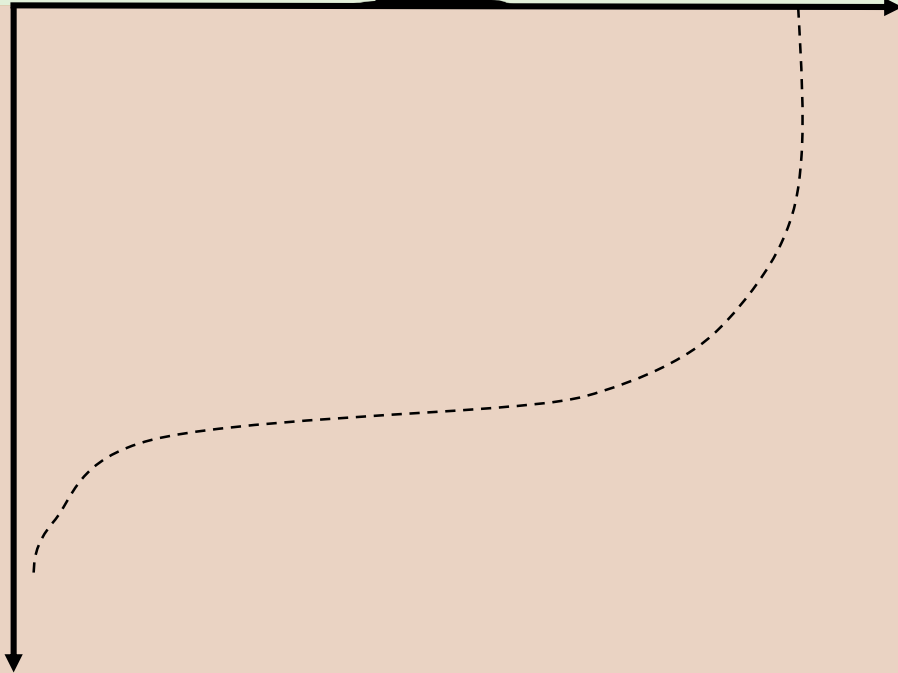


**In the humid tropics, soil weathering stage
affects differently the soil-to-plant silicon cycle
depending on land use**



Desilication degree of the soil

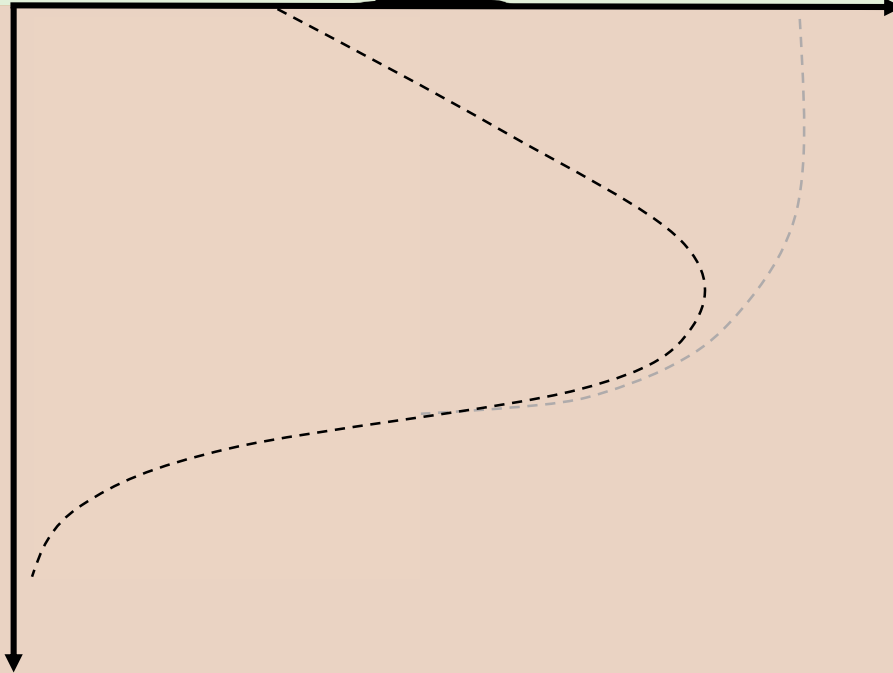
Soil depth

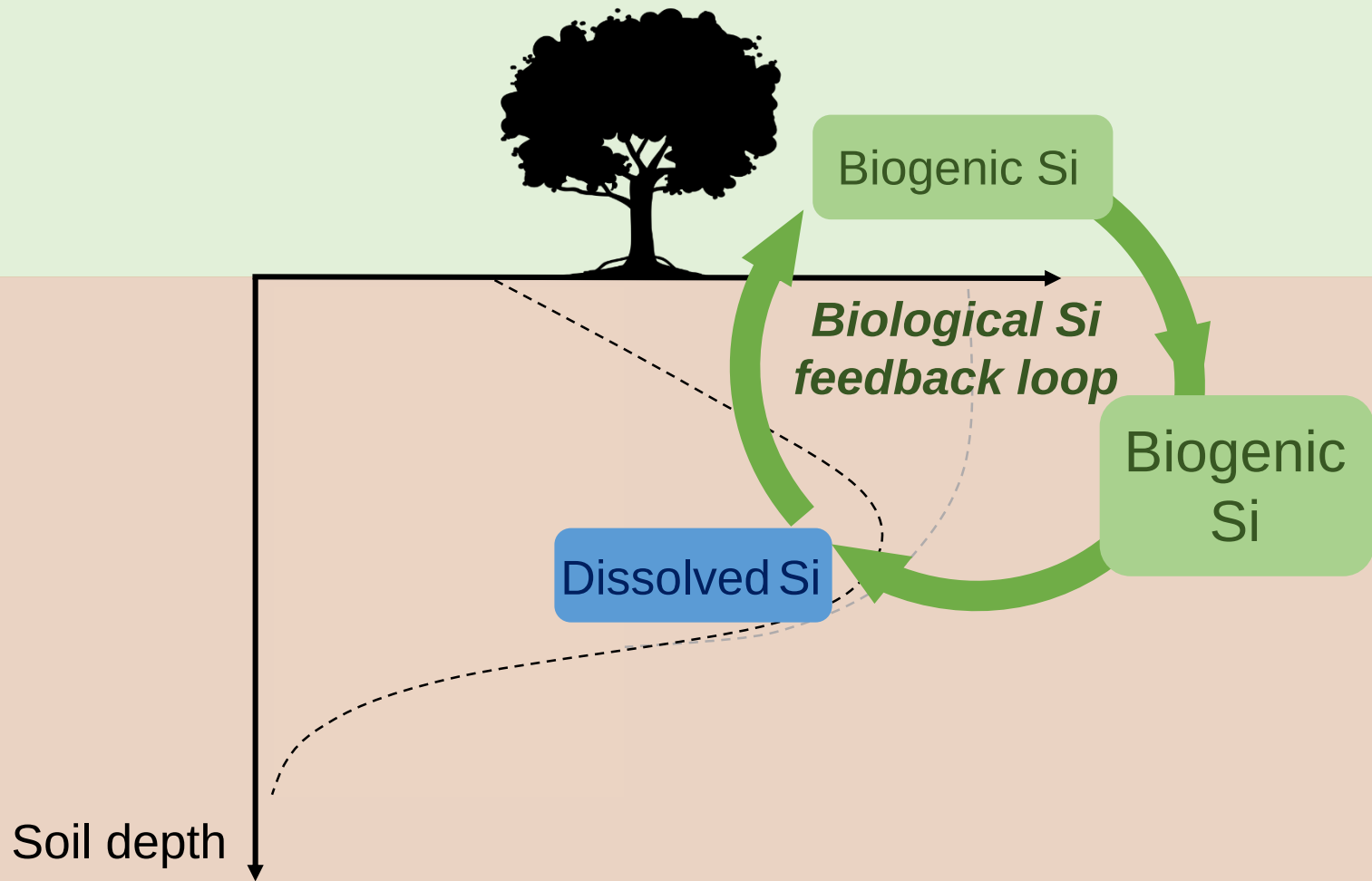


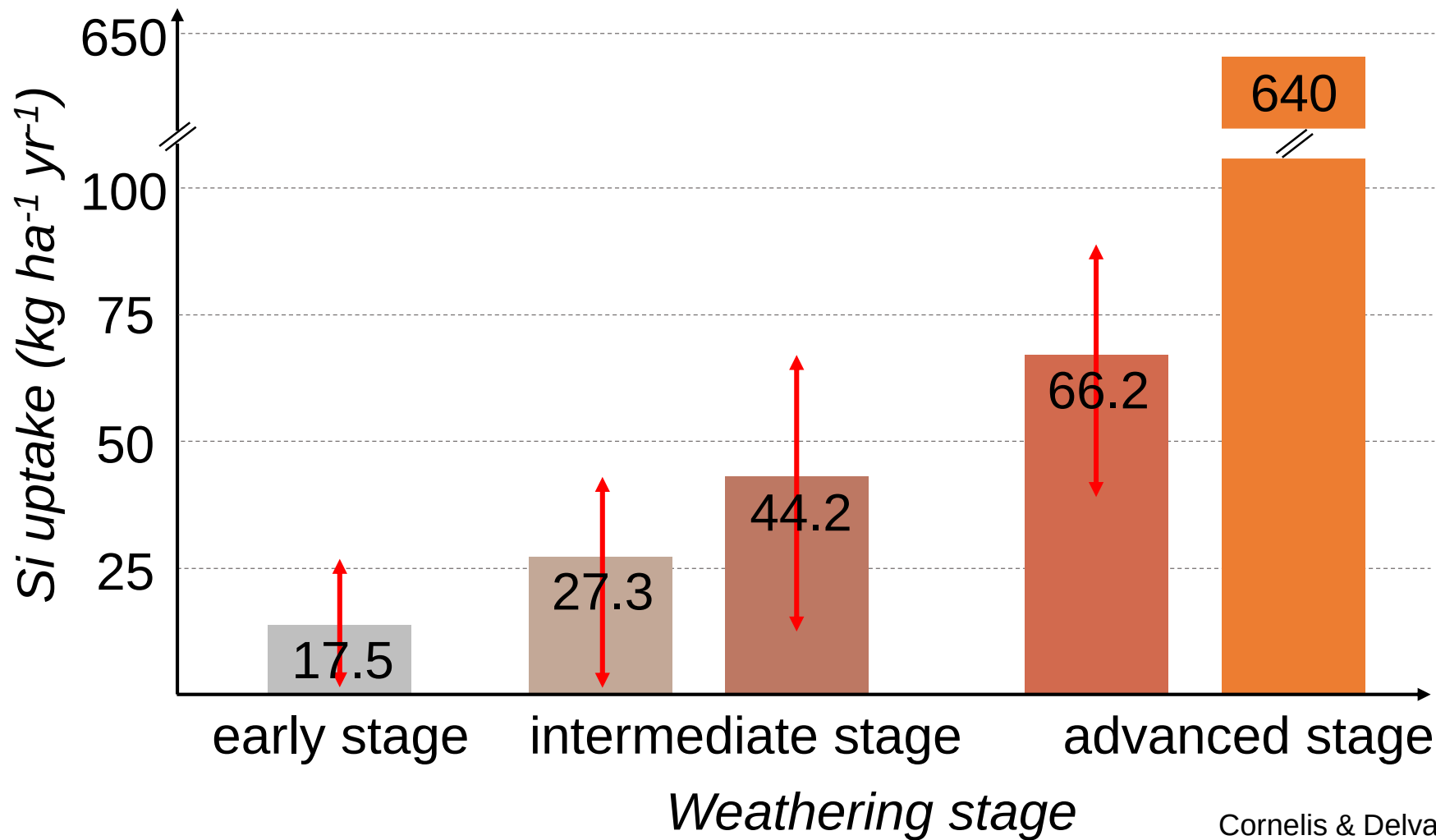


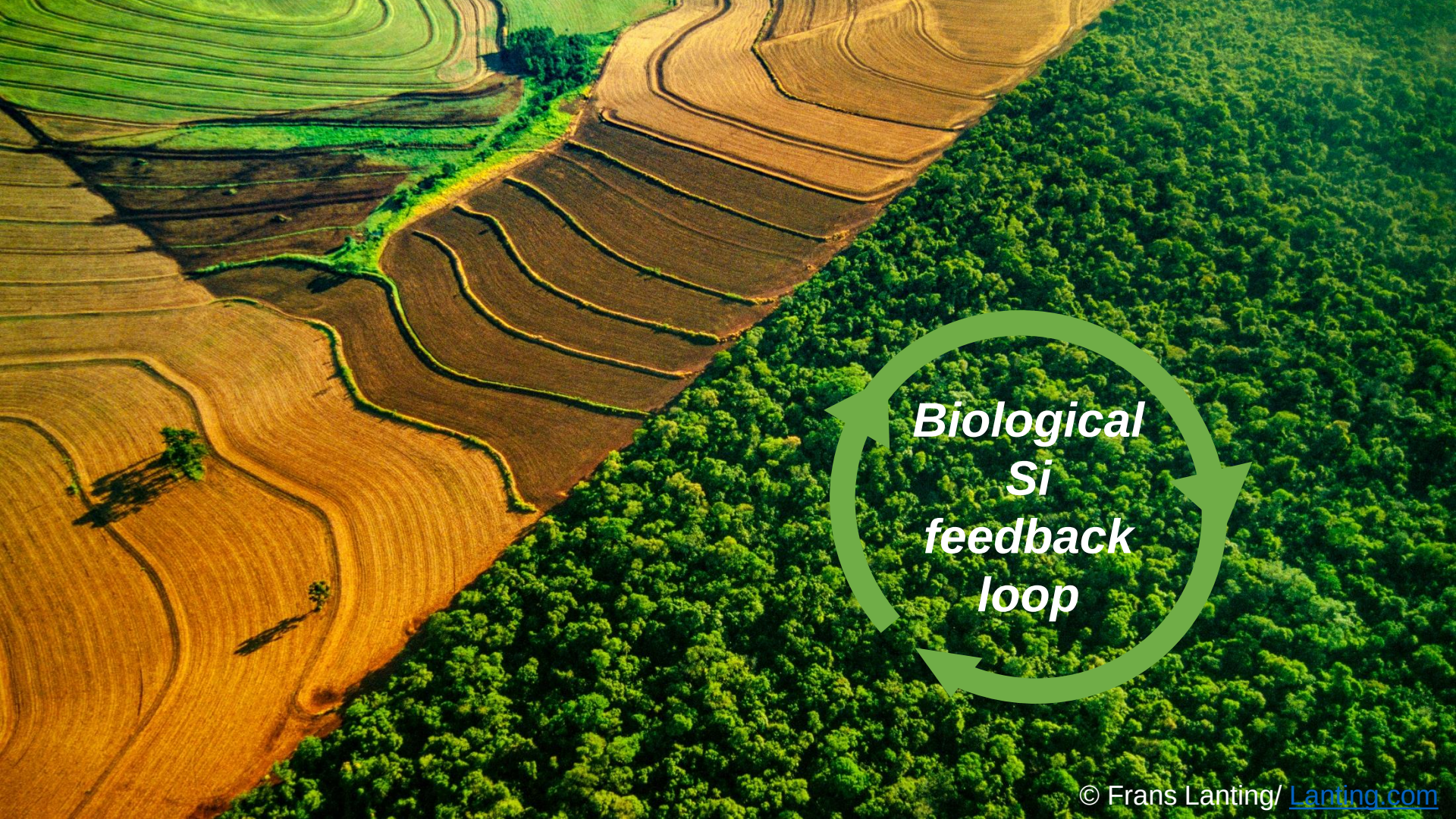
Desilication degree of the soil

Soil depth

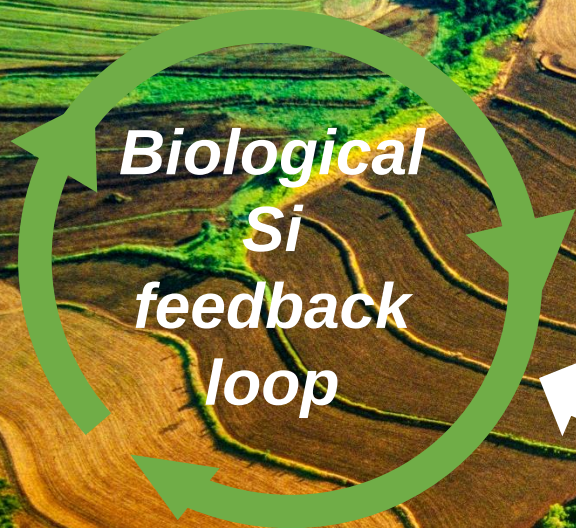




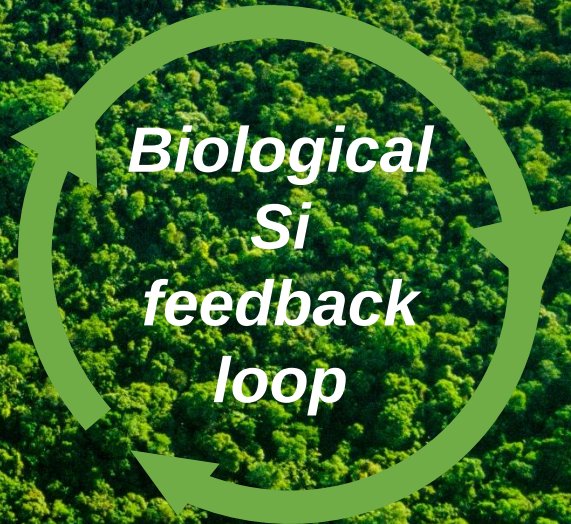


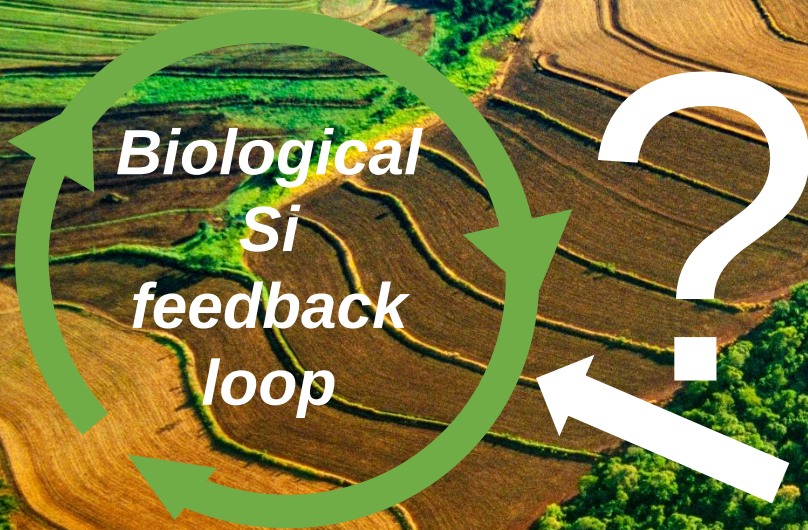
An aerial photograph showing a landscape with agricultural fields on the left and a dense forest on the right. The fields are divided into irregular, wavy shapes, some brown and some green. A circular arrow diagram is overlaid on the forest area, with the text "Biological Si feedback loop" inside it.

***Biological
Si
feedback
loop***

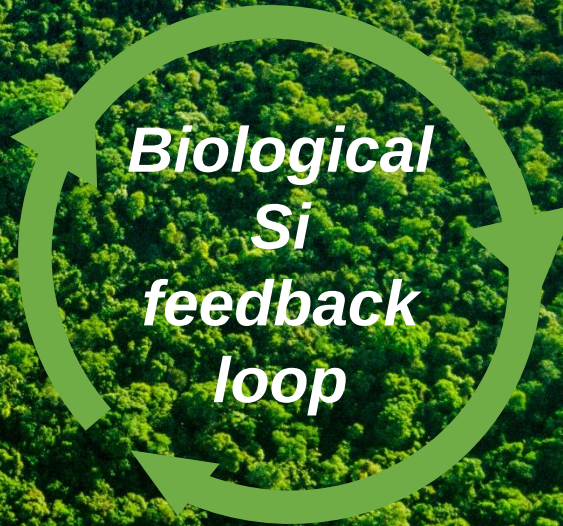


?

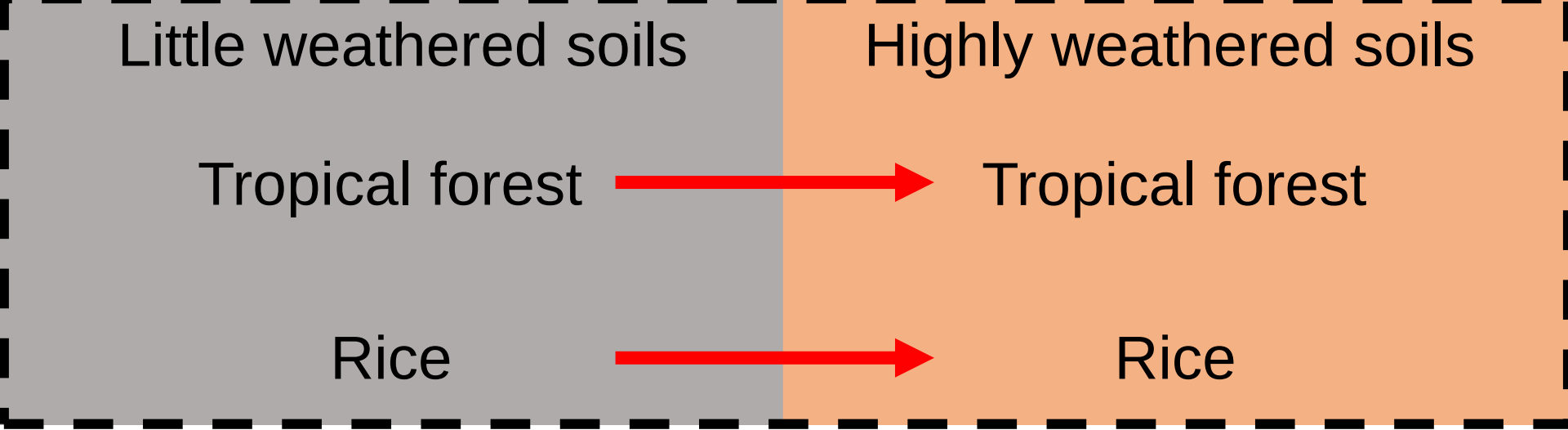




?



Could depend on
the soil weathering
stage



Litterature data

Impact of the soil weathering stage

Little weathered soils

Highly weathered soils

Tropical forest

Tropical forest

Rice

Rice

Litterature data

Impact of the soil weathering stage
And of the land use

Little weathered soils

Highly weathered soils

Tropical forest

Tropical forest

Rice

Rice

Litterature data

Experimental data
Impact of the straw
management

Tropical forest

Sugarcane

Banana

Si uptake (kg ha⁻¹ year⁻¹)

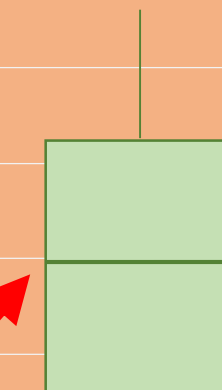
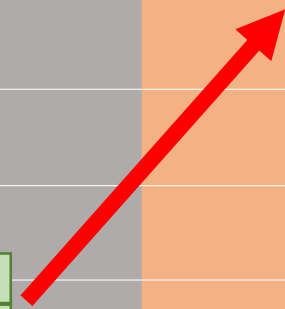
70
60
50
40
30
20
10

Little
weathered

Highly
weathered



Forest



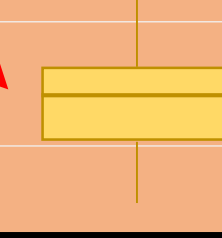
1500
1250
1000
750
500
250

Little
weathered

Highly
weathered



Rice



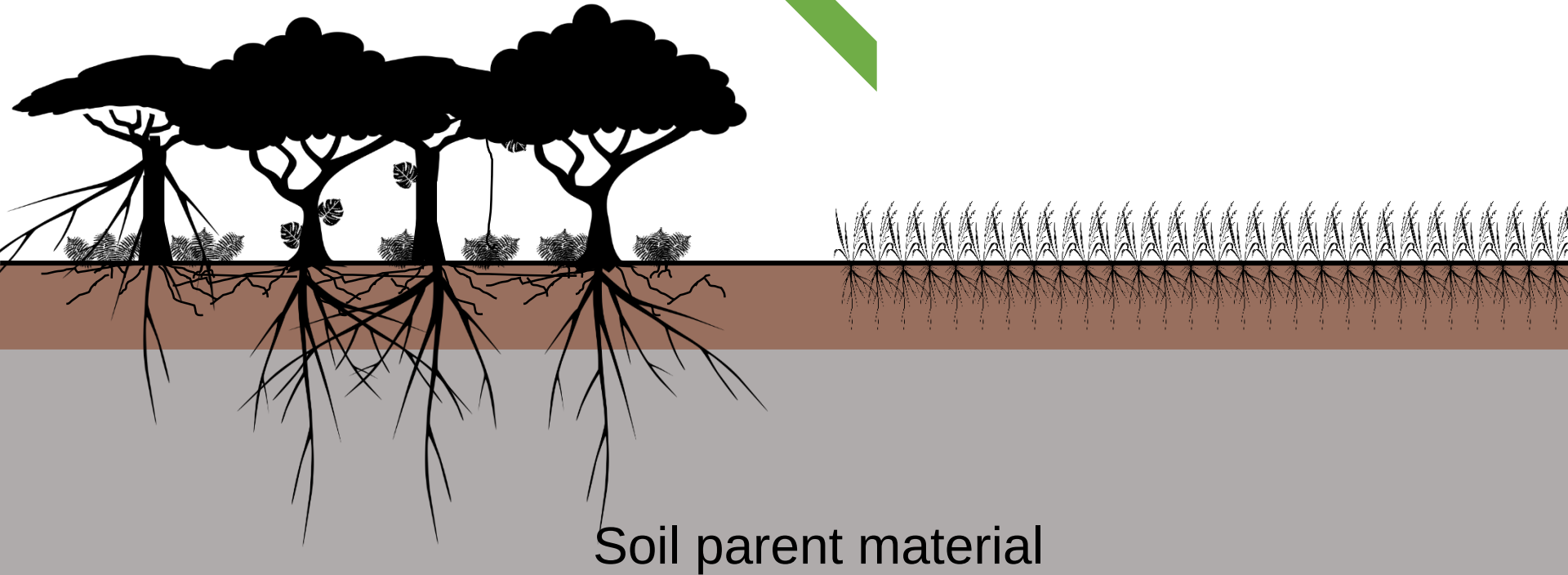
Little weathered soils

Tropical forest

*Si in standing
biomass: 17.8 kg ha⁻¹*

Tropical rice

*Si in standing biomass:
510-760 kg ha⁻¹*

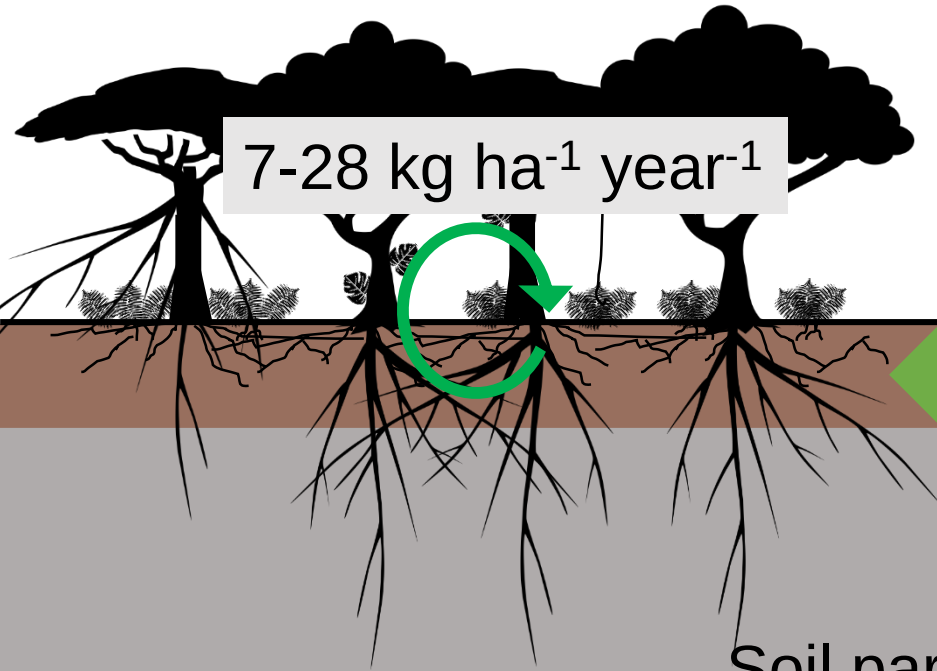


Soil parent material

Tropical forest

Si in standing biomass: 17.8 kg ha⁻¹

7-28 kg ha⁻¹ year⁻¹



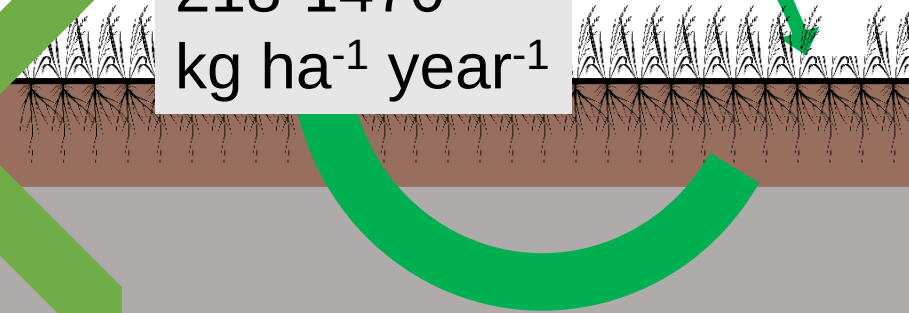
Soil parent material

Tropical rice

Si in standing biomass: 510-760 kg ha⁻¹

41-1240 kg ha⁻¹ year⁻¹

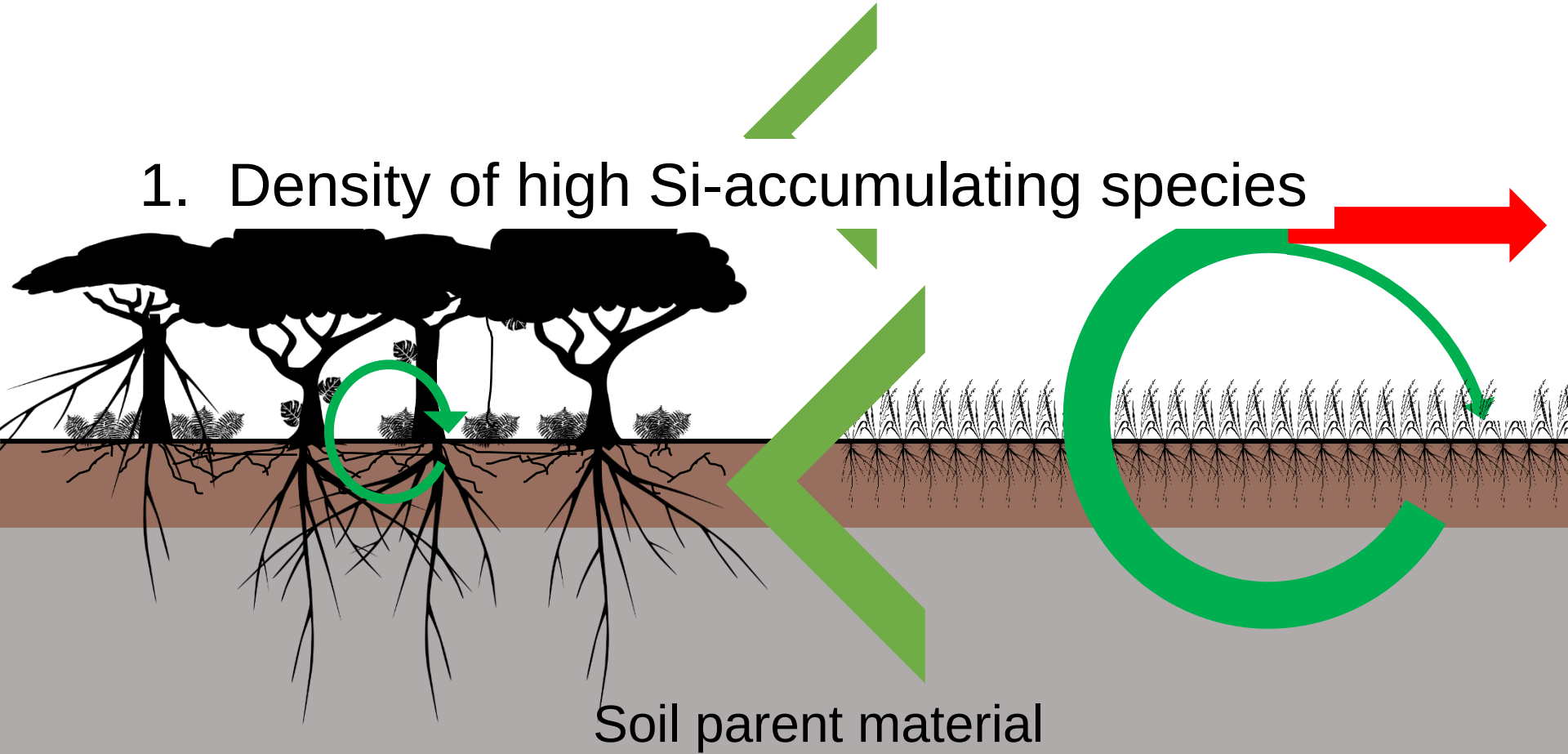
218-1470 kg ha⁻¹ year⁻¹



Tropical forest

Tropical rice

1. Density of high Si-accumulating species



Soil parent material

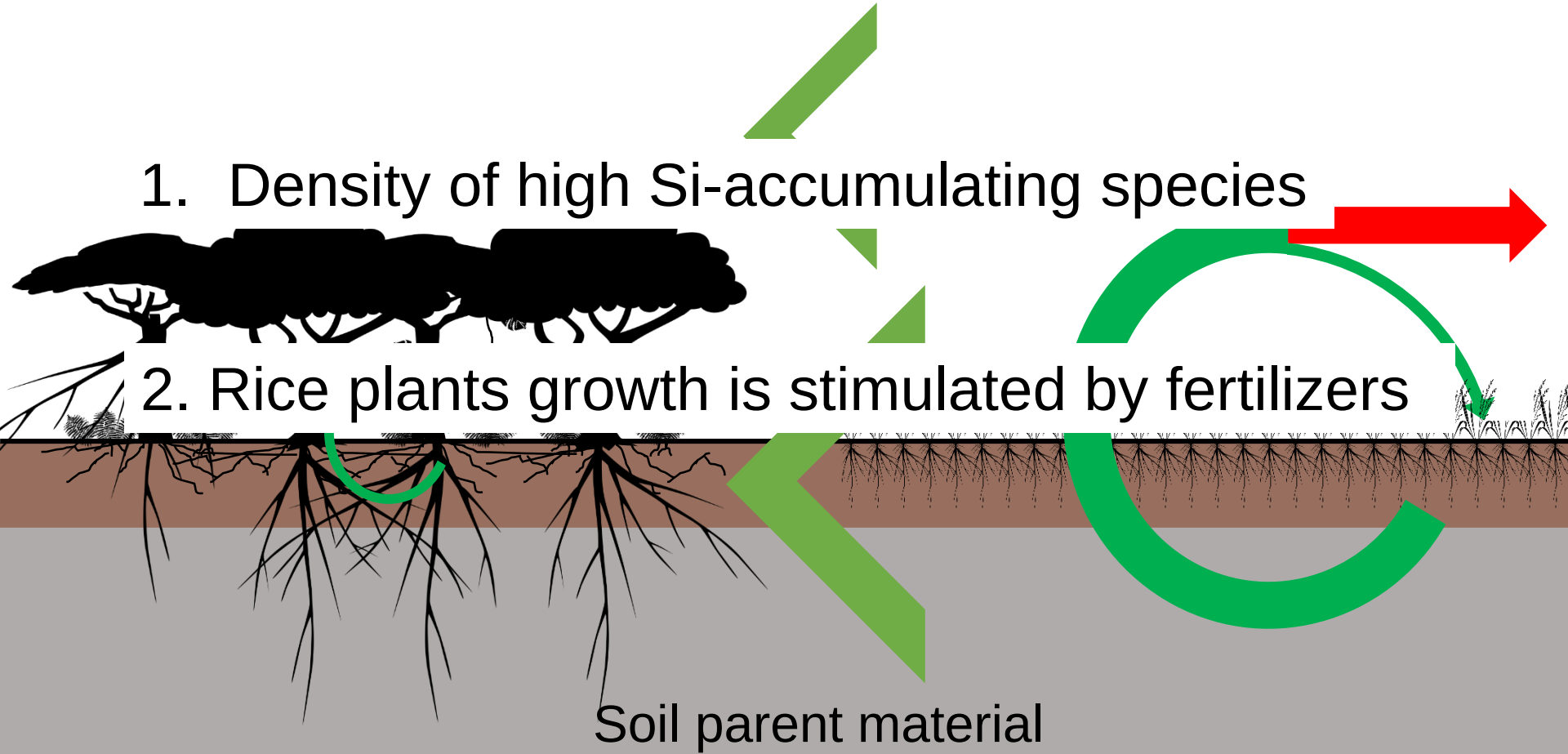
Tropical forest

Tropical rice

1. Density of high Si-accumulating species

2. Rice plants growth is stimulated by fertilizers

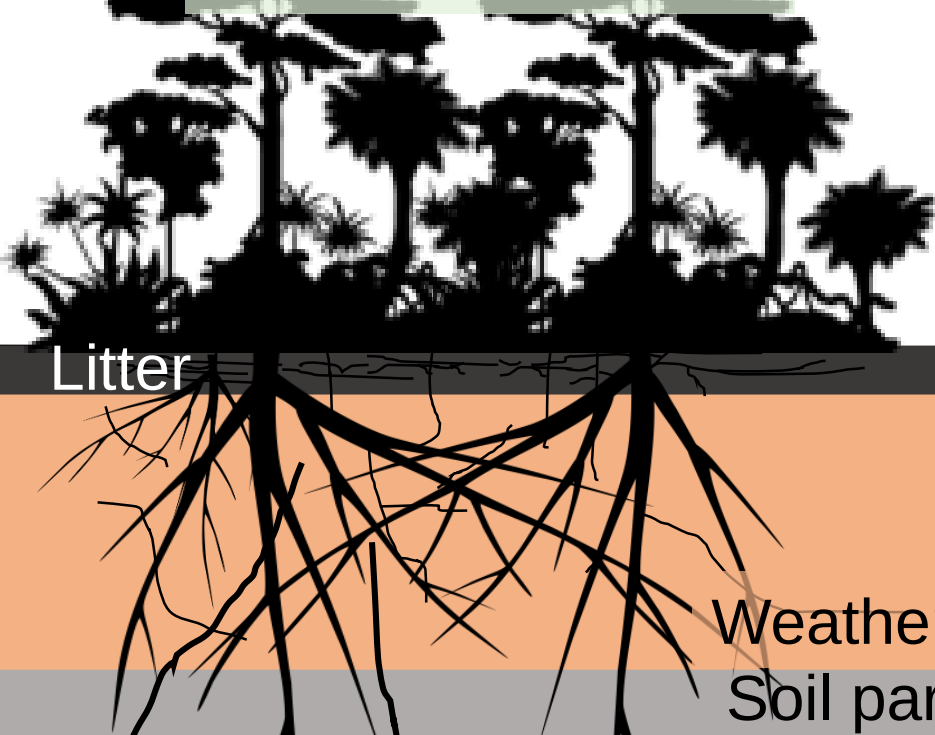
Soil parent material



Highly weathered soils

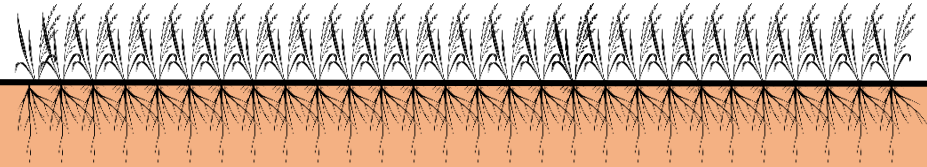
Tropical forest

*Si in standing
biomass: 834 kg ha⁻¹*



Tropical rice

*Si in standing biomass:
107-390 kg ha⁻¹*



Weathered horizon
Soil parent material

Tropical forest

Si in standing biomass: 834 kg ha⁻¹

21-76 kg ha⁻¹ year⁻¹

Litter

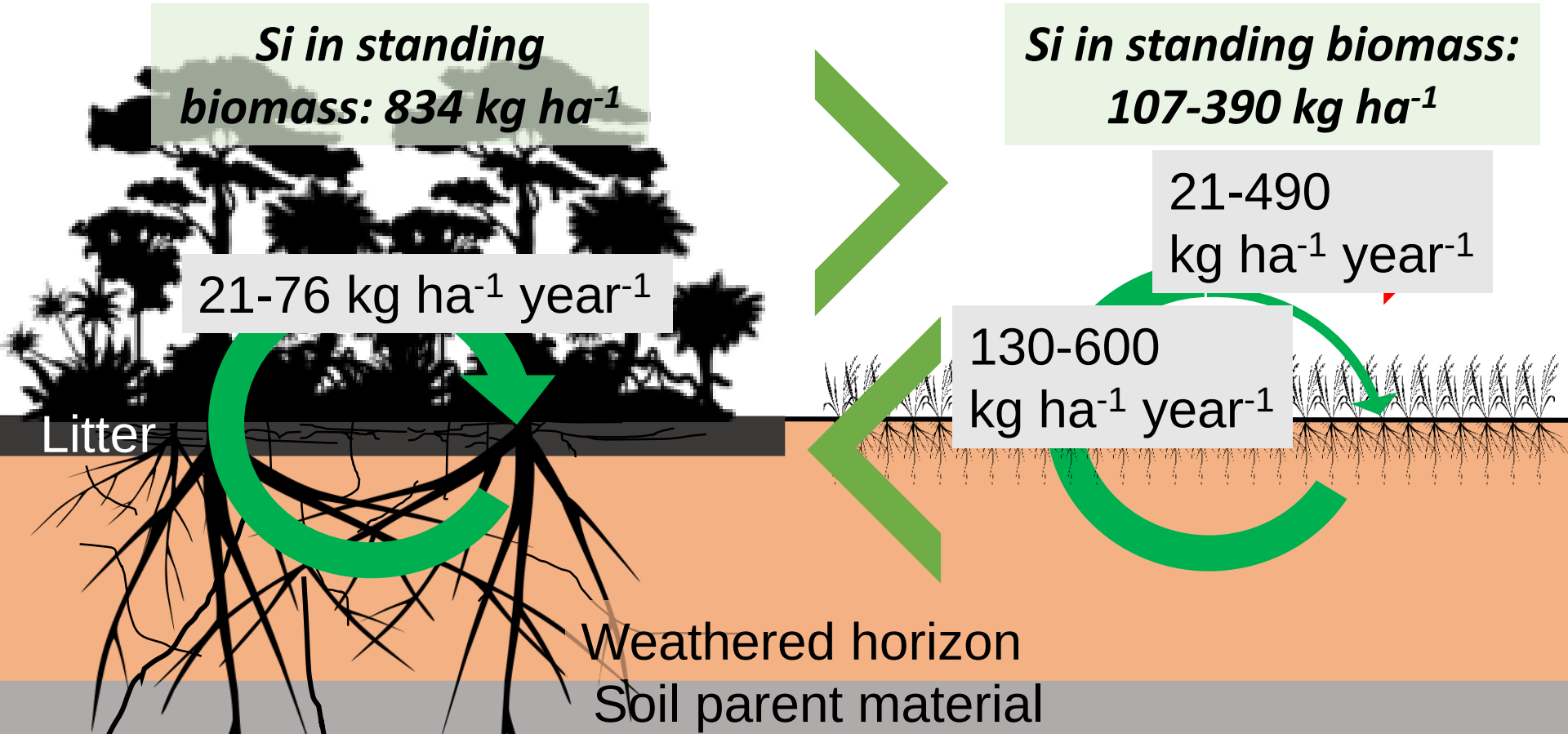
Weathered horizon
Soil parent material

Tropical rice

Si in standing biomass: 107-390 kg ha⁻¹

21-490 kg ha⁻¹ year⁻¹

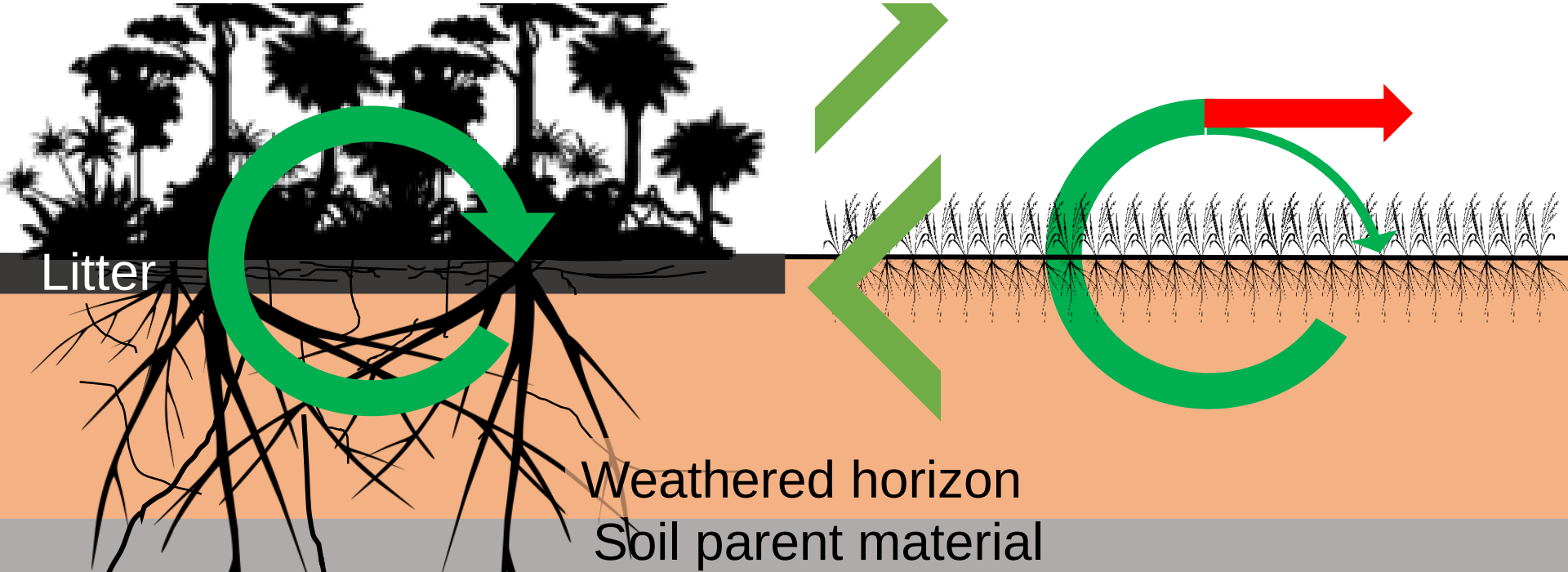
130-600 kg ha⁻¹ year⁻¹



Tropical forest

Tropical rice

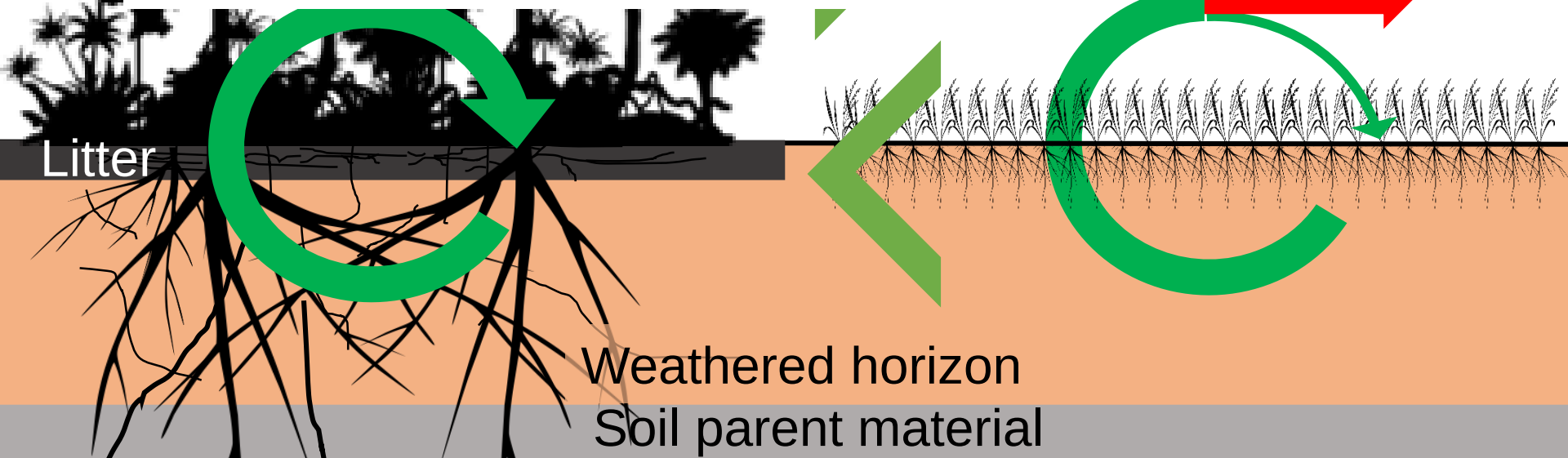
- 1. Biomass is much larger in climax tropical forest



Tropical forest

Tropical rice

1. Biomass is much larger in climax tropical forest
2. All plant parts return to the soil



Tropical forest

Tropical rice

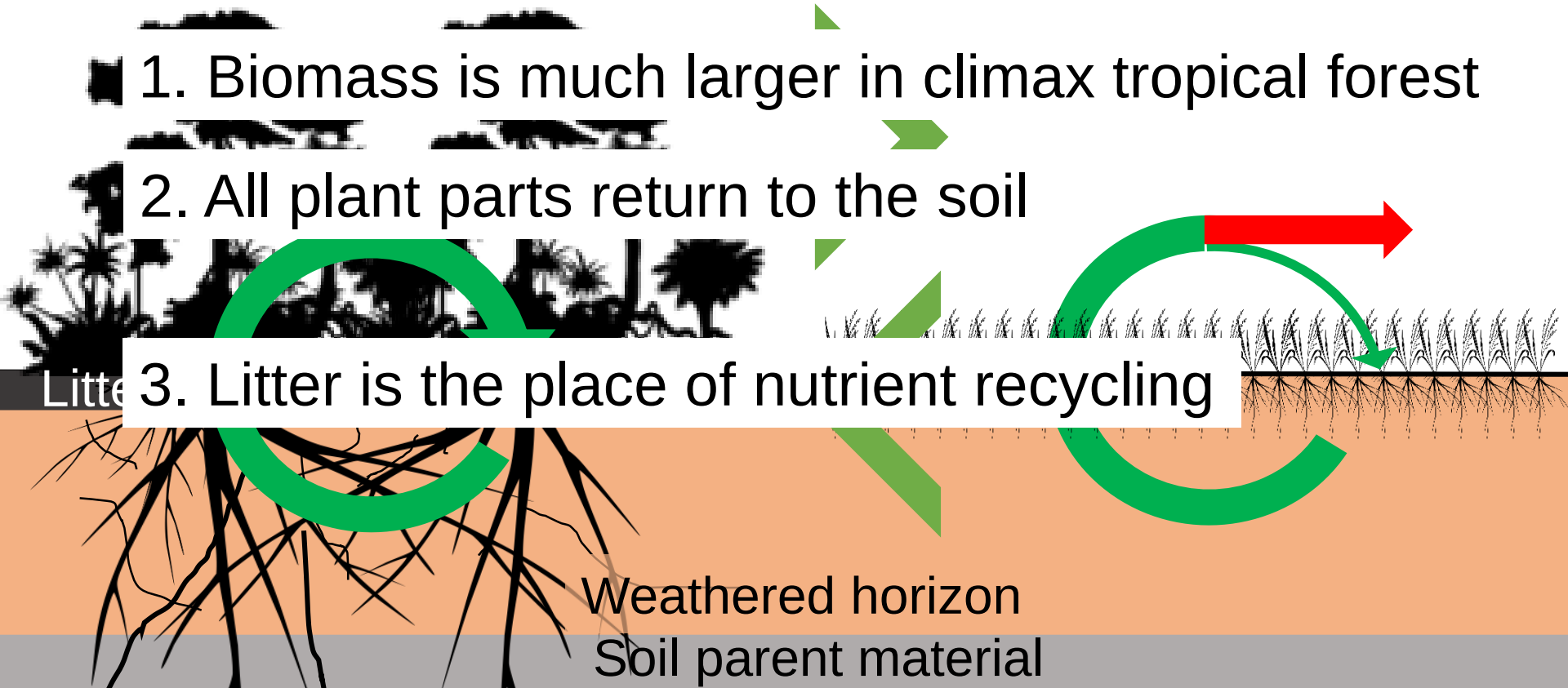
1. Biomass is much larger in climax tropical forest

2. All plant parts return to the soil

3. Litter is the place of nutrient recycling

Litter

Weathered horizon
Soil parent material



Tropical forest

Tropical rice

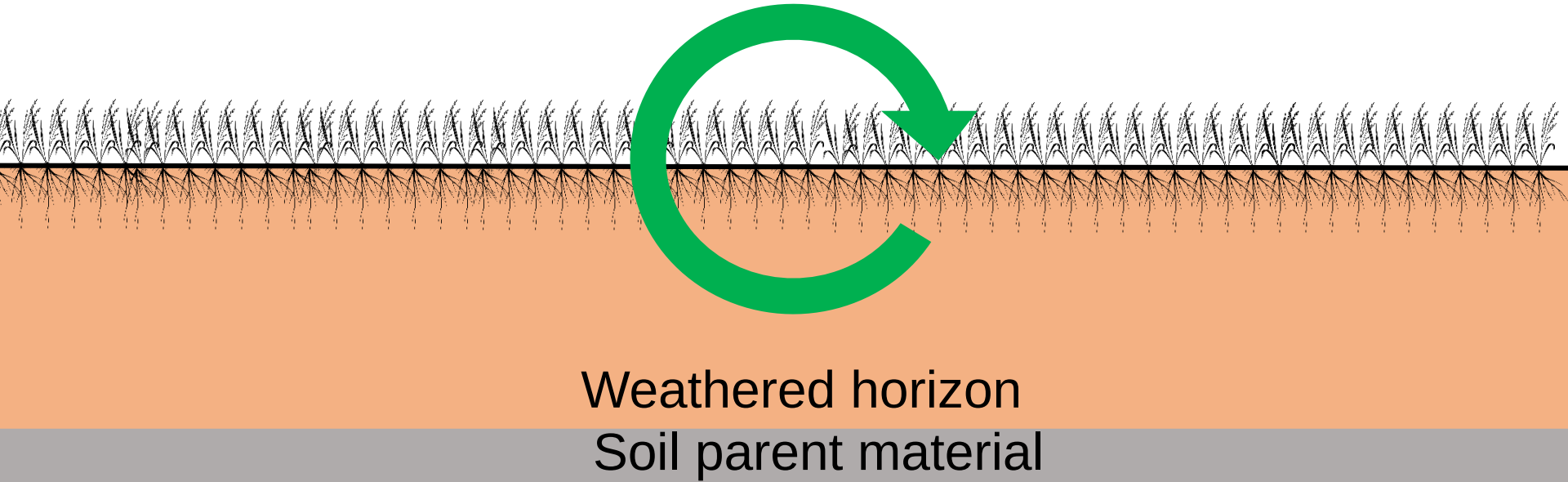
1. Biomass is much larger in climax tropical forest

2. All plant parts return to the soil

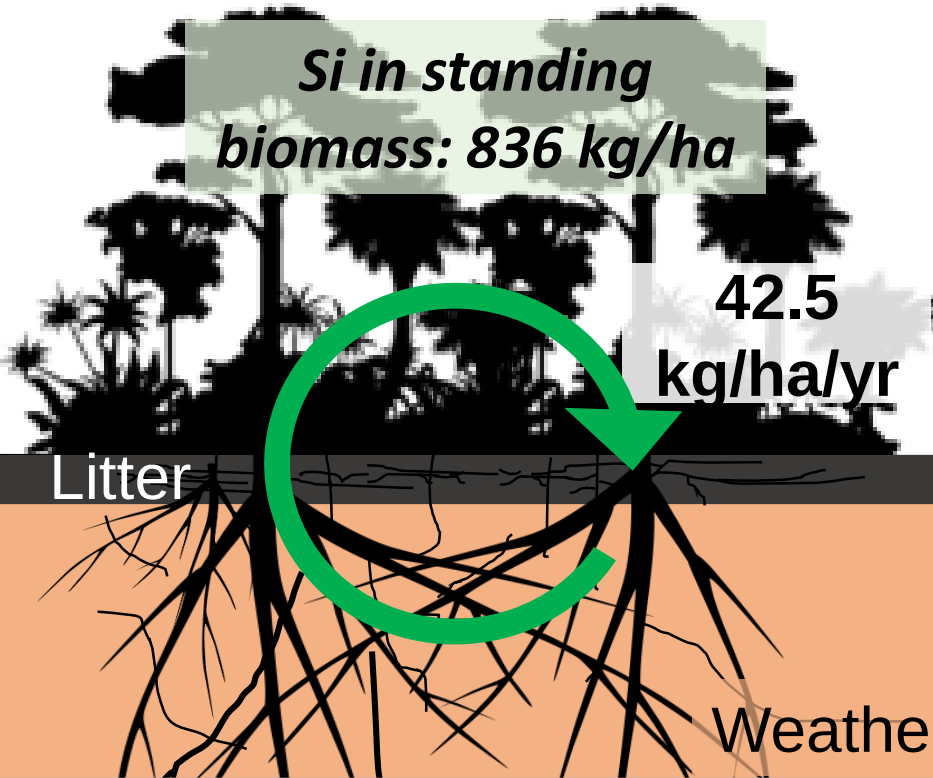
3. Litter is the place of nutrient recycling

4. Deep rooting → Si from deep horizons

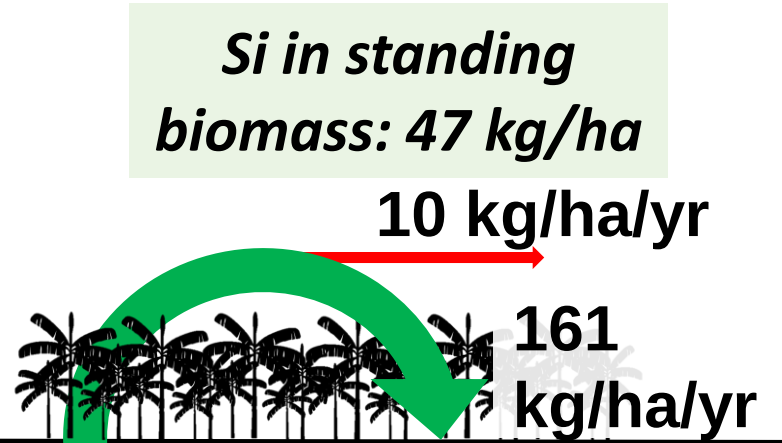
What if inedible plant parts
are not harvested?



Tropical forest

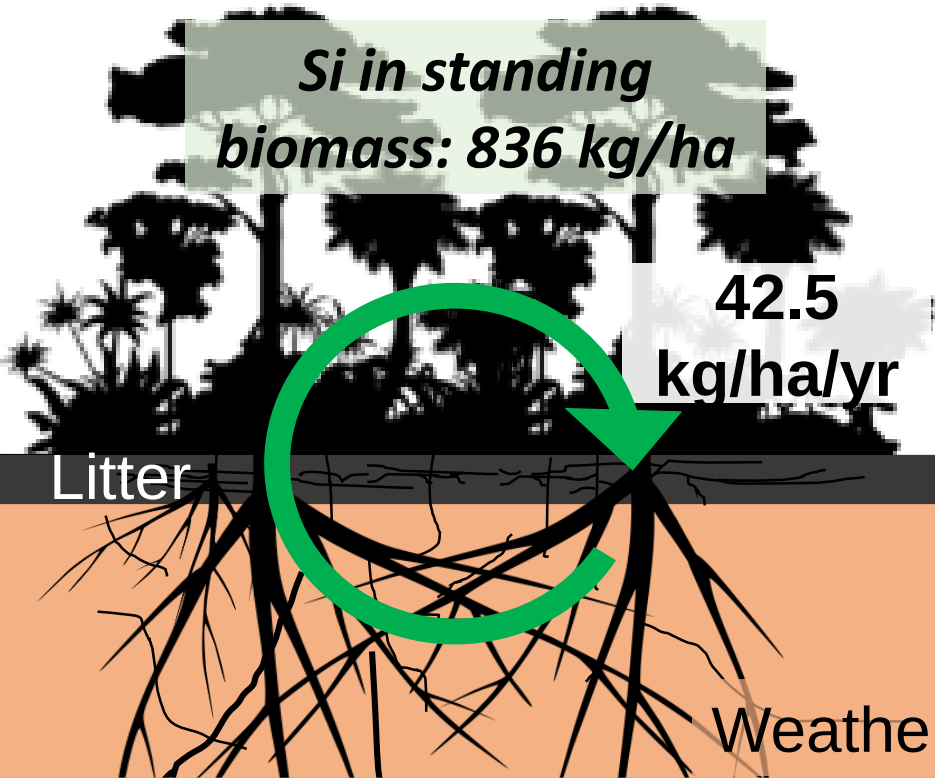


Banana

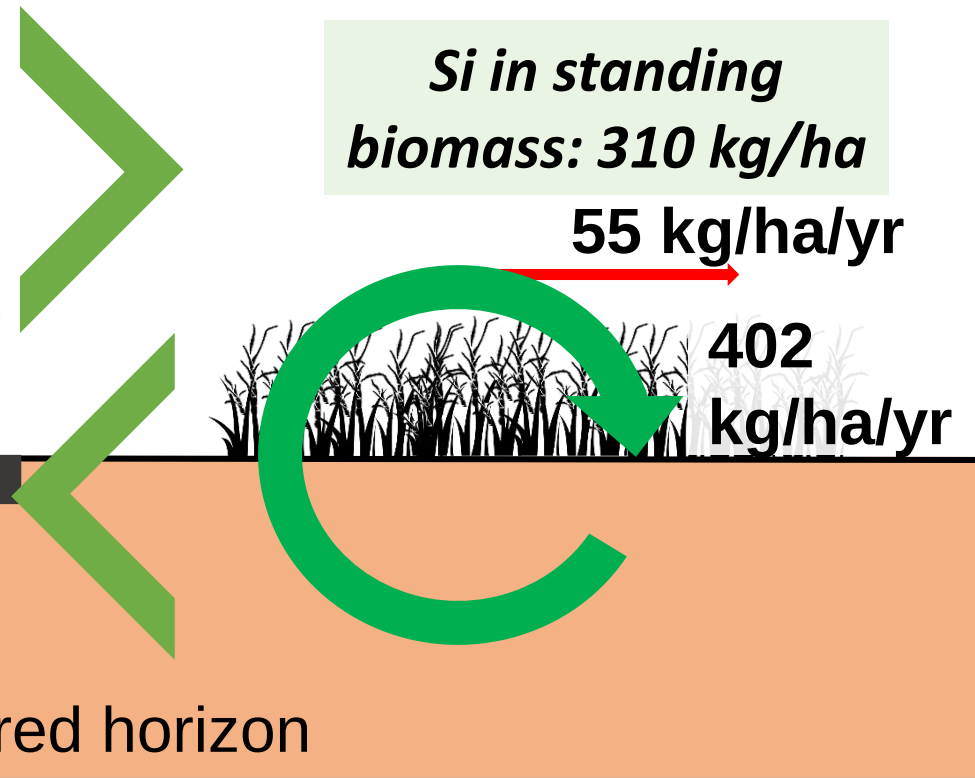


Weathered horizon
Soil parent material

Tropical forest

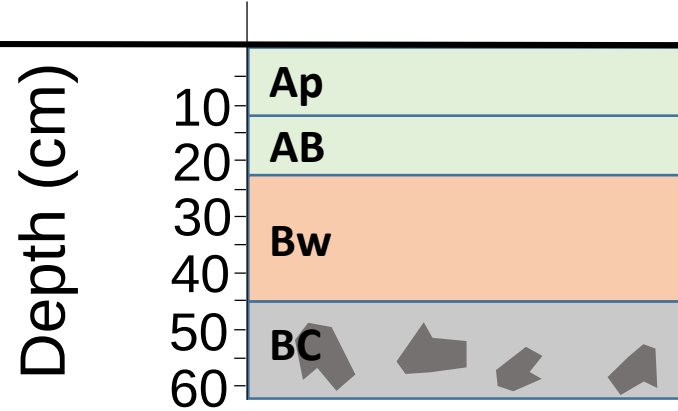


Sugarcane

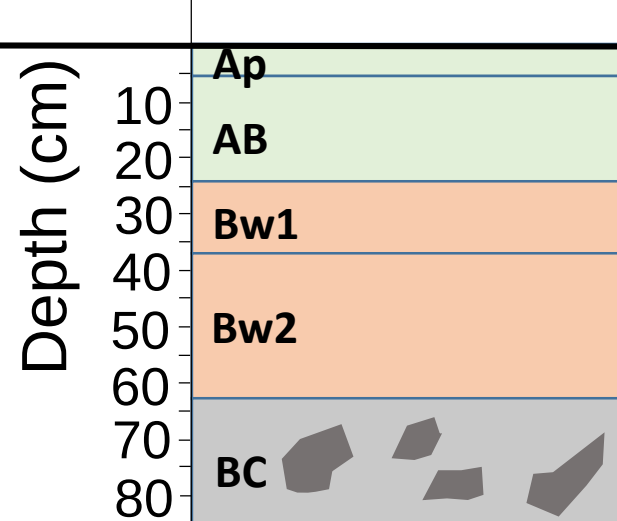


Weathered horizon
Soil parent material

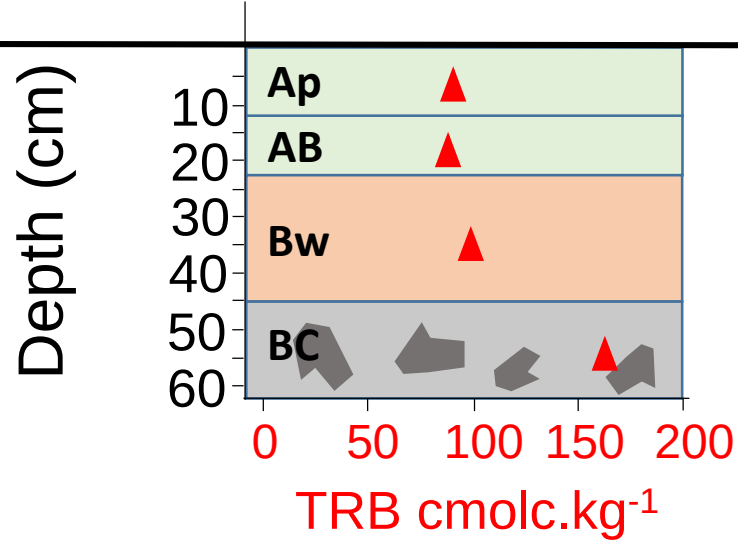
The banana case study



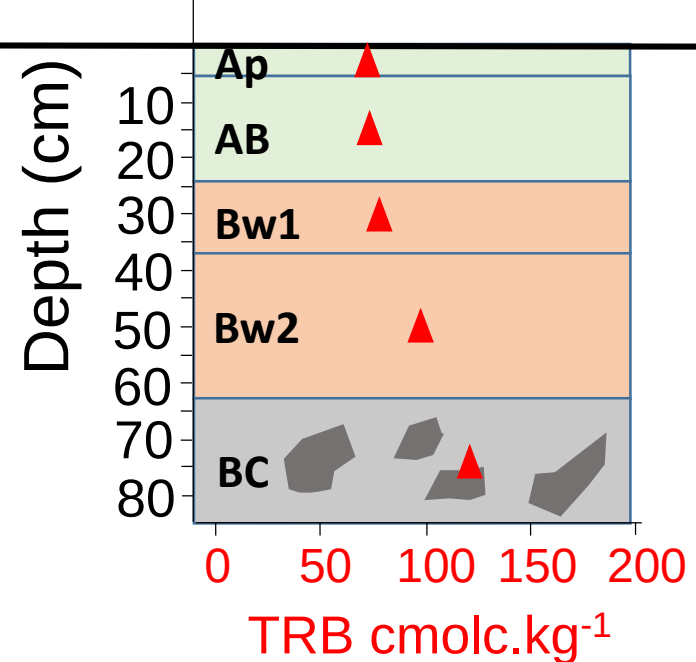
The sugarcane case study



The banana case study



The sugarcane case study

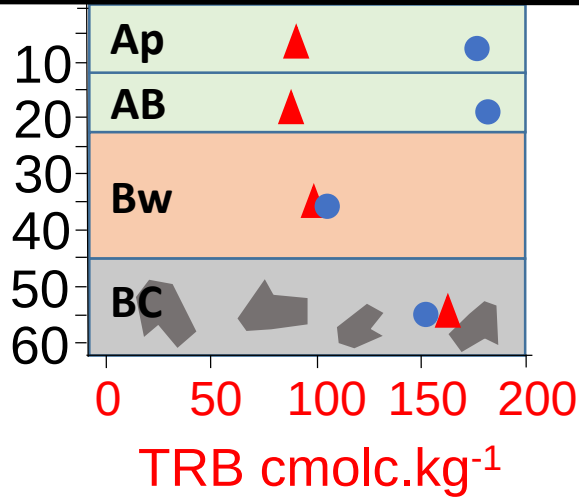


The banana case study



0 0.001 0.002 0.003
DSi mol.l⁻¹

Depth (cm)

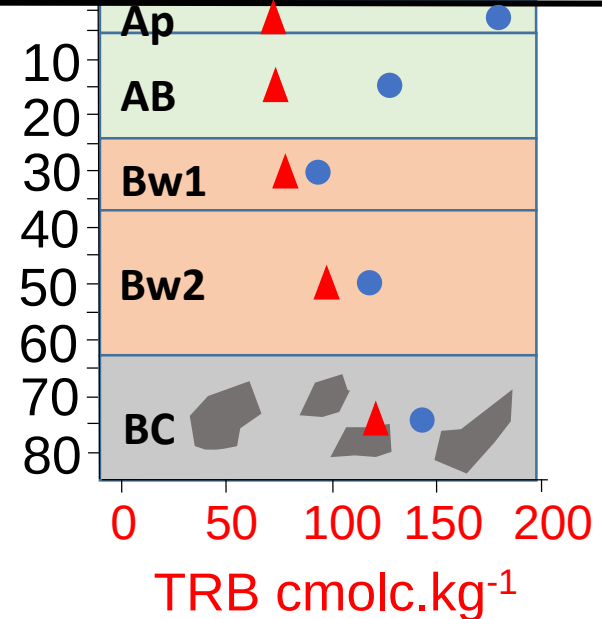


The sugarcane case study

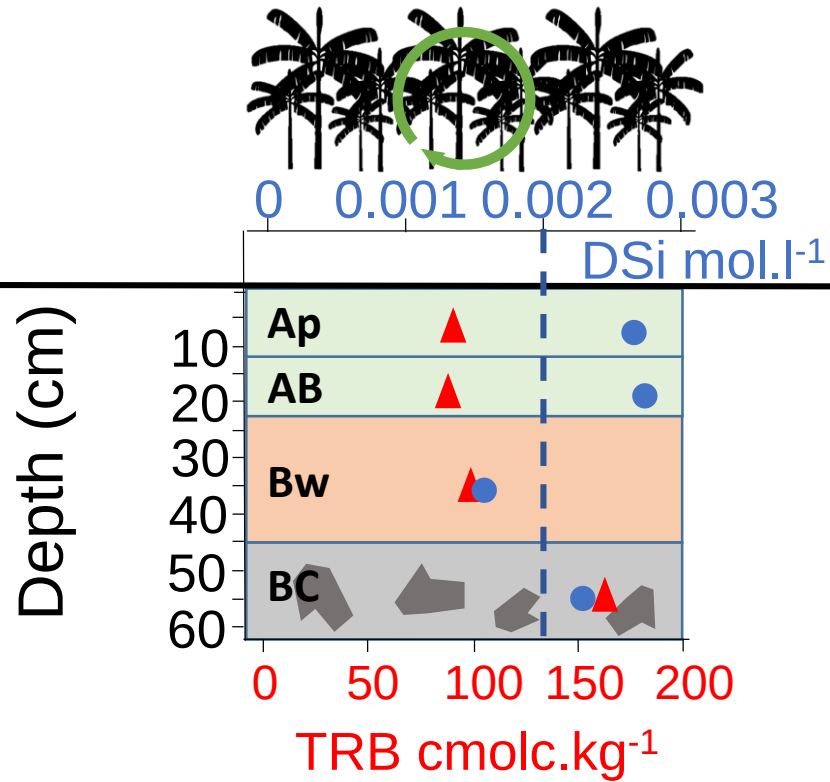


0 0.001 0.002 0.003
DSi mol.l⁻¹

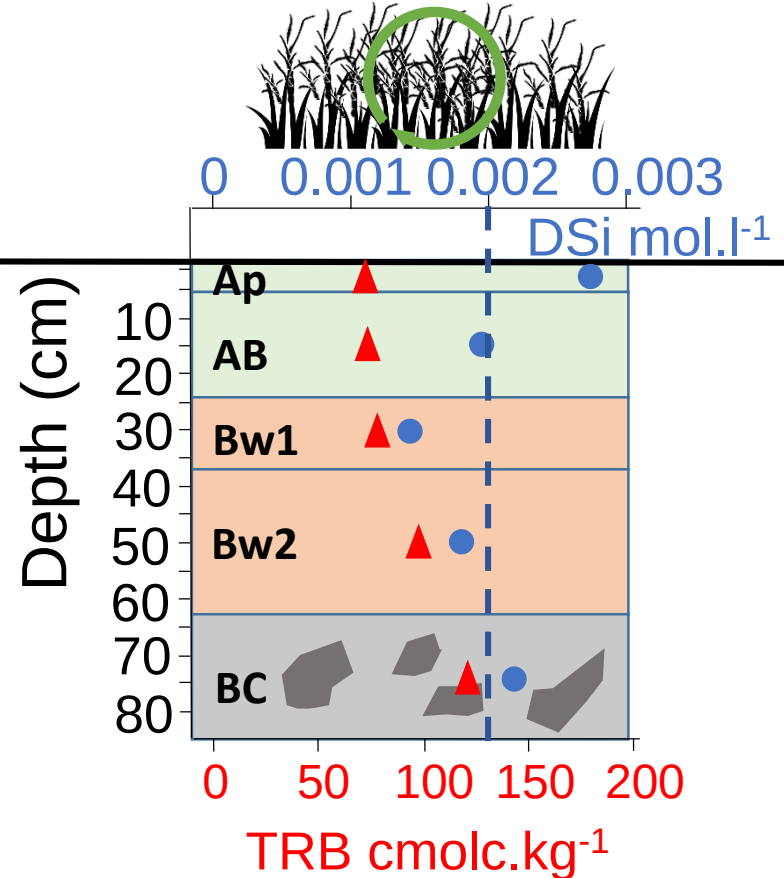
Depth (cm)



The banana case study



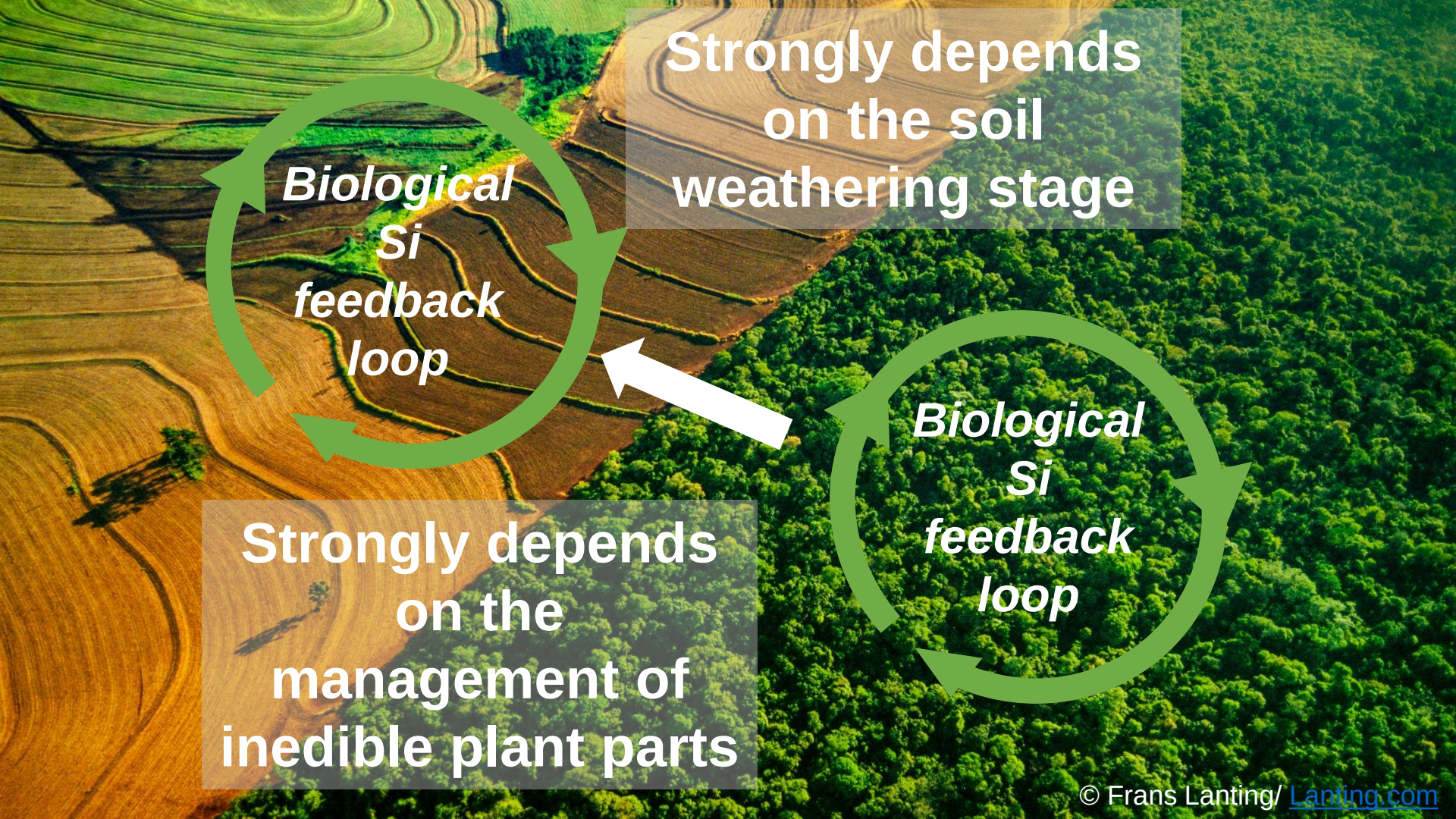
The sugarcane case study



Strongly depends
on the soil
weathering stage

*Biological
Si
feedback
loop*

*Biological
Si
feedback
loop*



Strongly depends
on the soil
weathering stage

*Biological
Si
feedback
loop*

Strongly depends
on the
management of
inedible plant parts

*Biological
Si
feedback
loop*

An aerial photograph showing a landscape divided into two main sections. The left side features golden-brown agricultural fields with distinct curved furrows, suggesting a recent harvest or plowing. A small cluster of trees is visible in the lower-left field. The right side is a dense, vibrant green forest. A semi-transparent grey rectangular box is centered over the boundary between the fields and the forest, containing the text "Thank you for your attention" in white.

Thank you for your
attention