

PROFILES IBSE Teaching/Learning Materials for Students

compiled by the PROFILES Working Group of the Maria Curie-Skłodowska University, Lublin - Poland



What type of soil affects plant growth?

A Module for Biology Instruction - for Grades 1st to 2nd of junior secondary school

Developed by: Elwira Samonek-Miciuk

Institution: Department of Biology and Environmental Education,

Maria Curie-Skłodowska University, Lublin - Poland

Homepage: https://umcs.lublin.pl/zaklad_dydaktyki_chemii

Mail: elsami@poczta.umcs.lublin.pl

Introduction

During the lessons of realization of this module you will study soils differing in properties and will conduct experiments whose results will allow to estimate the effect of some properties of soil due to different factors on crops. Thus in the future as potential owners or persons buying ground to cultivate plants (e.g. vegetables), you will be more aware what ground to choose for cultivation of plants for consumption.

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For further information see: www.parsel.eu.

These worksheets belong to:

What type of soil affects plant growth?

Each soil depending on conditions of this formation has a characteristic structure i.e. so called soil profile. At the same time human activity is becoming a more and more important soil formation agent. It can affect maintenance of quality and soil formation (e.g. fertilization) but also it can destroy soil. Therefore buying or hiring ground meant for plant cultivation one should remember that quality and crop of cultivated plants will depend on the soil quality. At the same time more and more ground areas, which could be used for agriculture, are designed for buildings and roads. This causes possibly the most rational and effective exploitation of remaining grounds to compensate for the drop in agriculture products.

I. Soil as the biologically active surface of the Earth

1. What are the soil formation agents?

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2. What are the elements of soil profile?

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3. What is the importance of soil?

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II. Study and determine the following properties of soil

a. colour

Sample A

Sample B

Sample C

Sample D

b. scent

Sample A

Sample B

Sample C

Sample D

c. kind of soil

Sample A

Sample B

Sample C

Sample D

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d. components of soil

Sample A

Mineral:

Organic:.....

Sample B

Mineral:

Organic:.....

Sample C

Mineral:

Organic:.....

Sample D

Mineral:

Organic:.....

Determination of the kind of soil: finger sample

1. A pellet of soil should be kneaded in hands and a sausage of penal thickness should be formed:	a/ a sausage can not be formed b/ a sausage can be formed	- move to point 2 - move to point 5
2. Powder the sample between a thumb and a forefinger:	a/ single grains well palpable b/ single grains lighty or not palpable at all	- move to point 3 - move to point 4
3. Powder to sample in hands:	a/ there is no fine soil material in the palm of the hand b/ there is slight soil material in the palm of the hand	- sand - poorly clayey sand
4. Roll out the sample and powder between your hands:	a/ it can not be formed or it can be poorly formed, it goes dirty and is not sticky b/ it can not be formed or it can be poorly formed, it goes dirty and is not sticky	- sandy-loamy soil - sandy-clayey soil
5. Crush the sample between a thumb and a forefinger close to the ear:	a/ its clatters strongly b/ it does not clatter at all or it clatters lightly	- sandy clay - move to point 6
6. Estimate the smoothed out surface of rubbing:	a/ after smoothing the surface is dull b/ after smoothing the surface is shiny	- loam - move to point 7
7. Rub the sample between to basic glasses:	a/ it clatters during rubbing one glass against another b/ it smears like butter during rubbing one glass against another	- loamy clay - clay



e/ mechanical composition of soil

Sample of soil/type of soil	Fraction I (stones)		Fraction II (ground, sand)		Fraction III (dust, floatable, parts)	
	Weight	%	Weight	%	Weight	%
A						
B						
C						
D						

f/ chemical properties of soil

Sample of soil/type of soil	pH	Content of carbonates	Presence of sodium (+ -)	Presence of potassium (+ -)	Presence of phosphorus (+ -)
A					
B					
C					
D					

III. Effect of soil pH on growth of plants

Searching question:

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Hypothesis:

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Materials:

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Procedure:

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No. mug	Results of germination and growth observation
I	
II	
III	
IV (control sample)	

Interpretation:

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IV. Effect of fertilization on growth and development of plants

Searching question:

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Hypothesis:

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Materials:

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Procedure:

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Sample/type of soil	Concentration of fertilizers			Water (control sample)
	5%	3%	0.5%	
	Results of observation			
A				
B				
C				
D				

Diagram

Interpretation:

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V. Summary:

1/ Which components present in the soil can be hazardous for human health after consumption of plants growing on it? Give examples and effects of their activity.

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2/ Why is rational fertilization of soil indispensable in cultivation of plants. Justify your reply.

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3/ Write a few most important pieces of advice based on the investigations for someone who plans to buy ground to cultivate plants.

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