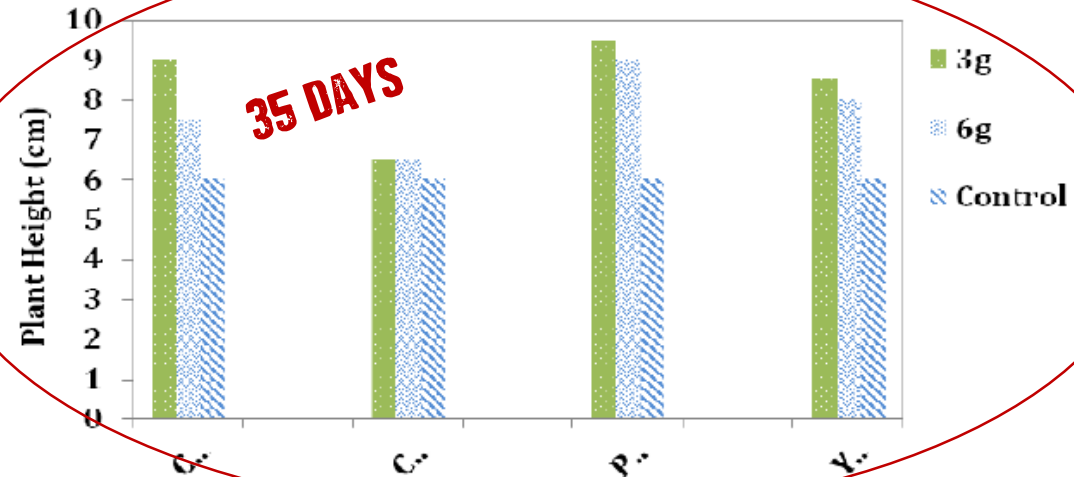
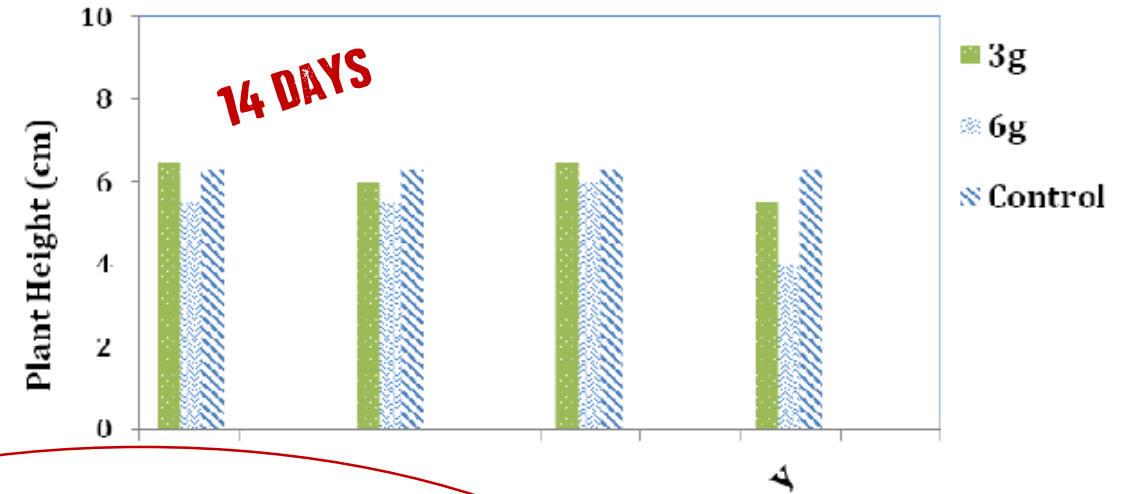
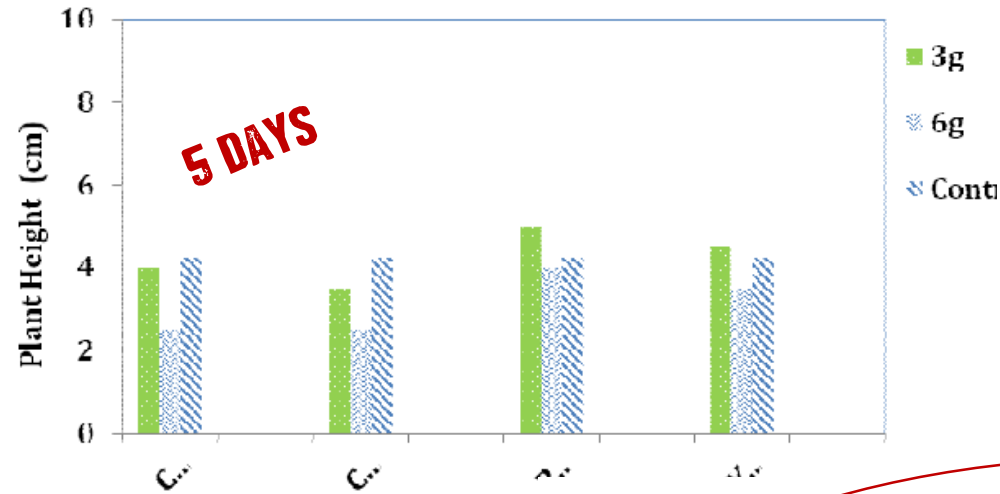
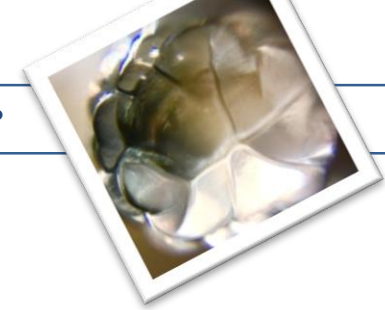


DROUGHT !

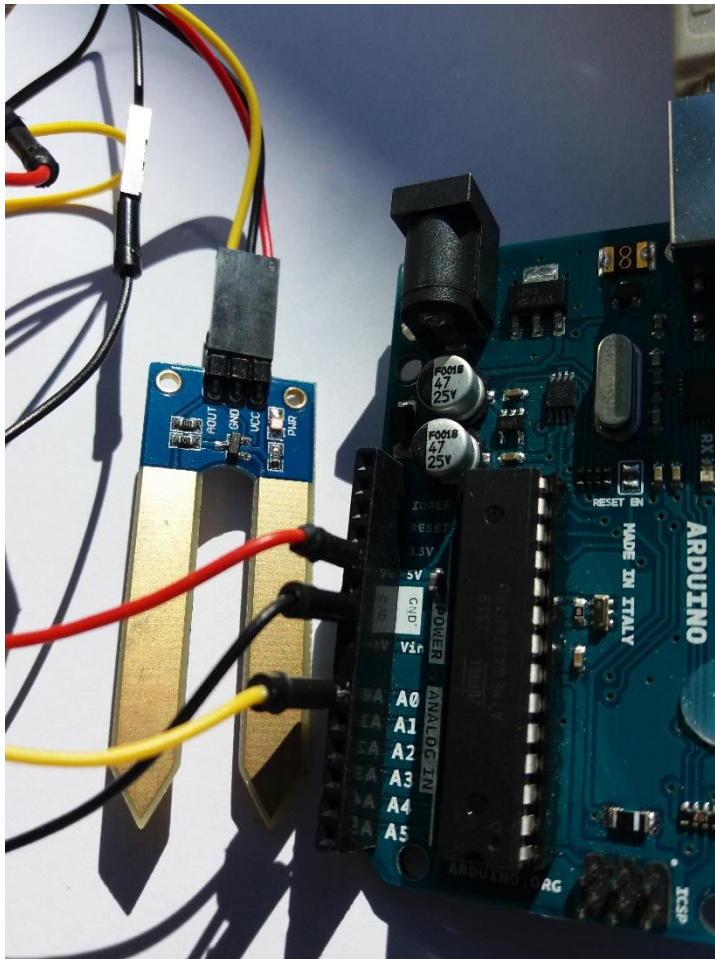


SAP are most effective
In the long period

Source:
http://www.academicjournals.org/article/article1379498708_Nnadi%20and%20Brave.pdf



Soil Moisture Sensor: Circuit – (analogue mode)



Red: VCC to 5V - *power*

Black: Ground to GND

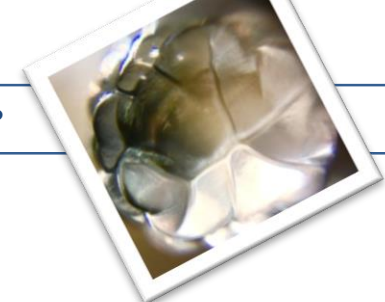
Yellow: AOUT to A0 - *analog signal*

<http://www.circuitstoday.com/arduino-soil-moisture-sensor>

How the sensor works- The two probes allow the current to pass through the soil. The resistance indirectly measures moisture value.

More water → soil will conduct more electricity → less resistance. Therefore, the moisture level will be higher.

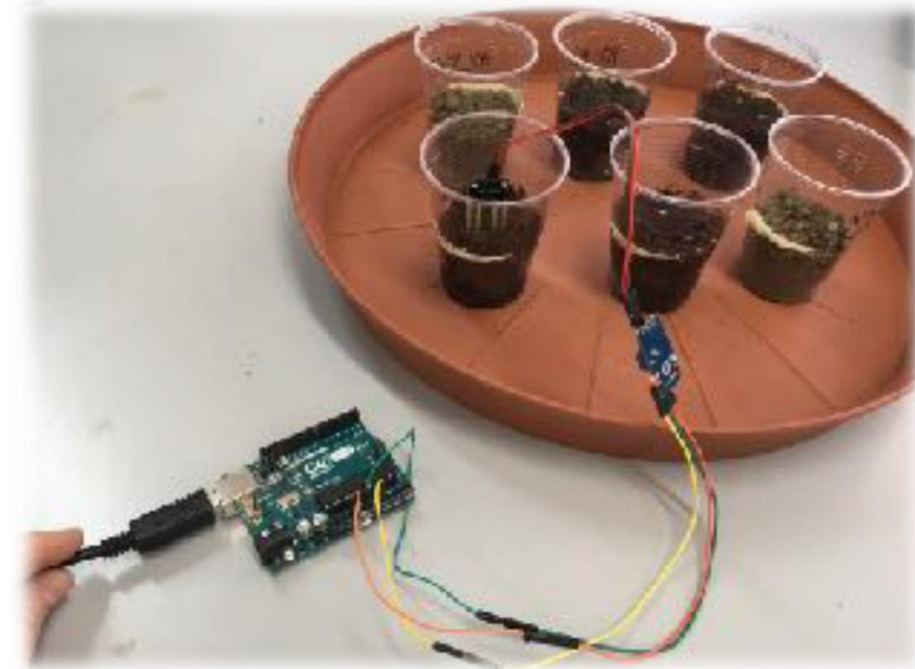
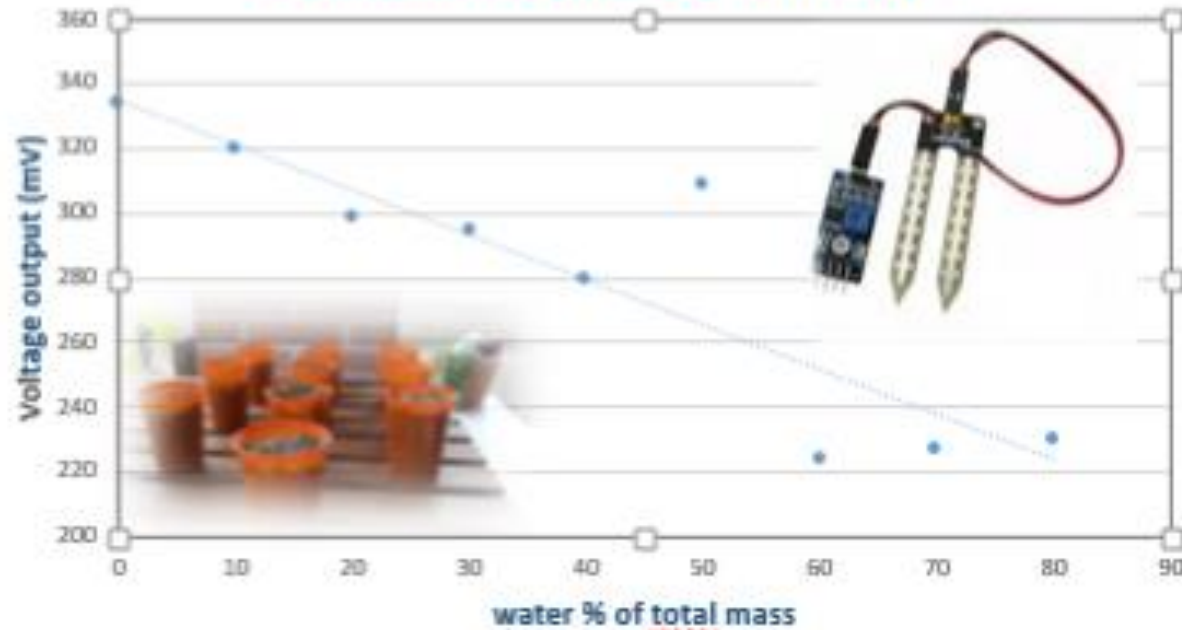
Moisture VS Resistance is an inverse relationship



Soil Moisture Sensor: Calibration



Soil Humidity Sensor Calibration

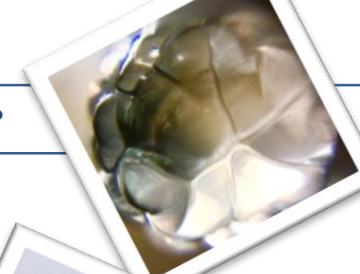


Put the sensor in

- Air
- Different % of soil and water → systematic variation
- Water

Suggested values (to be checked=

- Air: 0
- Dry soil: 0 -300
- Humid soil: 300-700
- Water: 700

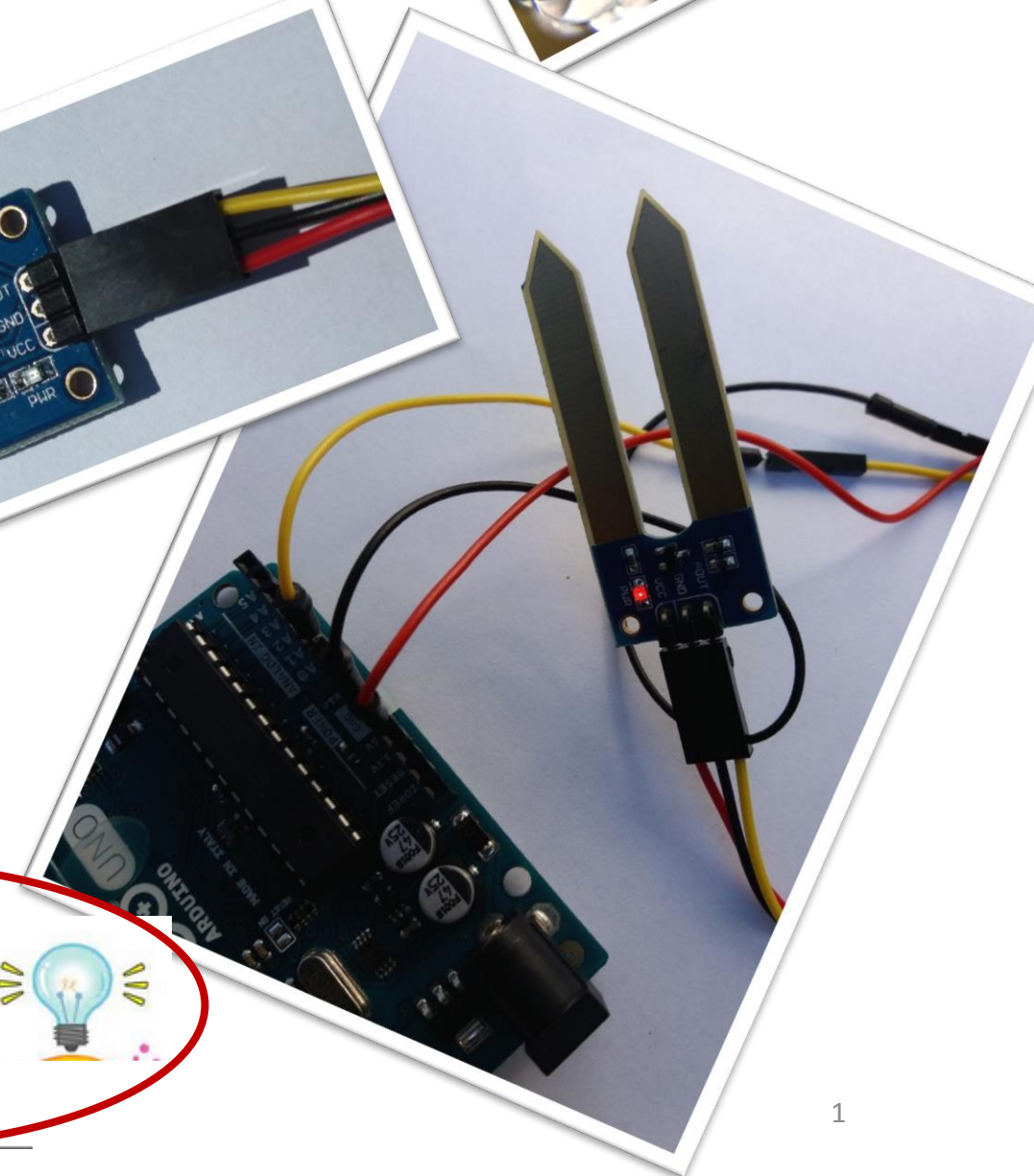
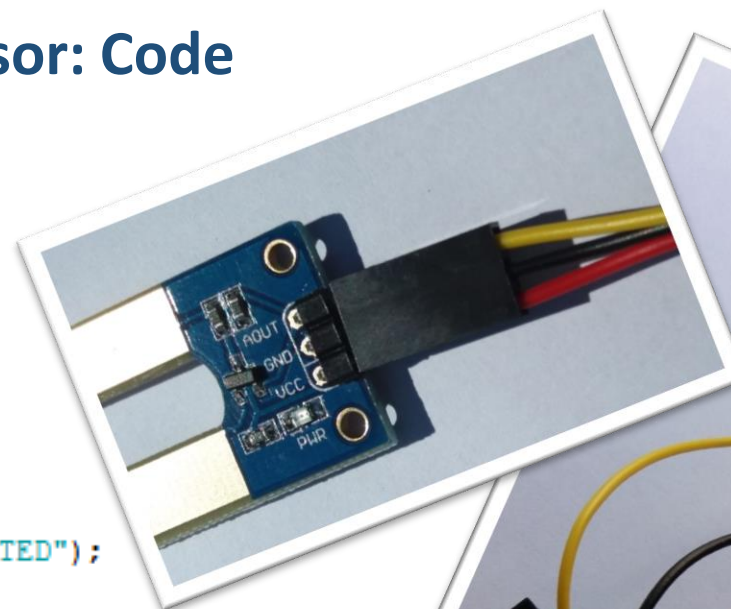


Soil Moisture Sensor: Code (analogue mode)

```
void setup()
{
  Serial.begin(9600);
  pinMode(A0, INPUT);
}

void loop()
{
  int SensorValue = analogRead(A0); //take a sample
  Serial.print(SensorValue); Serial.print(" - ");

  if(SensorValue <= 100) {
    Serial.println("Sensor is not in the Soil or DISCONNECTED");
  }
  if(SensorValue < 400 && SensorValue >= 200) {
    Serial.println("Soil is DRY");
  }
  if(SensorValue < 520 && SensorValue >= 400) {
    Serial.println("Soil is Humid");
  }
  if(SensorValue < 650 && SensorValue >= 520) {
    Serial.println("Soil is very HUMID");
  }
  if(SensorValue >= 650) {
    Serial.println("Sensor in WATER");
  }
  delay(50);
}
```



Combined with red,
yellow, green LEDs





Soil Moisture Sensor: monitoring SAP efficacy



Different types of soil:

- How do they resist desertification?
- What's the efficacy of SAP? (sand is best)



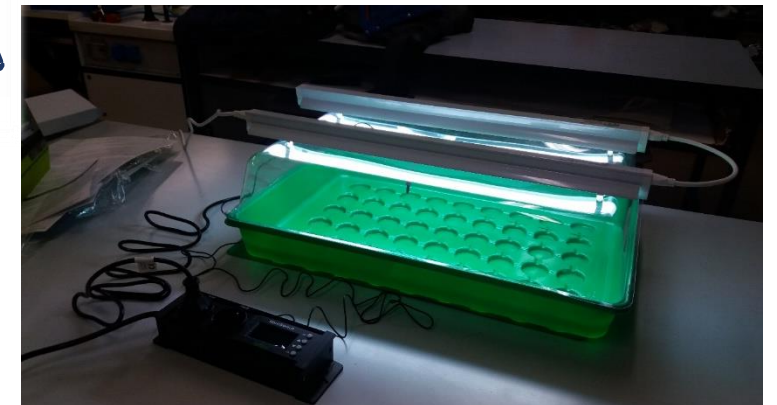
DESERTIFICATION

GROW YOUR OWN FOOD
... INDOOR SEVERE WEATHER

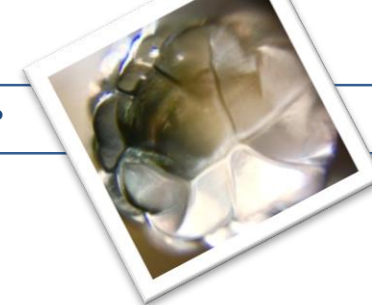
RACE TO SPACE



Outdoor



Indoor controlled environment:
thermally regulated green house



More SAP applications

- **Enhanced fertilizers efficiency** Dual application herbicide + fertilizers administering



Release rate study
Release by osmotic pressure



- **Barricade fire fighting gel**
thermal protective coating. water bubbles
efficiency > air bubbles one

<http://www.firegel.com>

https://www.youtube.com/watch?v=8_Uuz2nCugU/

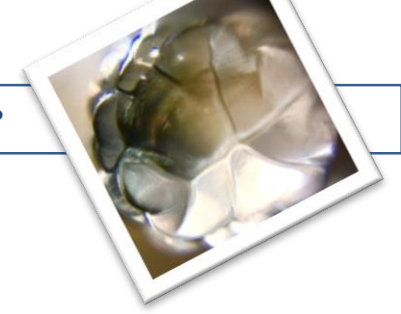
- **Polymers for soil remediation.**



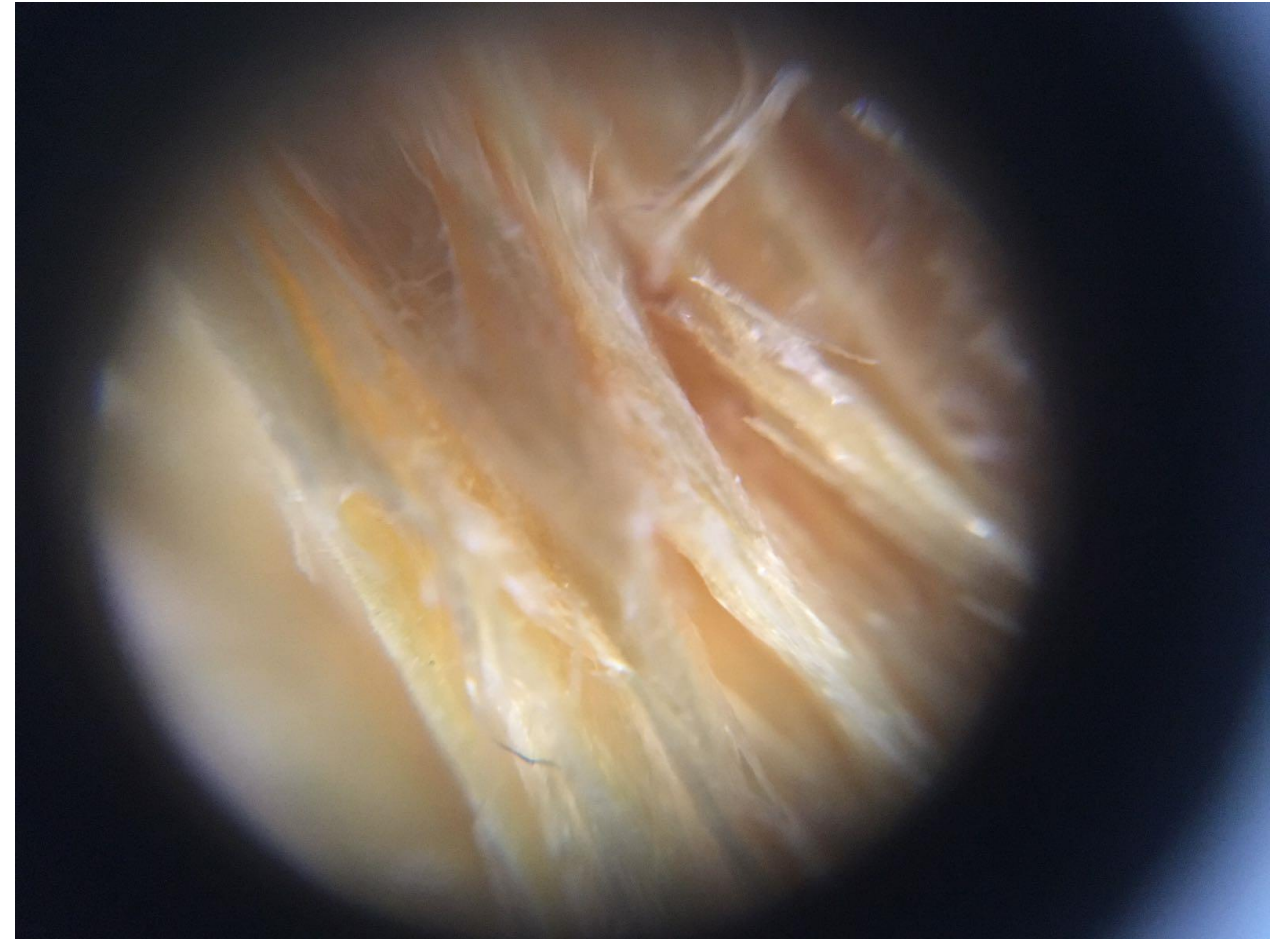
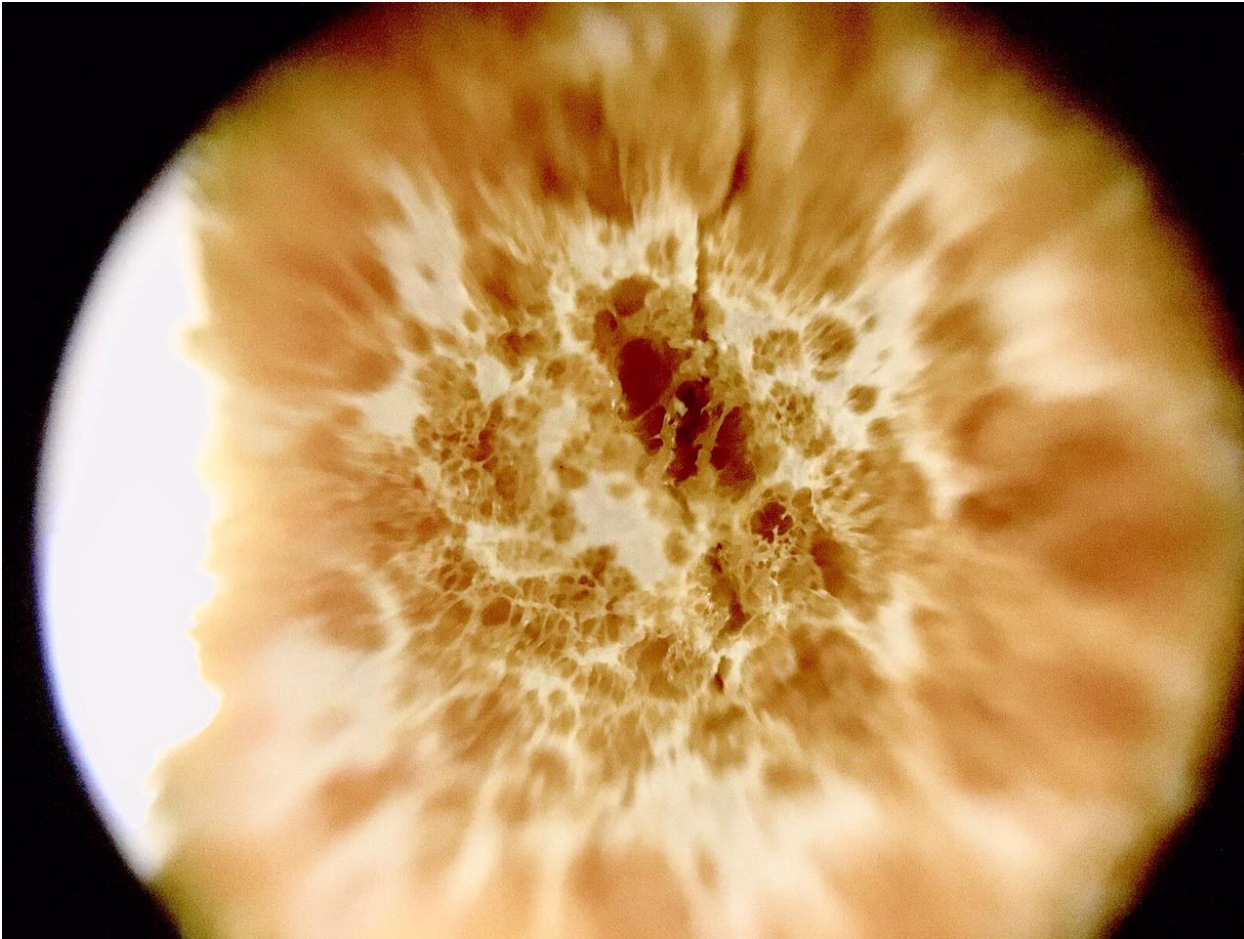
sewage and flood water disposal,
hydrotransport of solids

The case: Emilia Romagna nitrogen excess
leaching in groundwater → **the innovative idea:**
sewage cans! **PICTURE!**





Superabsorbents for water remediation: Aeroclay



Superabsorbents for water remediation: Aeroclay



- Selectively absorbs oil NOT water
- Made from clay + water
- with mixing + dry freezing procedure

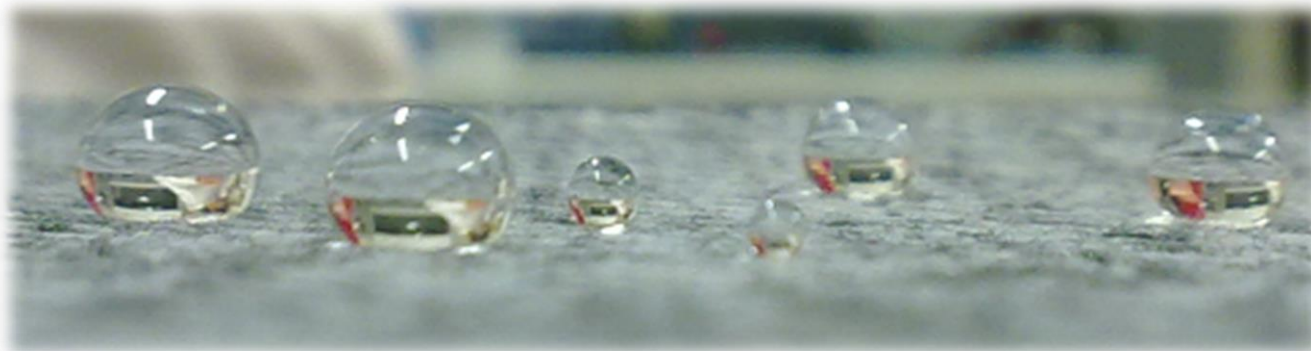


Superhydrophobic materials for water remediation: Magic Sand

- Selectively absorbs oil NOT water
- Originally designed for oil spilling remediation
- Too expensive



Superhydrophobic materials for water harvesting



- Dry areas with foggy nights
- Large superhydrophobic nets could be used to collect water condensation