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What type of soil is better to grow a certain type of plant ?

Group: ALMIAM scientists.

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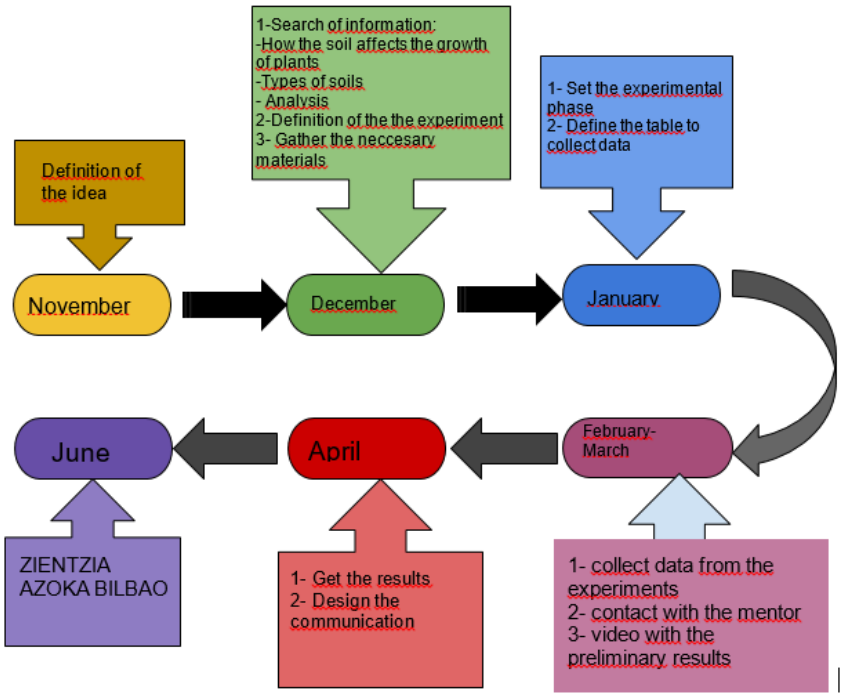


Image 1: timetable, planning of the project

Summary

Our project consists of knowing what type of soil is better to grow a certain type of plant (lentils). For this purpose we took soil from different places (River bank, Pine forest' soil and commercial soil) and we sow lentils in each of them.
We wanted to check in which lentils would grow the best.

During this period we carried out several experiments, for example, to determine the texture of the soil, measure several parameters,... and thus discover which soil characteristics might influence the different growth rate.

Materials and methods.

We have used different **materials** depending on the experiment we were going to carry out. Below we enlist them indicating what they were used for:

Plant growth	**Measuring the growth of the plants**	**Soil texture**	**Analysis of the soil**	**Biomass**
• Different soils (river bank, pine forest, commercial) • Pots • Lentil seed • Water • Graduated cylinder: to water the plants. • Sticks: to maintain the plants up. • Thread: to link the sticks.	We measure the plants on different days to see its evolution. Material needed: a measuring tape.	• Petri dish • Spatula • Hands • Plastic board • water	• extractant solution • soil • funnel • filter paper • test tubes • test strips • a pattern to compare results	• Petri dish • Scales • Plants (roots, stems, leaves)

SOIL 1: (river bank)

SOIL 2: (pine forest)

SOIL 3: (commercial)

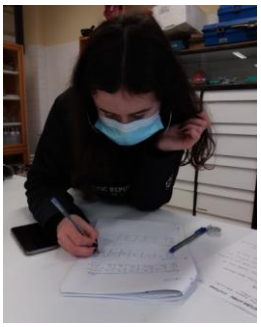
As far as the **procedures** are concerned, the procedures we used for each part of the experimental phase are detailed below.

Measuring the growth of the plants

Plant growth was controlled weekly.

Watering was also made weelkly (200 mL per pot)

Data were collected in our laboratory notebook



Soil texture

We took some soil of each tyoe and we put them in a petri dish, then we pour water there, after that we did small balls with the different soils and finally we do an ring with each soils and according to the tamale and the consistency of the ring we calculate its texture.

Analysis of the soil

We took some soil and we mixed them with an extractant solution to analyze the soil, then we put the soil in a funnel, to flow the nutrients into the test tubes.
Then we analyze the soils water quality with a fast and easy test. When we had the results we put them in a table.

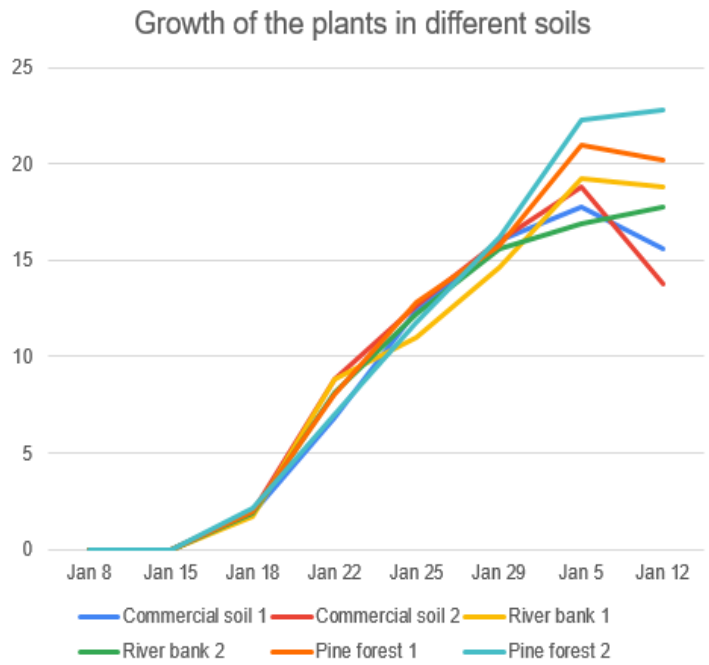
Biomass

We took some plants from the pots and we cut them into pieces (root, stem and leaf), we left them on a petri dish to dry for several days.
With a balance first we found roots weight, then stems weight and finally leaves weight.
We copy the data on the table.
We did this experiment to find out where the plant produces more biomass depending on the soil type

Results

Plant growth

We measured the plants on different days to see its evolution. Here we can see the graphical representation where it is indicated that the highest growth has corresponded to the plants planted on the pine forest soil.



Soil texture

In the case of the texture of the different soils, the soils were handled as indicated in the procedure and depending on whether or not rings could be made, the soil types were classified according to the table shown below

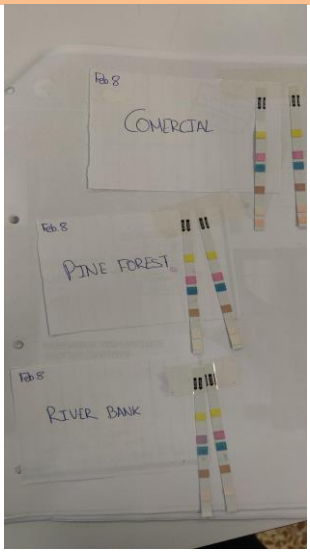
- The soil from the river is a clay soil
- The pine forest's soil is a muddy soil
- Commercial soil is sandy soil

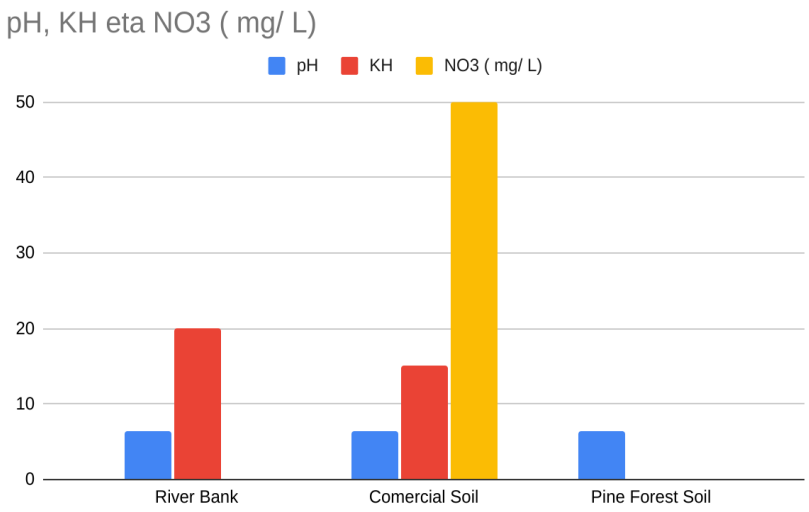
Texture	Stickiness	Characteristics
Sand (S)	Not sticky	Loose, cannot be moulded.
Loamy Sand (LS)	Very slightly sticky	Can be moulded into a ball, cannot be rolled into a ribbon between the fingers.
Sandy Clay Loam (SCL)	Slightly sticky	Can be rolled into a short ribbon between the fingers but this cannot be bent without breaking. Will nottal a shine nor show a finger print when squeezed.
Clay Loam (CL)	Sticky when sufficiently moist	Can be rolled into a ribbon and be bent into a half circle before breaking. Will take a shine and show a finger print.
Sandy Clay (SC)	Very sticky	Can be rolled into a ribbon and bent almost to a circle before breaking. Takes a good shine with many sand grains showing.
Clay (C)	Very sticky	Can be rolled into a ribbon which can be bent into a circle before breaking. Takes a strong shine with few sand grains showing.
Heavy Clay (HC)	Very sticky	Very difficult to break up and work. Stiff, sticky.

Table 5.1: Soil Textures According to Manipulation When Wet

Analysis of the soil

To proceed with the analysis of the soil composition, we used the soil extract and introduced there a strip of the Ibaialde kit into each type of soil to measure nitrates, KH and pH.
As can be seen in the graph, the pH measurement obtained in this way was inconclusive, nitrates were detected only in the soil of commercial origin and KH was highest in the river soil.





Biomass

Concerning to biomass, in the commercial soil it is highest in the stem, and in the other two soil types it is highest in the roots.

	ROOT (biomass in g)	STEM (biomass in g)	LEAVES (biomass in g)
Commercial soil	0, 03 g	**0, 06**	0, 05
Pine tree forest's soil	**0, 08 g**	0, 02	0, 03
River bank's soil	**0, 11 g**	0, 04	0, 01

Conclusion

The plants have shown higher growth in the pine forest soil, which has a muddy texture, KH is intermediate and nitrates were undetectable.
Biomass in these plants was mainly concentrated in the roots.

In the case of the plants planted in the river soil, they showed an intermediate growth, the texture was clay and the KH was the highest.
Biomass in these plants too was concentrated in the roots.

As for plants grown in commercial soil, they concentrated biomass in the stem, nitrates could be detected, showed lower growth and also perished earlier.

In any case, the experiment was of limited duration and a longer experiment should be done with plants growing individually, not in groups as on this occasion.

Bibliography

RESOURCES FOR LAB PRACTICE

- https://www.soils4kids.org/experiments (last seen: april, 4, 2021)
- https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/edu/?cid=nrcs142p2_054300 (last seen: april, 4, 2021)
- https://harvesttotable.com/how_to_grow_lentil/ (last seen: april, 4, 2021)
- Humanity development library 2.0 (Chapter 5: Soils and soil moisture data) (last seen: april, 4, 2021)

Acknowledgements

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