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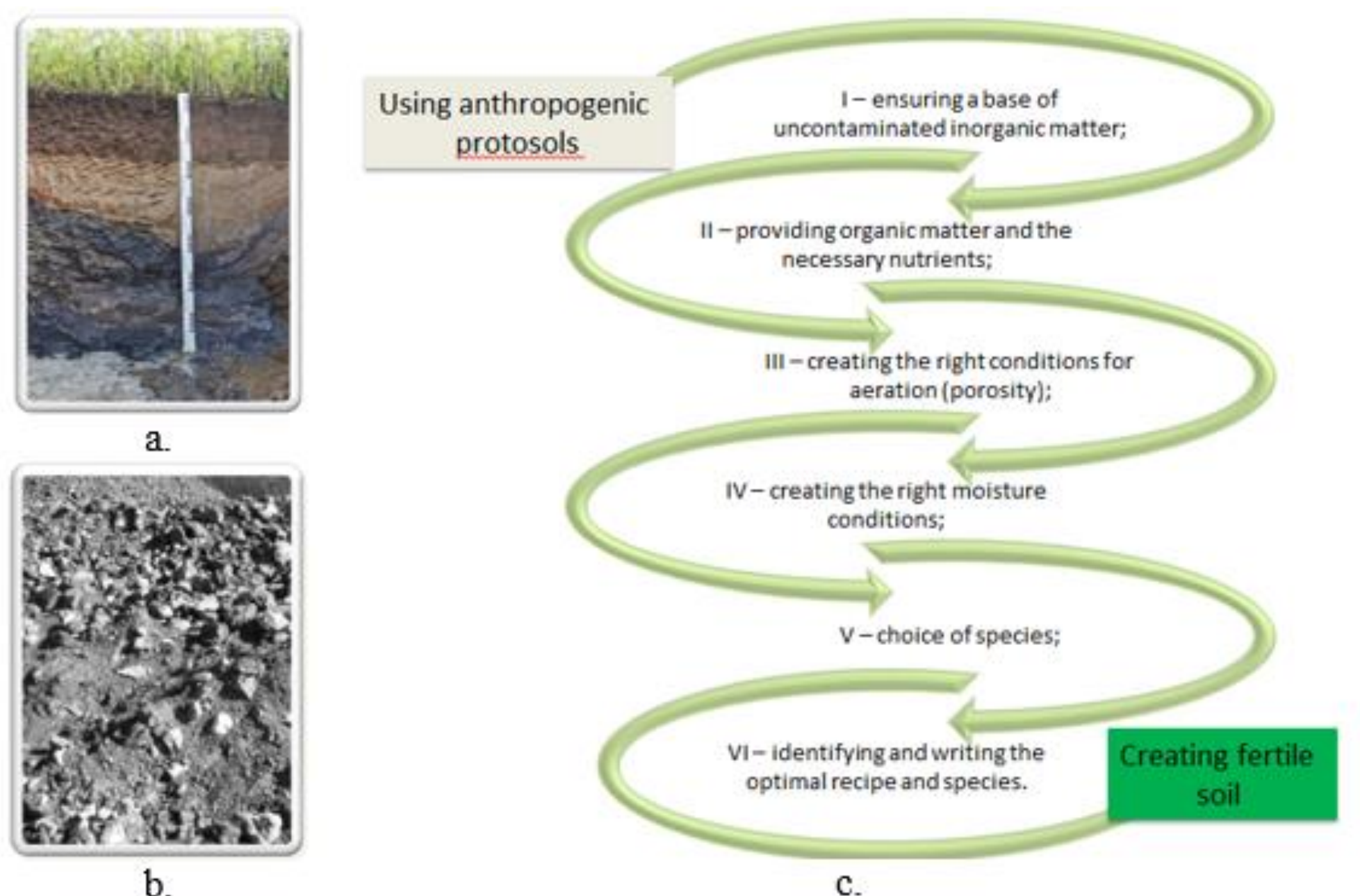
MONITORING THE DEVELOPMENT OF PLANTS ON THE ANTHROPOGENIC SOILS FROM THE STERILE DUMPS OF THE COAL OPEN PITS IN THE ROVINARI MINING BASIN

Roxana, BÂRDEA, Izabela – Maria, APOSTU, Maria, LAZAR
University of Petroșani

Abstract: Topsoil is essential for vegetation, forming through interactions among Earth's spheres. Human activities, especially mining, can severely degrade soil, leaving infertile waste materials known as anthropogenic protocols. To restore these soils, amendments like compost and manure, along with green crops such as clover and alfalfa, are needed to improve fertility. The research tested plant growth on soil substitutes made from sterile mining waste mixed with organic materials, using methods to monitor plant population and coverage efficiently.

• Introduction

Soil, the earth's top layer, undergoes significant transformations, making it a critical life-supporting resource. Its formation is governed by climate, parent material, topography, time, and organisms. Mining activities severely degrade land, leaving behind infertile lithological materials and sometimes dangerous elements.



a. Fertile soil; b. Anthropogenic protocols; c. Important stages in pedogenesis process

• Material and method

The study was conducted in the Rovinari Mining Basin, Romania, focusing on the Peșteana Nord internal waste dump. Waste rocks (clays, sands, marls) were collected and mixed to create sterile soil substitutes. Six soil mixes (R1–R6) were prepared, combining sterile materials with compost, manure, and fertilizer. Three plant mixes (green peas, grass + red clover, grass + alfalfa) were sown in 30 pots and monitored over 94 days. Methods included monitoring soil pH, moisture, and light levels, with plant density assessed using the DAFOR scale and a proposed soil coverage index.

• Results and discussions

Soil pH, moisture, and light were monitored to guide interventions. Green peas bloomed 30-50 days after sowing, with harvesting aligning with maturity markers. Red clover and alfalfa generally thrived, with alfalfa showing initial slow growth but later abundance. Grass was dominant where clover and alfalfa were abundant. The coverage index indicated full substrate coverage by day 62, with the best results in R5 and R6. Green peas yielded best in R5 (sandy clay), though some pods in R3 rotted. Soil substitutes R1 and R5 supported adequate productivity, despite field conditions.

• Conclusions

The experiment used 30 pots with three plant species/mixes and six soil substitutes from sterile mining material. Herbaceous plant growth was evaluated using established and new methods (the square method with the DAFOR scale, the soil coverage index method). Red clover was abundant in most pots, while alfalfa became dominant in R4 and R6. Grass was consistently dominant. The highest coverage was achieved with red clover + grass and alfalfa + grass in R5 and R6. Green peas performed best in R5 but struggled in saline substrates like R6. Overall, plant development was satisfactory, though certain substrates delayed growth. Harvesting on day 94 confirmed soil preferences and plant adaptability.

Determining the population density (DAFOR scale)

Soil substitute		R1									
Plants species	Pot no. Day	1	2	3	4	5	6	7	8	9	10
		1	2	3	4	5	6	7	8	9	10
S2	I	D14	O	O	O	O	O	O	O	F	O
		D34	D	A	A	F	F	F	A	A	A
		D62	D	D	D	D	D	A	A	D	A
	T	D14	R	-	O	O	O	R	O	R	O
		D34	R	O	O	A	F	O	F	A	A
		D62	A	A	A	A	A	A	A	A	D
S3	I	D14	R	O	O	O	O	R	R	R	F
		D34	F	D	A	F	F	R	F	A	A
		D62	D	D	D	D	D	A	A	A	A
	L	D14	R	-	O	O	O	-	O	O	F
		D34	F	R	F	A	O	-	F	A	A
		D62	A	A	A	A	A	A	D	D	A

I – grass; T – red clover; L – alfalfa; D – dominant; A – abundant; F – frequent;
O – occasional; R – rare

Determination of soil coverage index

Soil substitute		R1									
Plants species	Pot no. Day	1	2	3	4	5	6	7	8	9	10
		1	2	3	4	5	6	7	8	9	10
S2	D14										
	D34										
	D62										
	D94										
S3	D14										
	D34										
	D62										
	D94										

coverage degree > 100%; coverage degree = 100%; coverage degree < 100%; coverage degree → 0 %;

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