Mulches

Aim: To determine the effect of different mulches on soil retention. What mulch holds more water in comparison to the other mulches.

Hypothesis: In my opinion, I believe wool will hold the most water due to its density.

Equipment:

Wool, Bark and white plastic

Tin tray

Water

Soil

Thermometer

Independent variables:

Wool, bark and white plastic

Water

Soil

Dependent Variables:

To make it dependent, we have to measure the loss in water to the closest gram and ensure each container gets 50ml of water exactly. Moreover, we have to check the water loss every 3 days and ensure that no altering impacts could affect the experiment such as being outside, exposed to rain etc.

Controlled Variables:

In this experiment we controlled variables by ensuring all tin trays we the same size, each had the correct measured amount of soil, each had the correct amount of water measured and that in weighing the matter no changes were made to how it was weighed and was always recorded in grams. Moreover, we checked all had the same amount of environmental processes e.g indoors so no wind and all were sitting where they would receive the same amount of sunlight.

Method:

* Gather all equipment- refer to sheet
* Select 3 mulches for carry out the experiment with
* Lay out foil trays labelled 1 to 3 for each different mulch
* Collect soil and fill it 2.5 cm up the tray
* Lay selected mulch over soil- so mulch acts as the top soil
* Measure out 75 ml of water on a flat surface
* Put 75ml into each tray
* Weigh the total amount of tray with its contents
* Record data
* Repeat weighing of each tray every 3 days
* Record data each time
* Weigh each tray a total of four times and calculate the water loss
* Analysis data and select which mulch is best.

Consider your result: Does it agree with you or not?

In this investigation, I found that white plastic retained the most water due to its material properties. Plastic does hold many beneficial factors such as water retention, soil temperature and weed prevention whilst preventing soil erosion. My hypothesis of wool having the best water retention was incorrect as I didn’t consider factors such as micro fibers and the density of the wool. I believed wool would hold the water in more due to its absorbing factor however, I did not fully comprehend the micro fibers and possible weak spots in the wool or that it may absorb and still evaporate after a small amount of time. I agree with my results as I should have analyzed the wool type in depth and considered that white plastic would overall act as a shield against the evaporation process. White plastic held an average of 10 mls more than wool every time we re-weighed the soils. I ensured that my results were reliable by carefully following instructions and measuring the correct amount of anything required in this experiment. Moreover, I tested each mulch a total of four times every three days. On top of this, I could also analysis my data against other people’s experiments to see if my results varied far from theirs or if we all gathered similar results.

List and explain the biological ideas and how your mulch works. How will this affect the farmer?

White plastic turned out as the best mulch due to its material factors. For evaporation to occur, light must touch the water molecules and transfer energy when the sun molecules collide with it thus forming water to overcome vaporized presser therefore leading it into becoming a form of gas which then leaves the soil with less water. However, plastic contains man made molecules called Polymers which as non-penetrable by evaporating factors such as sunlight. This theory explained why my hypothesis was incorrect as I did not consider the plastic in depth in comparison to the wool as I did not thoroughly analysis the material properties. This therefore, meant that plastic acted as a shield against the sun thus slowing the rate of evaporation. However, sunlight is a requirement for photosynthesis- when the plant absorbs the energy from the sunlight to carry water up the stem so the plant can then respire. This is essential for plant growth and so without this the farmer will not be succeeding in sufficient plant growth. Plastic acts as a shield against the sun so yes, it slows down the rate of evaporation, but it also negatively impacts aspects such as the rate of photosynthesis and transpiration therefore, affecting its overall growth. On the other hand, no mulch retained the lest water meaning it had a fast rate of evaporation. Despite being able to undergo photosynthesis more naturally and transpire with more ease, it would only work with a sufficient amount of water which it would not be very good with the rate the water was evaporating. The soil structure is also a major influence as water needs to be able to be retained well thus meaning the better pore space, the better retention also. I had initially believed wool would be the best mulch as its springy factor would benefit the overall water holding capacity however, I did not factor that this would also depend on the microfiber's of the wool as the change between fibers can consequently lead to being unreliable due to wool coming in different microfiber's thus meaning there would be much variation in the water retention. Moreover, plastic is a non-biodegradable material meaning it would not break down and form organic matter or hummus therefore, it would not attract invaluable factors such as organisms and insects. Wool would eventually break down thus attracting those factors but, no mulch would mean there would be no change in soil activity or structure or health. The farmer has to consider all factors to find a balance of each aspect to overall increase crop or pasture growth to see any outcome in product.

Recommendation to farmer:

I would recommend to the farmer to analysis; the soil structure, amount of organic matter, total amount of rainfall, what crop or pasture it would be used on and topography before selecting a mulch due to the variation in soil types meaning that the farmer may find another mulch that would be more beneficial for soil quality and growth production. Through this experiment, I discovered white plastic retained the most water due to the small polymer molecules making up its materialized mass. However, I would not recommend the farmer to select this mulch as it has various negative environmental impacts such as being non-biodegradable. Out of the four mulches that we experimented with, I would recommend using wool as its spring like structure and micro fibers aid in water retention whilst allowing sun to pass through therefore still allowing photosynthesis to occur and moreover, it is a biodegradable material thus meaning it won’t negatively impact the environment. Moreover, wool is very durable so the farmer will get a good use of money out it. I wouldn’t recommend bark as it was too dense and didn’t impact water retention very much. No mulch would simply do nothing to the natural state of the farm so I would not recommend this as it will not improve the land or help for if the farmer is striving for better plant growth.