

# Soil Solarization

A Daily  
Dose of  
Sun Keeps  
the Pests  
Away

How Soil Solarization Works



# Agricultural “Warfare”







# Current Practice: Herbicides

## ➤ What is an **herbicide**?

➤ Herb = plant

➤ -icide = describes the act of killing

For example: suicide or genocide



➤ **Herb + icide = plant killer**

➤ **These chemicals remove unwanted plants from the fields**



# Current Practice: Pesticides

- Based on the word roots you learned from “herbicide,” guess the definition of “**pesticide**”
  - Pest = a destructive insect or animal that attacks (eats or infects) crops
  - -icide = describes the act of killing
- ★ ➤ **Pest + icide = unwanted insect or animal killer**
- **These chemicals remove unwanted insects and animals from the fields**

# Pesticides & Herbicides



*Hypothesize:* Why do you think this man is wearing a mask and protective suit?  
Write your answer in your notebook.



These chemicals are designed **to kill living things**. HUMANS are living things, too!  
Exposing humans to pesticides and herbicides is dangerous to people!



# Pesticides & Herbicides

Pesticides  
& herbicides



# Pesticides & Herbicides



## Pros

- ▶ Very effective at killing animals and plants that want to eat our crops



## Cons

- ▶ Toxic to humans
- ▶ Kill both harmful AND helpful plants and animals
- ▶ Can run off into surrounding areas and damage ecosystems





# Alternatives to Pesticides & Herbicides

- Introduce **natural predators**

For example, introduce ladybugs to eat aphids

- **Mulch** surrounding soil

For example, cover the ground surrounding the crop with wood chips so weeds cannot photosynthesize

- **Soil solarization!**



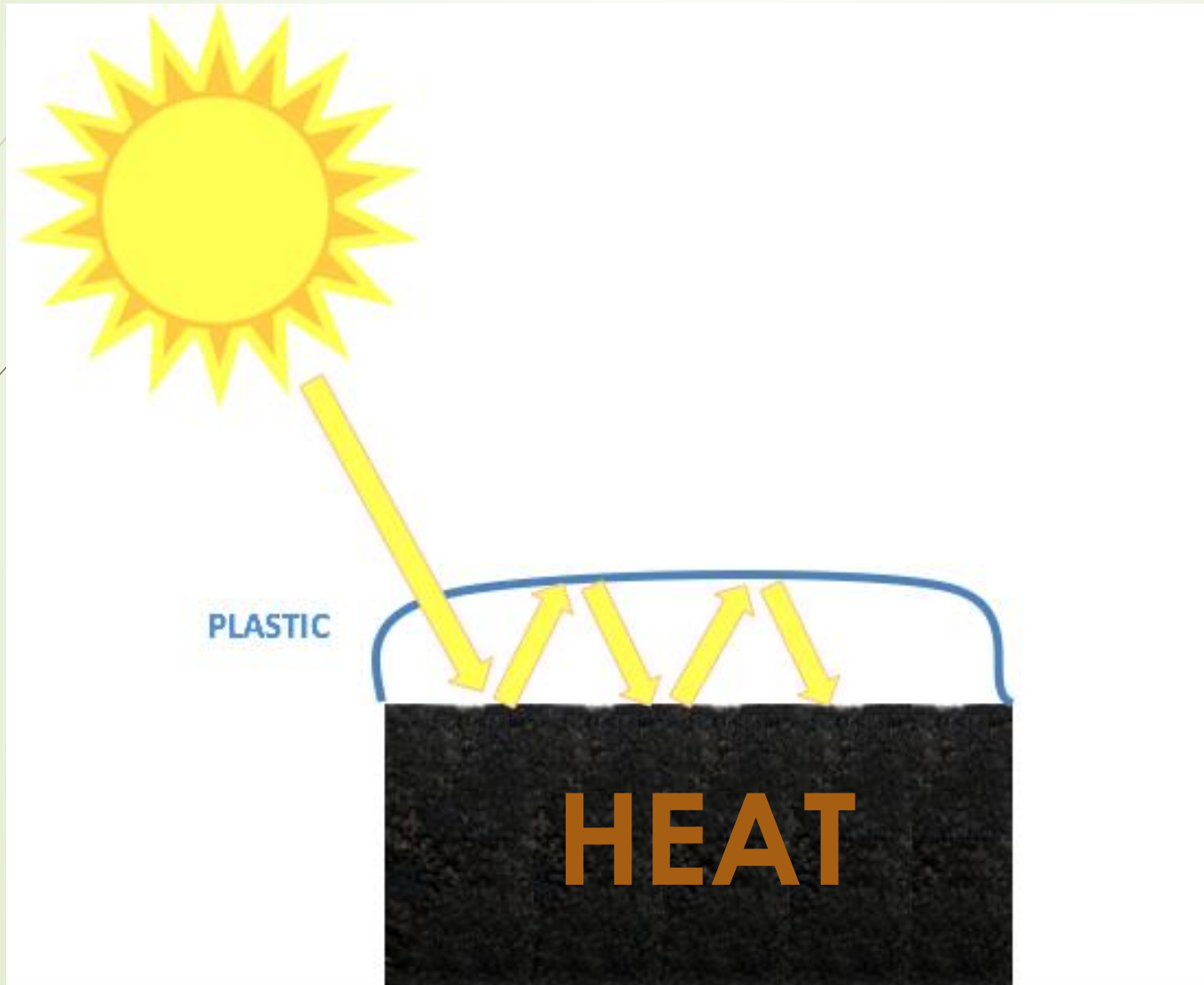


# Soil Solarization

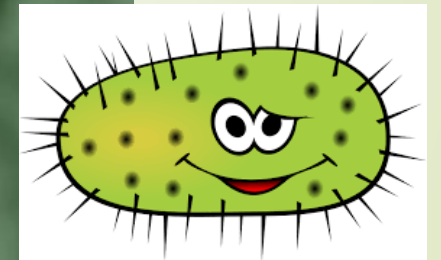
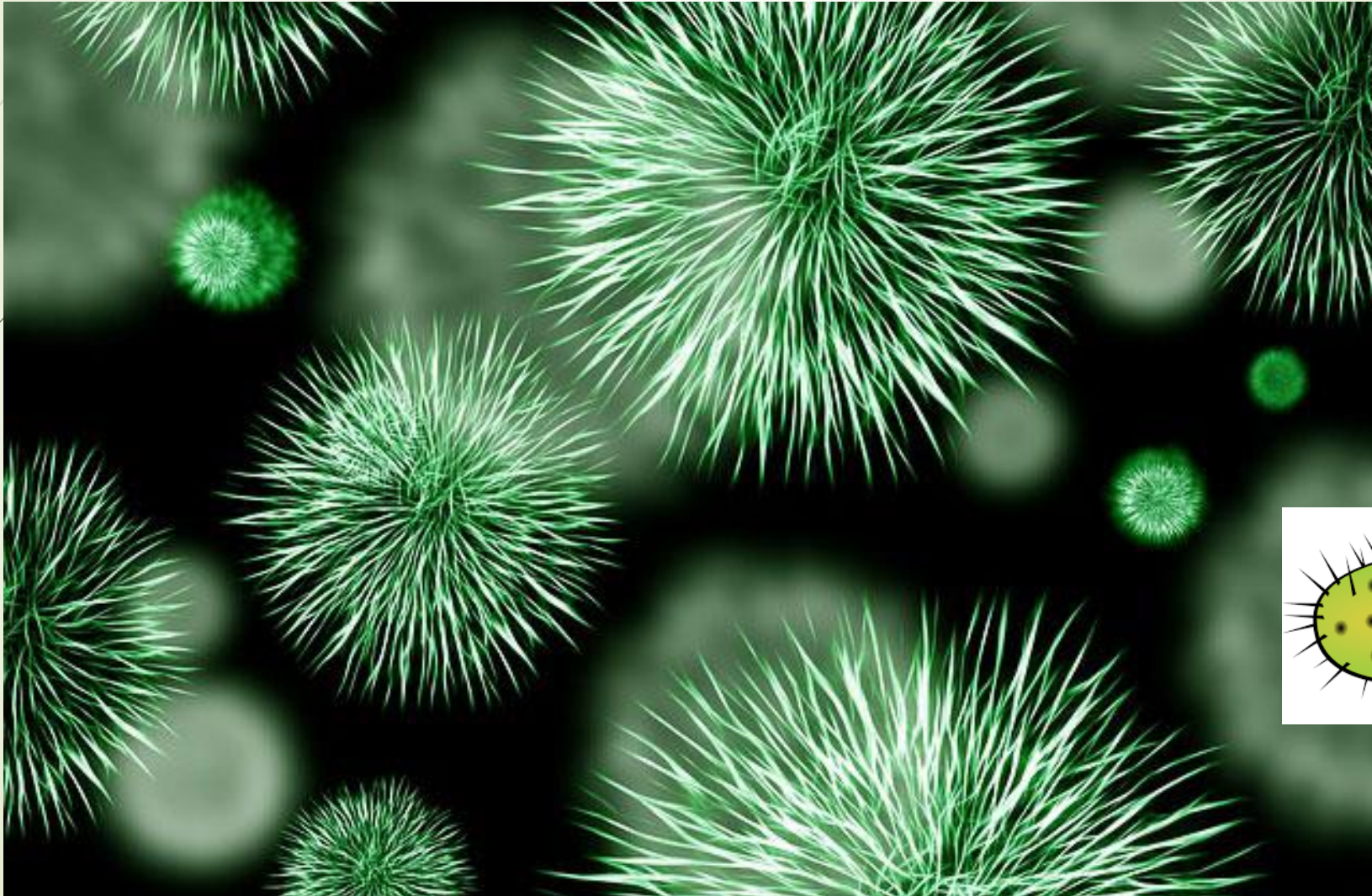


- **Definition:** A pest control technique in agriculture that uses the sun's radiation to heat the soil and eliminate unwanted animals, plants or fungi that could harm the crops

# How does it work?



# How does it work?





# How does it work?

- Some microorganisms prefer to live in the heated environment that solarization creates
- Under these conditions, they produce acids that are toxic to weeds and pests
- The longer you solarize the soil, the more acids are created and the fewer weeds and pests can survive





# Solarization Variables for Engineering Design

- Type/color of plastic used
- Amount of water in soil
- Addition of compost to soil

# Type/Color of Plastic



**Black**

**vs.**



**White**





# Water in the Soil

- The more water in the soil, the longer it takes to heat up

Think about making pancakes: It takes longer to cook really soupy batter than it does to cook thick batter.

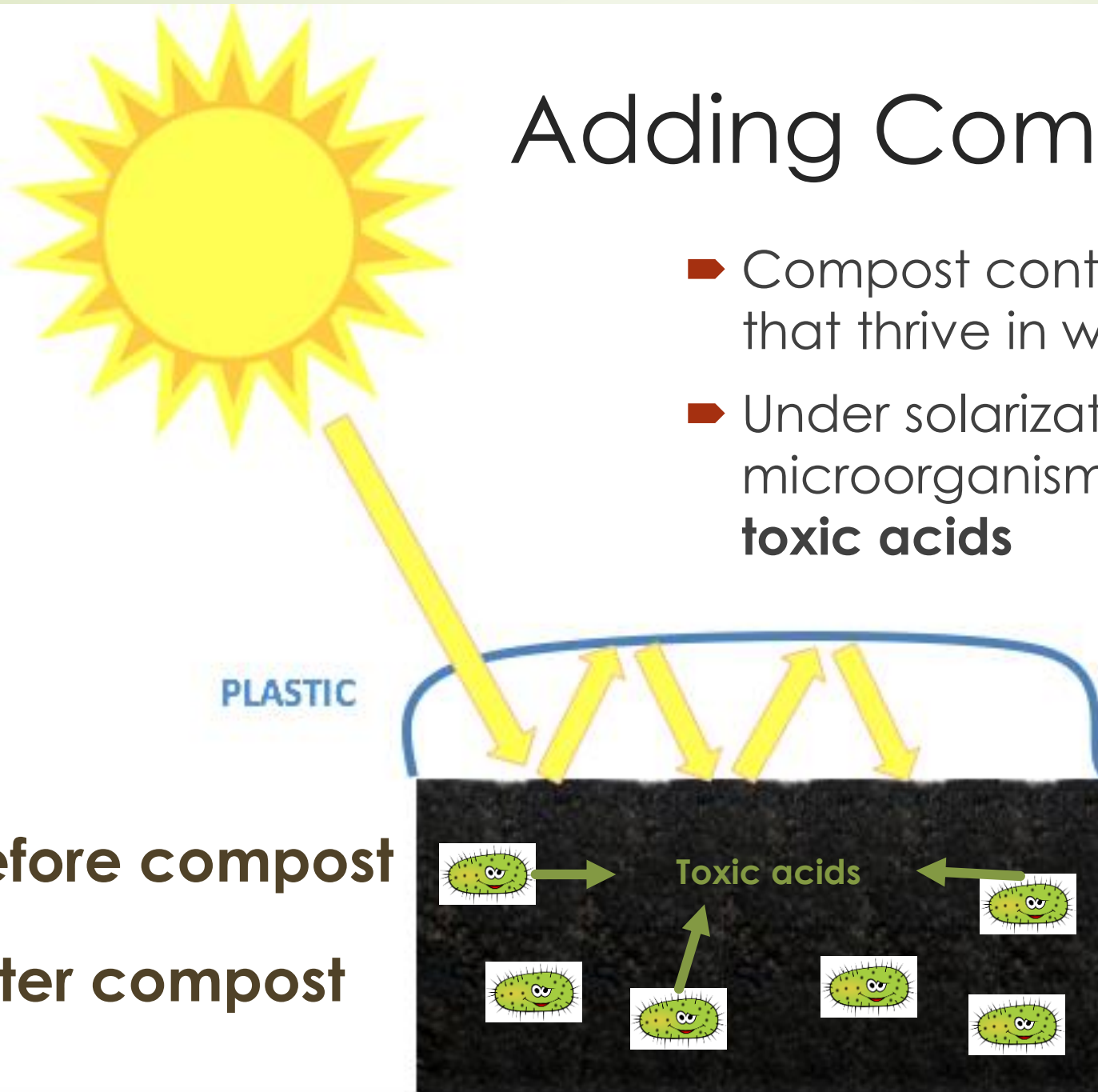
- Yet the microorganisms in the soil need water to live
- So for the technique to work, it is best if the soil is in the “sweet spot” between too wet and too dry

# Adding Compost

- Compost contains microorganisms that thrive in warm conditions
- Under solarization conditions, the microorganisms in the soil produce **toxic acids**

Before compost

After compost



# Concept Review

- A pesticide is a chemical that is applied to a field to eliminate pests that can harm crops.
- Pesticides and herbicides are toxic to humans and disrupt ecosystems.
- Soil solarization uses the sun's radiation to heat the soil.
- The heat and toxic acids produced by microbes prevent weeds and pests from living in the soil where crops grow.
- Engineers can decide the type of plastic, amount of water and whether to add compost in order to change the effectiveness of soil solarization.