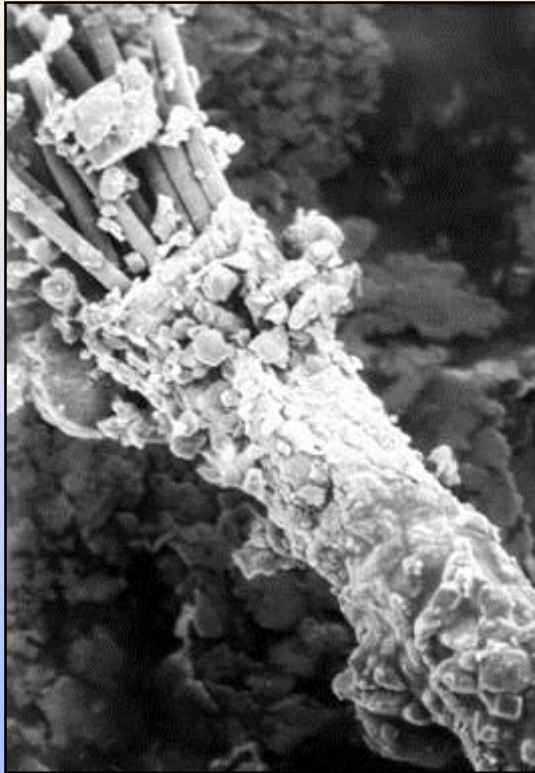


Why re-establish biocrusts? Because they are essential for successful plant restoration!!



And SO important we can no longer ignore them!!!

What are biocrusts?



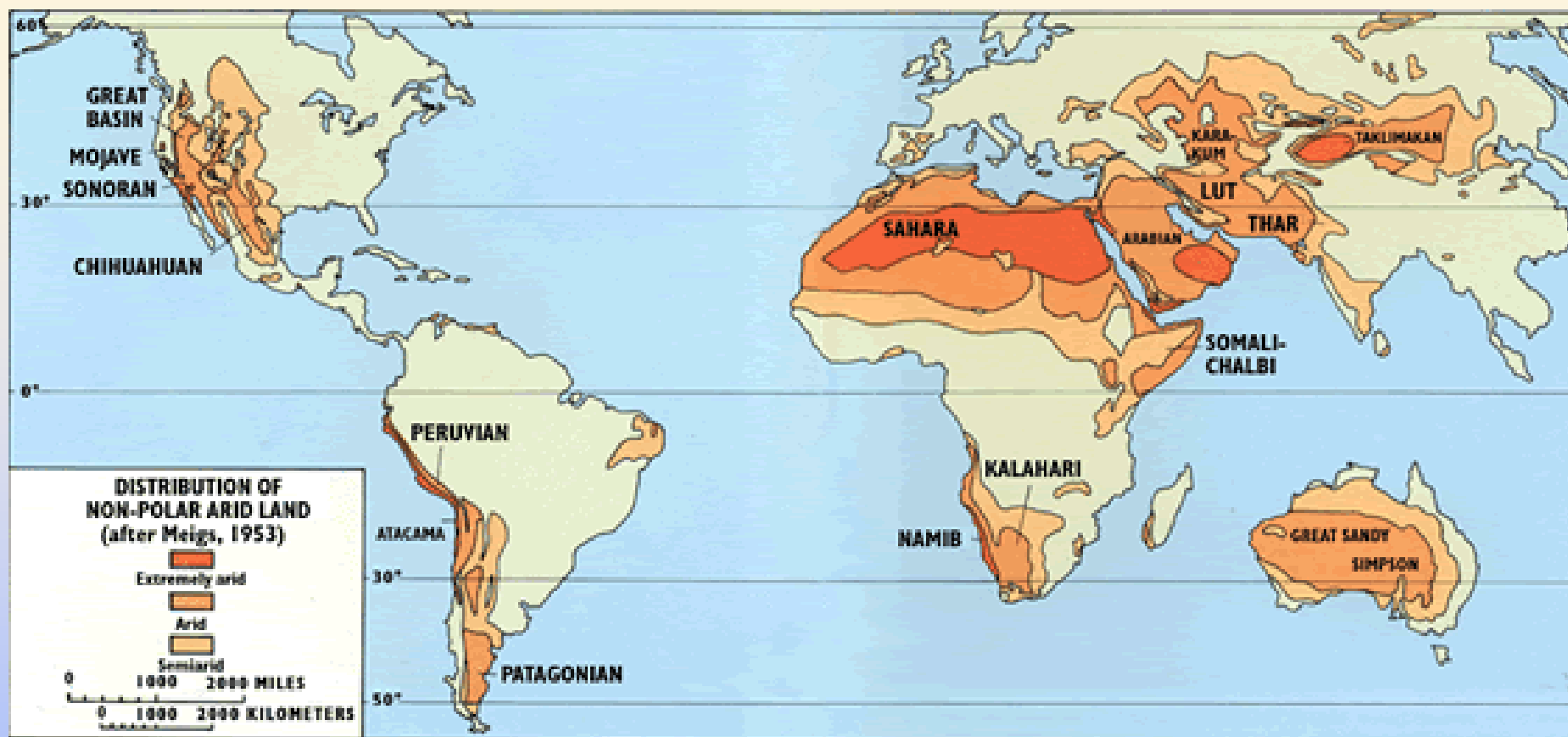
Cyanobacteria/Fungi



Lichens



Mosses



Up to 40% of terrestrial surfaces are drylands
(not including polar regions)

Crusts occur in most dryland vegetation types

Can be the dominant life form

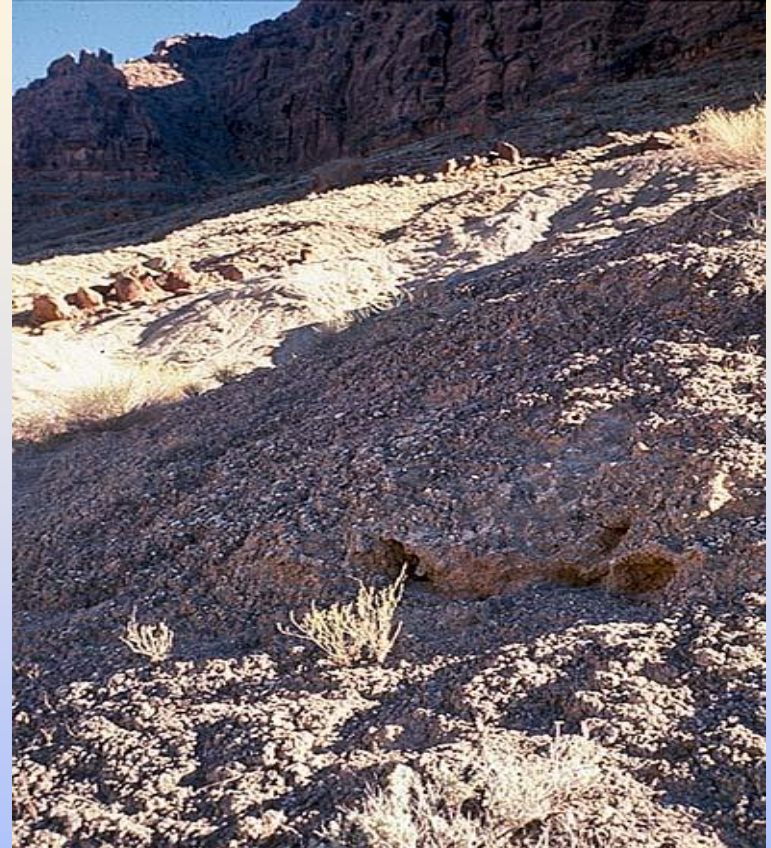


Soil Stability



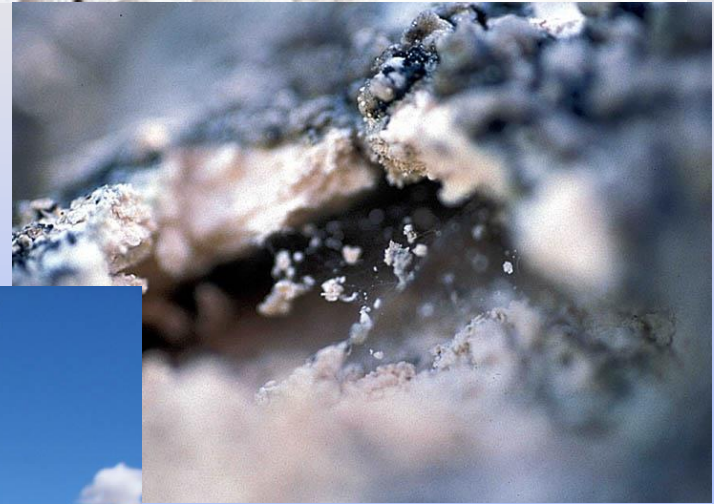
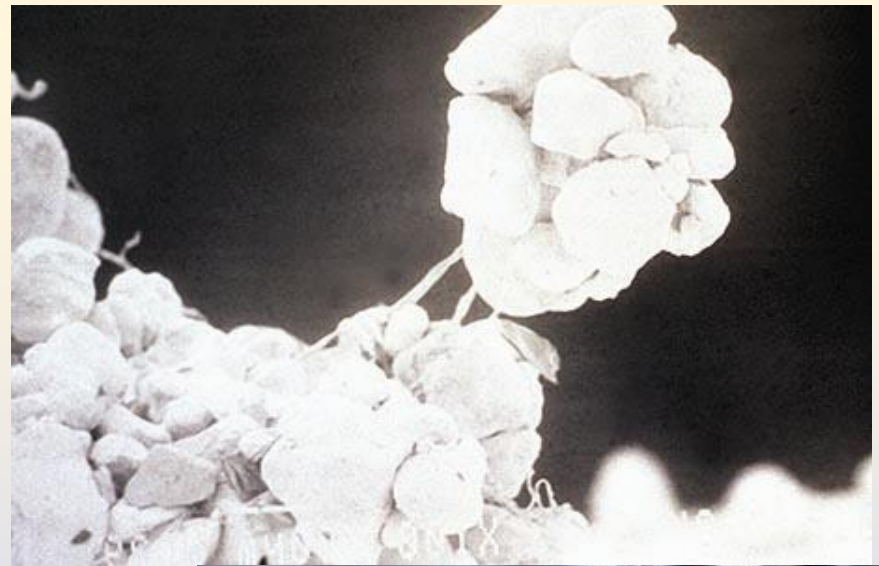
Sparse vegetation

But soils do not erode



Hill slopes

**Soils held beyond
angle of repose**



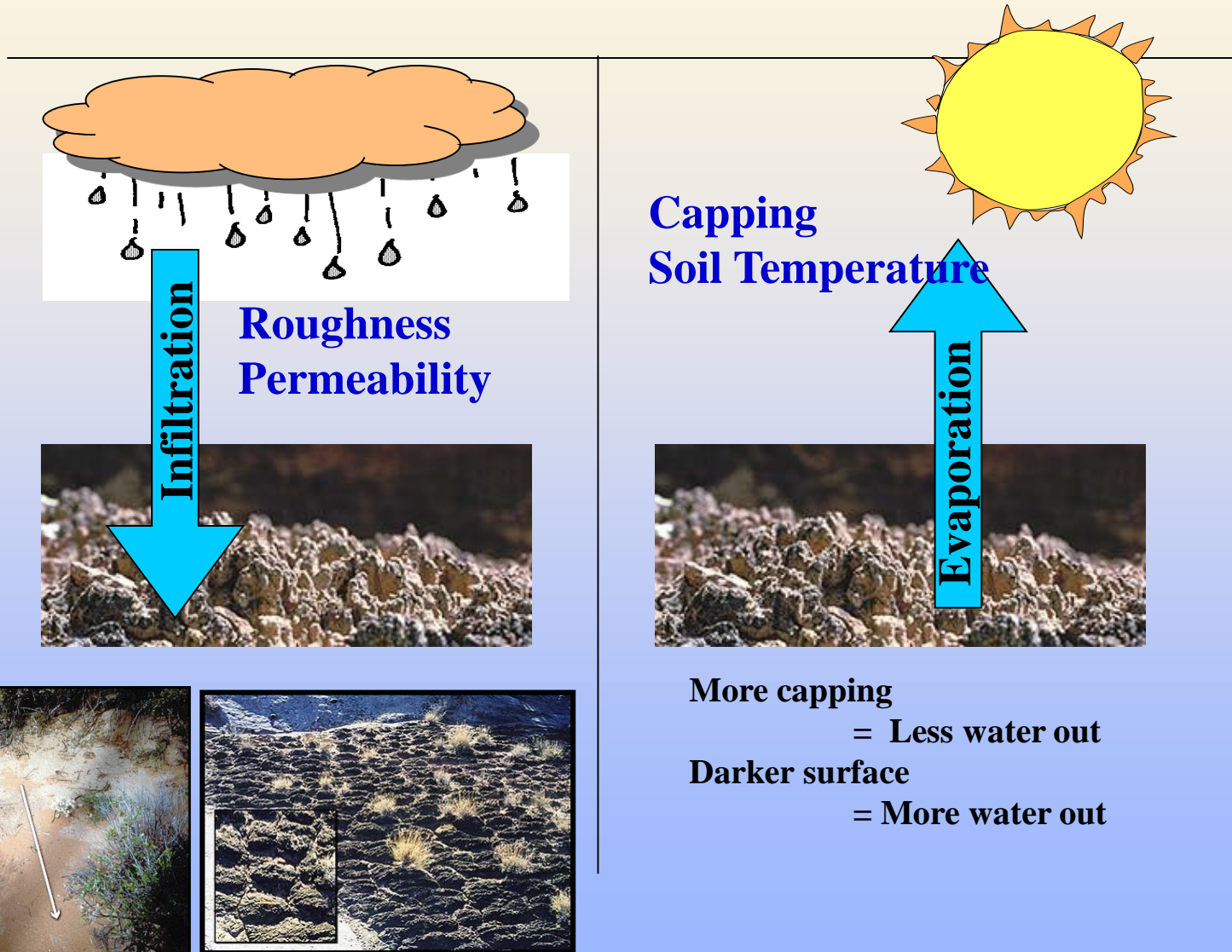
**Fibers make soils
erosion-proof**

Biocrusts can prevent water erosion



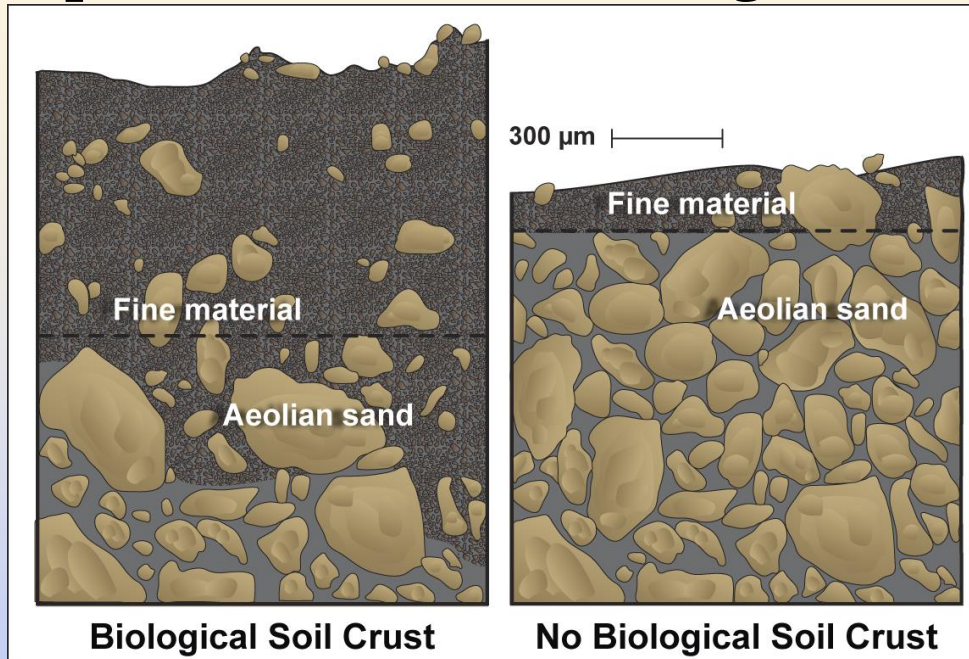


In semi-arid deserts (Colorado Plateau, Great Basin), biocrusts increase plant-available water



Biocrusts also increase soil fertility in many ways

Capture nutrient-containing dust



Retain seeds and litter

Contribute C and N, available P to soils

Increase soil fertility

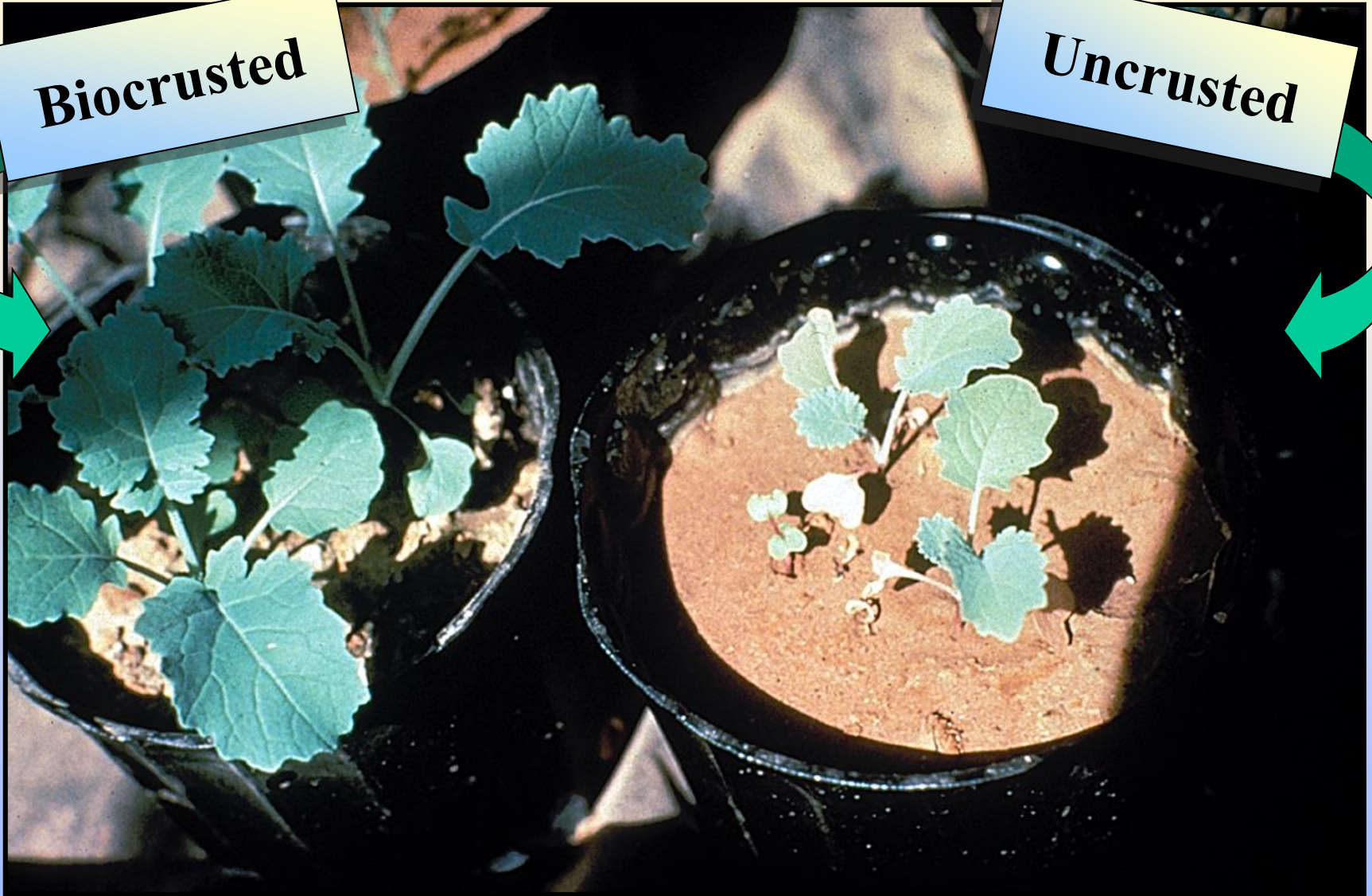
**Greater abundance of
soil biota = faster litter
decomposition**



**Darker surfaces = higher temperatures
= faster spring growth**

Biocrusted

Uncrusted



Plants growing in biocrusted soils grow faster, are bigger, and are more nutritious than in uncrusted soils

Biocrusts can influence plant community composition





The services provided by biocrusts are disrupted by surface disturbance, fire, and increased temperatures

In summary, biocrusts are integral in creating the soil conditions (stability and fertility) needed for successful plant restoration, but with disturbance, biocrusts are generally lost as well as plants.

And although we know alot about WHY we need biocrust to be part of restoration efforts, we know a lot less about getting them re-established...

The good news: we can now grow biocrusts FAST in the greenhouse

The not-as-good news:

- 1. Our scale of production and application is limited (oil pads, not large fires)**
- 2. Growth of some critical species is very slow**
- 3. We need more trait/genetic information to match propagules to sites (just like seeds!)**
- 4. Cost-effective field survivorship is low (we HAVE to figure this out!!)**

We have much work ahead and are 100+ years behind plant efforts...incredible, given how critical biocrusts are for healthy ecosystem function

