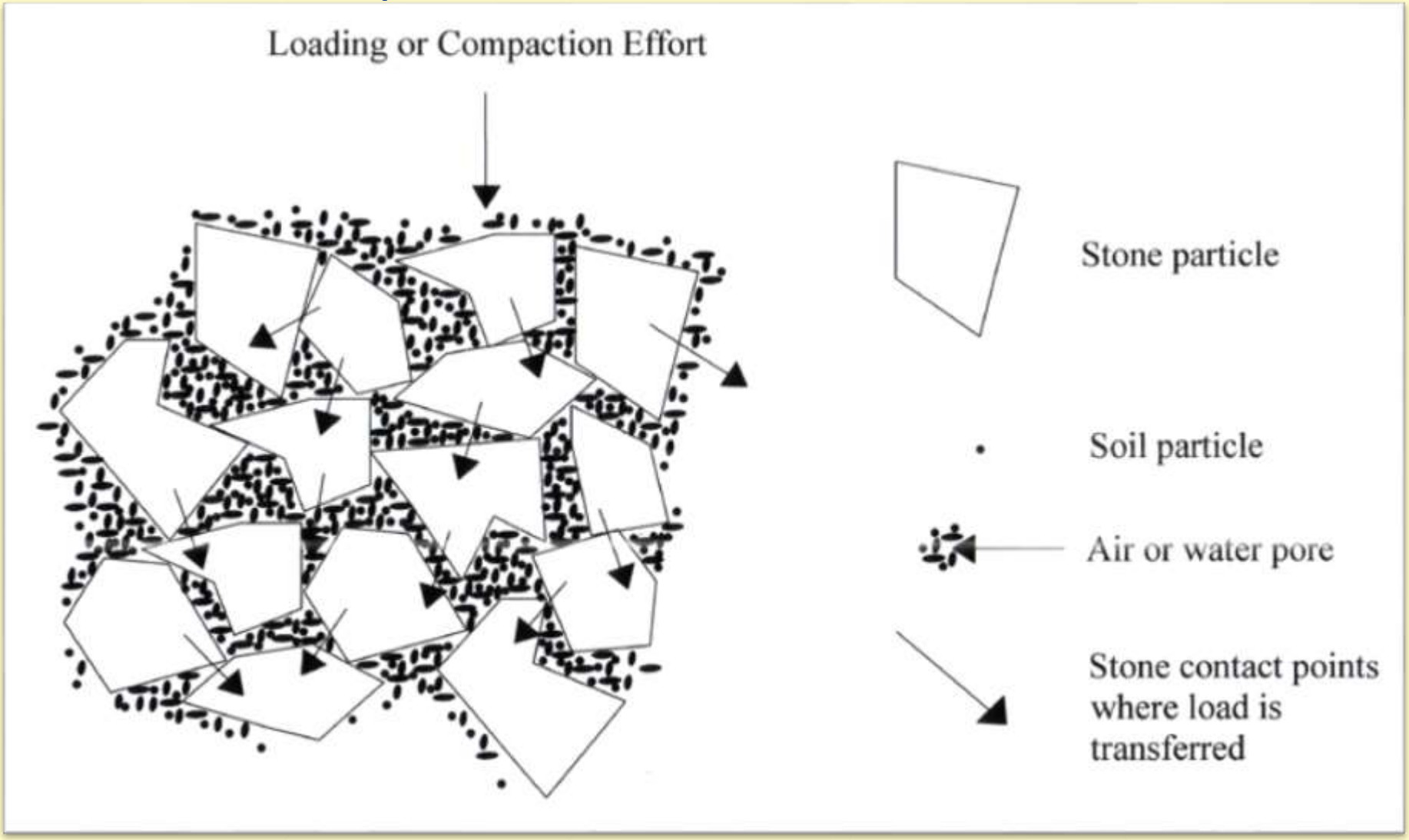
- Forget annual digging – let earthworms do it for you
- Plant with a  dibber or trowel
- Harvest leaving roots in ground as much as possible
- Harvest root crops by gently forking them up
- (Exception: creating a new plot from grassland - turf needs to be upturned and buried)

# Trowels and Dibbers

# No-tread
# Don’t walk on soil

- Avoid soil compaction by treading
- Paths can be hard or soft (grass, bark)
- Never tread on the soil, especially when wet, especially on heavy soils: it crushes the soil structure, reduces aeration, damages drainage, and remains compacted
- (Exceptions: When planting trees and shrubs, they must be *treaded in* to remove air spaces around the roots.)

# Soil compaction




Source: http://www.hort.cornell.edu/uhi/outreach/csc/article.html copyright free
Authors: Nina Bassuk, Jason Grabosky, Peter Trowbridge,James Urban

# Garden compost

- Turn ‘waste’ into garden treasure
- Digestion (by animals, bacteria) not decomposition
- A balanced diet: Not too much of anything at once
- ‘Pre-digest’ it: chop, mix, not in thick layers
- Grow ‘green manure’ (cover crop e.g. rocket, comfrey) specifically to add to the compost bin, rather than dig in

# What goes in: Compost is vegan

- Kitchen waste, coffee grinds, tea bags?
- Plants. Weeds? no seeds, no rhizomes
- Grass cuttings, tree leaves
- Chop up tougher stems
- Cardboard, paper (not coloured) torn up
- Organic cat litter, wood ash
- Soil and used compost
- Grow cover crop (e.g. rocket, comfrey) to add to the compost bin, rather than dig in
- NOT meat, cheese, or much fat/oil, or much citrus material (too acidic)

Vegetable cat litter

Wood ash

# Compost bins - size matters


UR 500 litres
Belli
COMPOSTEUR 500 litres
SERRE POLYCARBONATE 3.60M²
PRODUCT DESIGNATION:SERRE POLYCARBONATE 3.60M²
Measurements: 122cm x 10cm x 62cm
Gross weight: 10KG
CATALOGUE N°: J3451
GENCOD NR: 3459223527493
259

# Compost bins - make your own

- Aim at 1 cubic metre
- You need at least two bins, preferably three or four
- Wooden pallets or planks making three bays side-by-side, with open fronts and old carpet covers

# Managing compost

- Compost created by digestion by animals and bacteria - they need air (oxygen)
- Not dry (cannot grow) or too wet (no oxygen)
- A mix of fibrous (carbon) and soft (nitrogen)
- Compost needs turning over/mixing or aerating at least once before use
- With multiple bins, upturn compost from one bin to another, to mix and aerate
- More turning gives faster composting (6m-2yr)

# Smaller bins work less well


Grass cuttings

# Uses of garden compost

- As a mulch on flower and vegetable beds
- To fill raised beds, mixed with topsoil
- Sieved, to mix with topsoil, leaf mould and perlite/vermiculite to make potting compost

# Homemade liquid fertilizer

- Even in a fertile soil, some plants benefit from liquid feeding e.g. tomatoes
- In spring fill a bucket with nettle shoots *Urtica dioica* or comfrey *Symphytum officinale*
- Half fill the bucket with water, and cover
- Leave for two weeks (out of the way)
- Stir. Pour off the brown liquid and dilute 1/20 before watering the soil around plants
- Or buy seaweed extract

# Too many leaves? Leaf mould

- Leaves collected in autumn, put in a mesh bin or bin-bag with holes. Keep moist in summer.
- *Fungi* will rot them in one/two years to give a fibrous, low-nutrient compost ingredient
- Improves moisture retention & aeration

# Summary: soil is not a grow-bag

- ➢ Maximise carbon capture in the soil, minimise carbon loss. Increase organic content, turns to humus.
- ➢ Encourage soil ecosystem, especially earthworms
- ✓ Minimise digging, plant with a trowel/dibber, leave roots in the ground if possible
- ✓ Shallow forking and raking the surface (to get a fine *tilth*) necessary before sowing seeds directly
- ✓ Keep the soil covered with crops, green manure, compost mulch or leaves
- ✓ Make your own garden compost to use as a mulch or in your potting compost
- ✓ NO inorganic, artificial fertilizers, pesticides, fungicides

# The End

# Starting a new garden soil from grassland

- Digging needed
- In this case the top layer of turf must be buried at a spade's depth and forking the soil below that.

# Possible dates for weekend garden visits (Bostock's availability)

- Sunday 16 April
- Sat-Sunday 6-7 May
- (Sunday 14 May EM Plant Swap)
- Sat-Sunday 27-28 May
- Sat-Sunday 10-11 June
- Saturday 17 June
- Sat-Sunday 1-2 July
- Sat-Sunday 8-9 July
- (School holidays start 10 July)