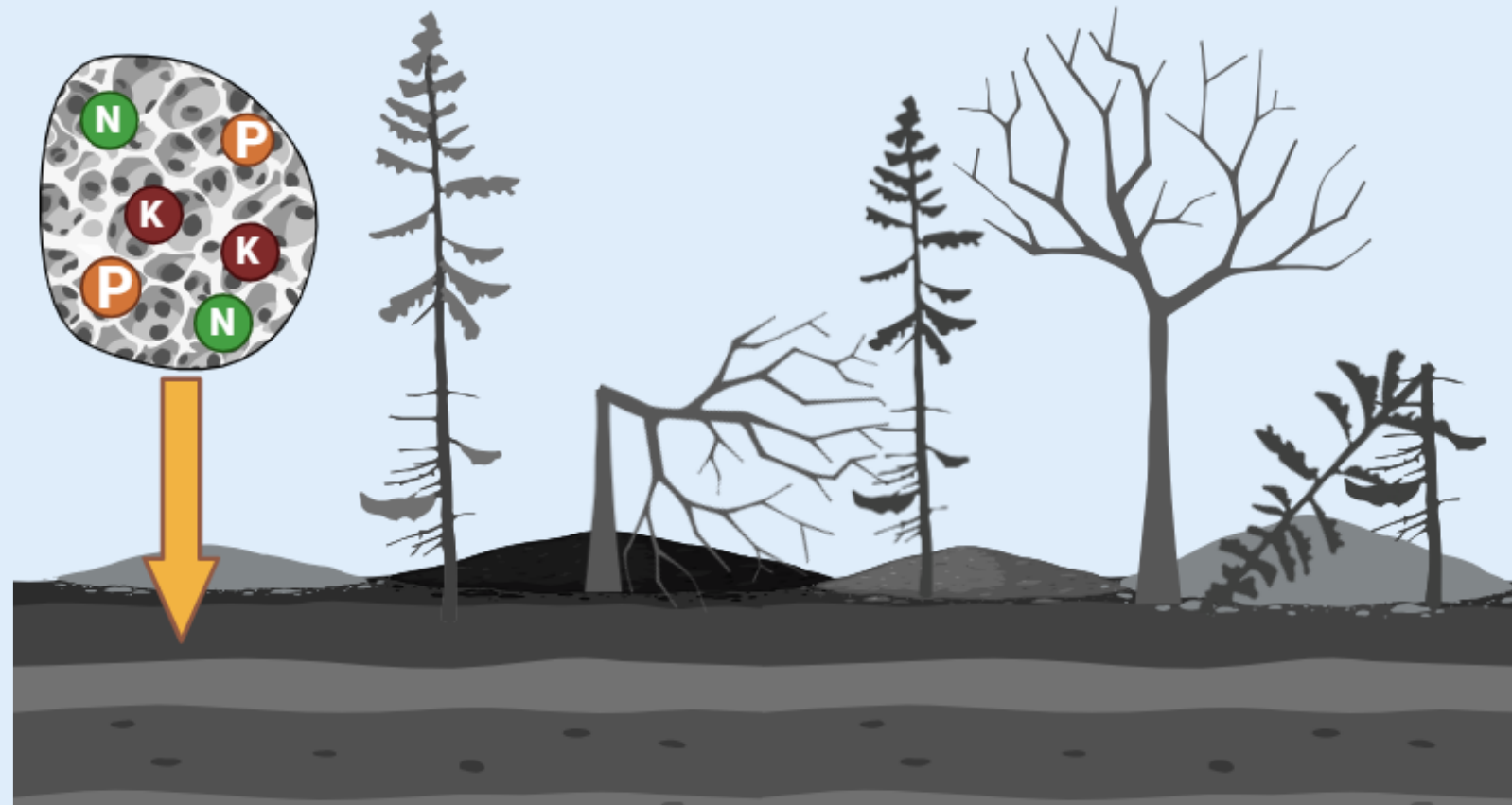


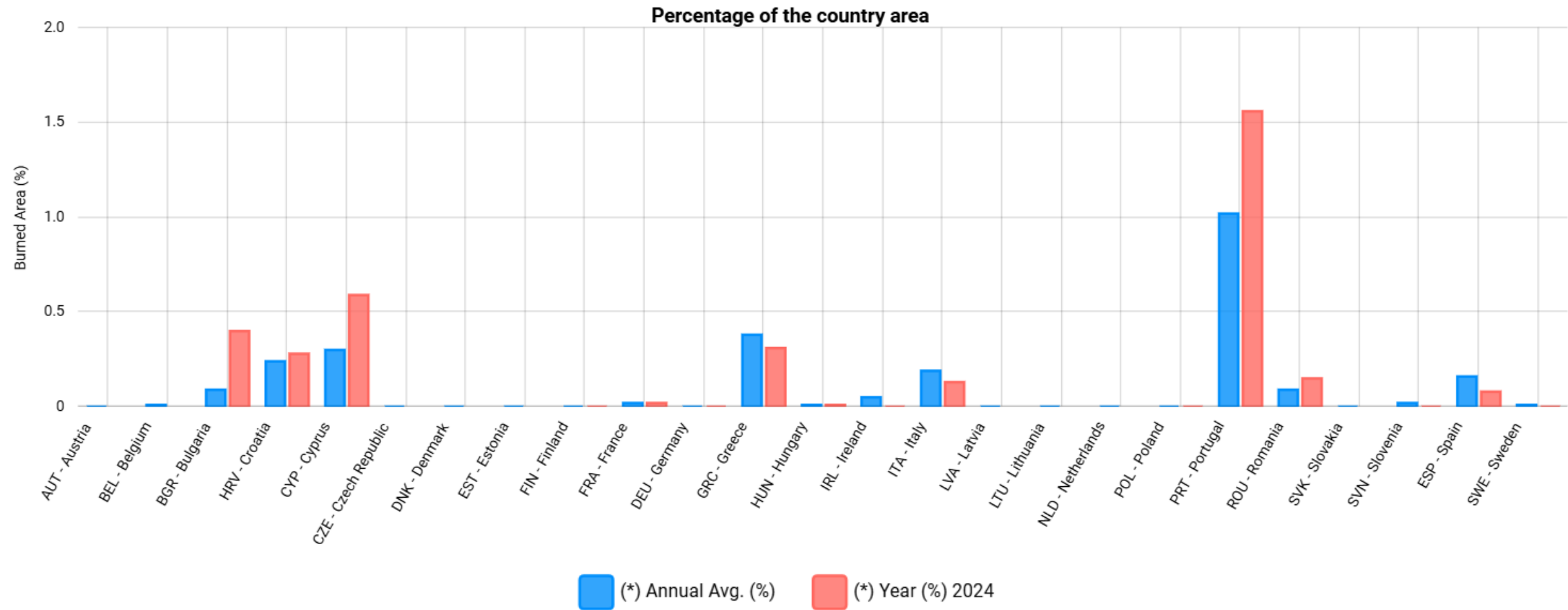
Biochar-Based Controlled-Release Fertilizers from Vineyard Pruning Residues: A Sustainable Strategy for Post-Fire Soil Rehabilitation

Olena Dorosh, Andreia F.
Peixoto, Cristina Delerue-
Matos, Manuela M. Moreira

**III SEMINÁRIO
DA REDE
INCÊNDIOS
SOLO**



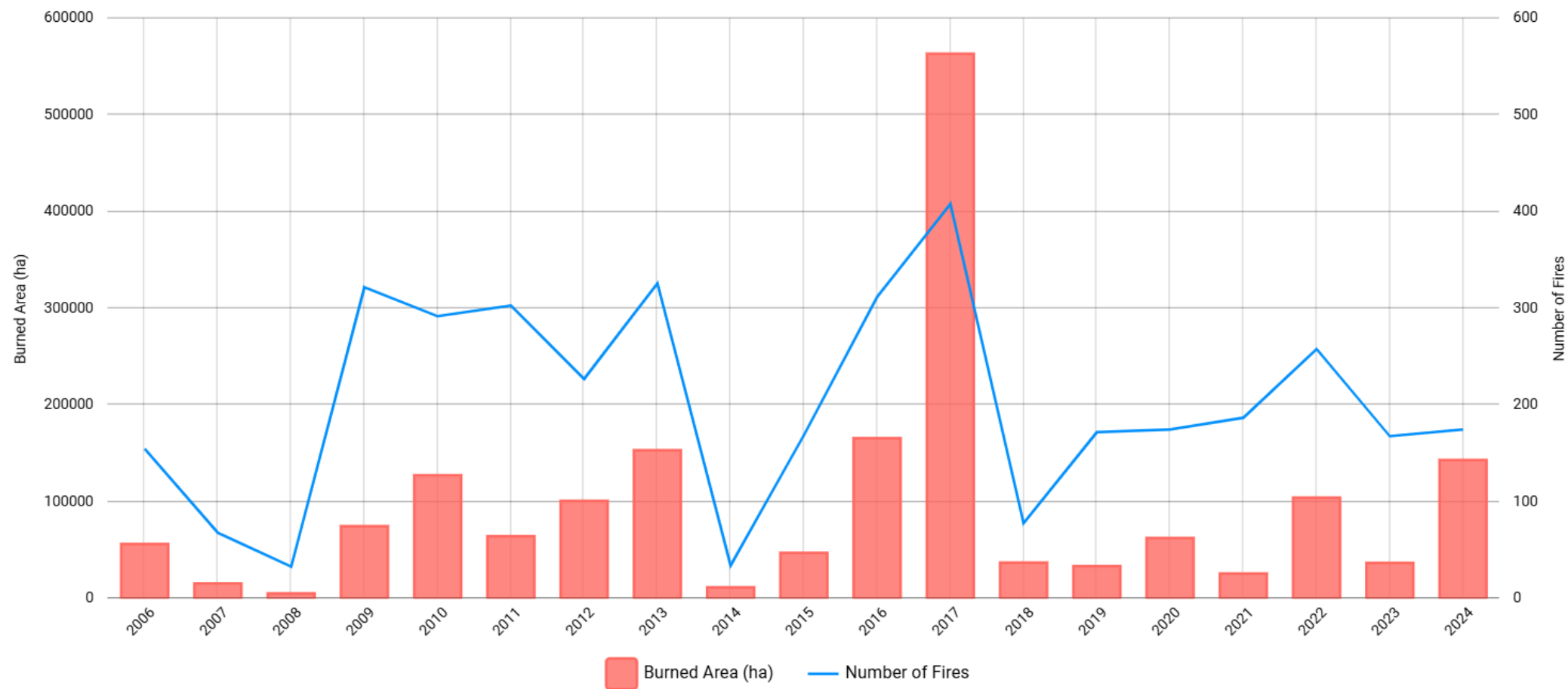
EFFIS Estimates for European Union



Percentage of burned area in function of countries total área; in blue is the average percentage from 2006 to 2023 and in red is the percentage correspondent to 2024.

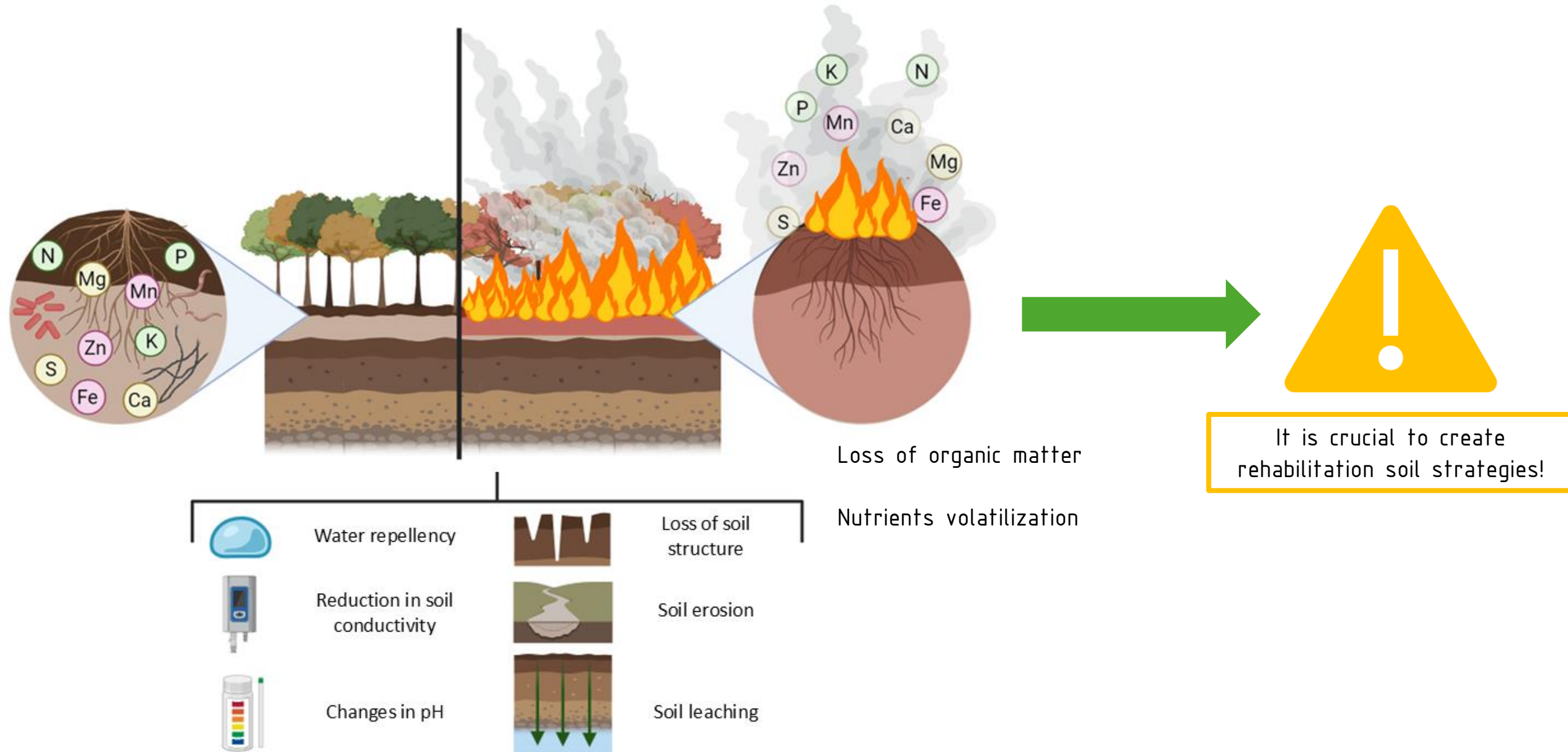
Source: <https://forest-fire.emergency.copernicus.eu/apps/effis.statistics/estimates>

EFFIS Annual Statistics for Portugal



Burned area (ha) and number of fires at Portugal between 2006 and 2024.

Source: <https://forest-fire.emergency.copernicus.eu/apps/effis.statistics/estimates>



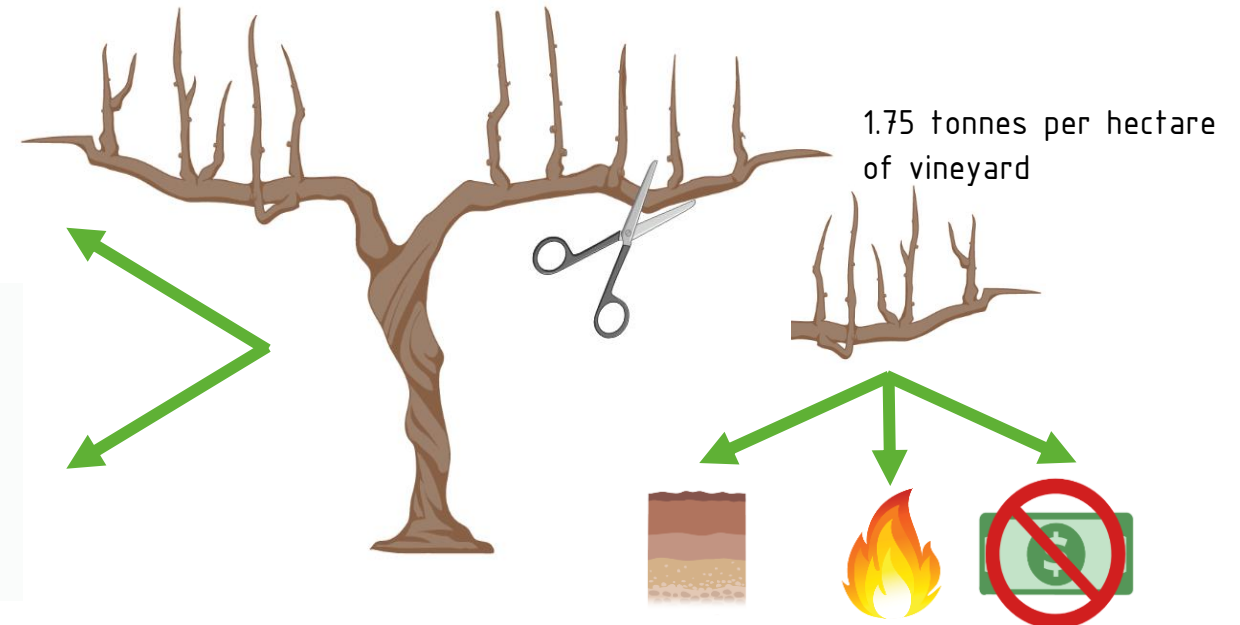
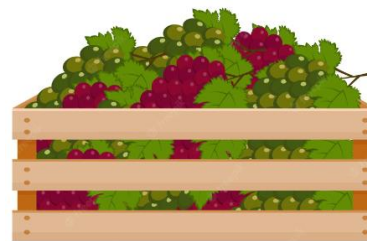
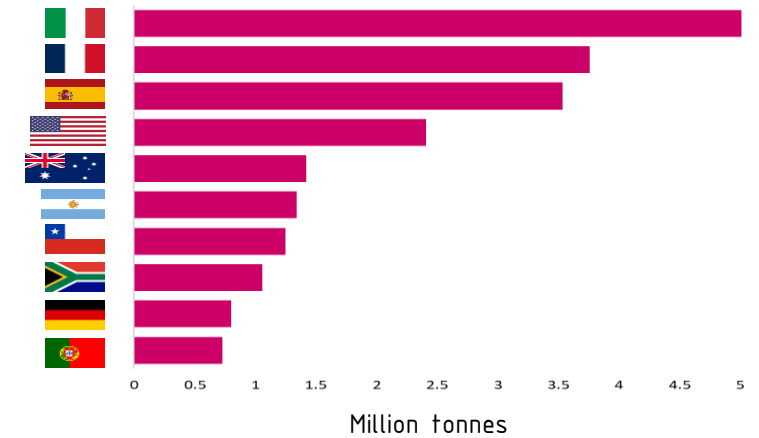
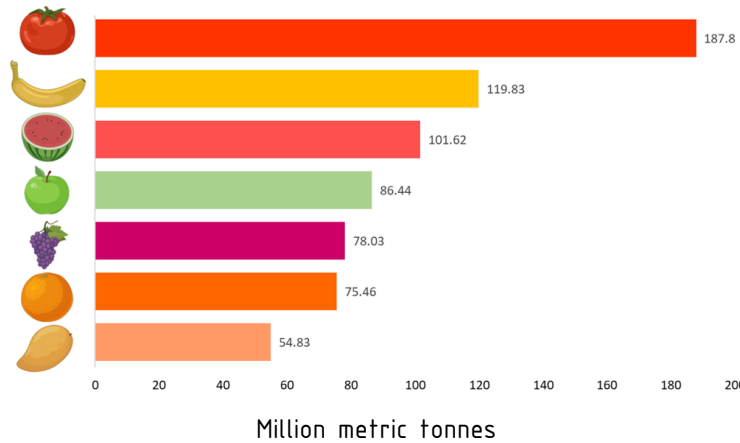


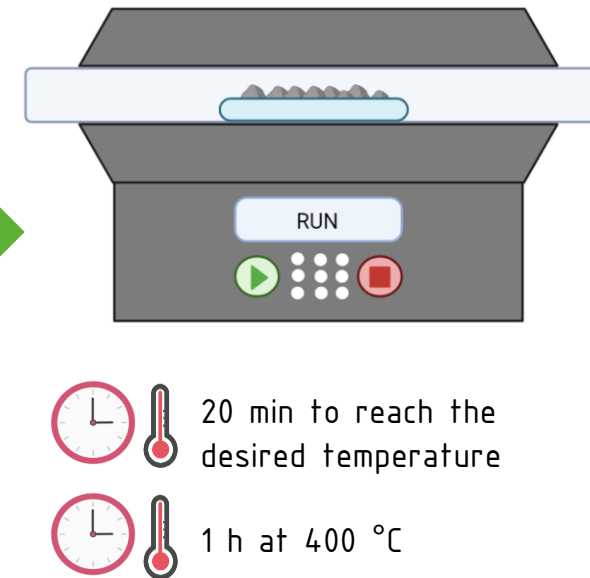
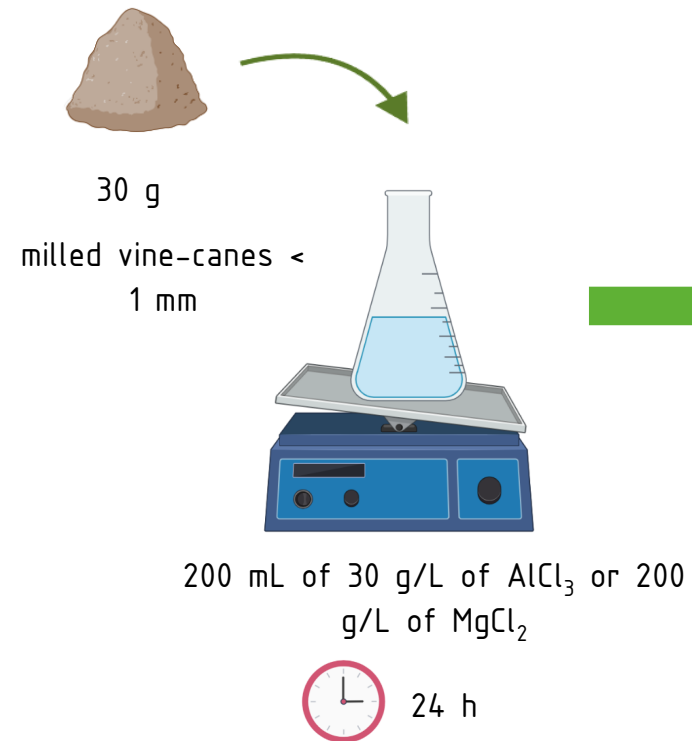
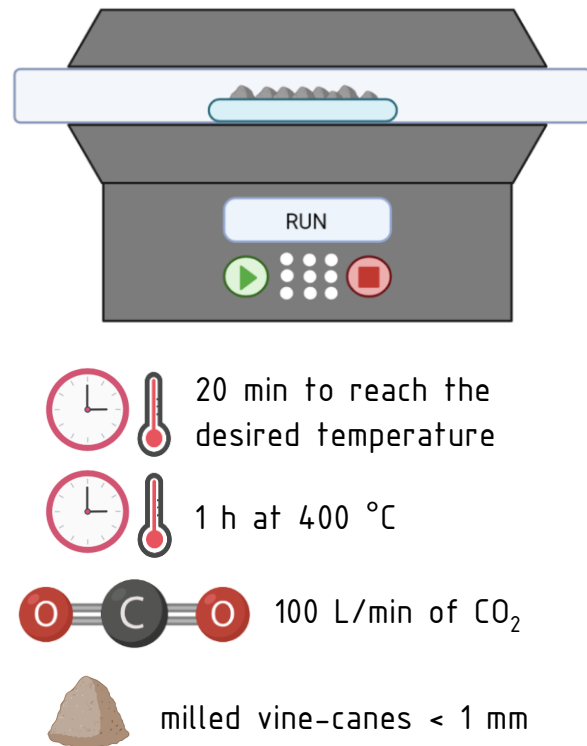
Follows the principals of
a Circular Economy



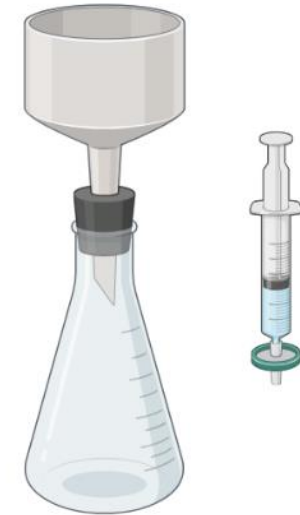
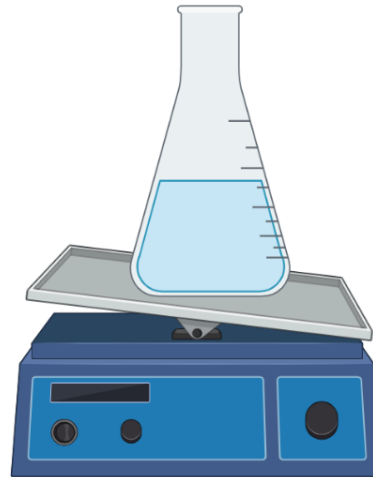
Nutrients are released
over time

Improves both physical and
chemical soil properties





Adsorption studies were performed in different pH values (2-13), as pH highly influences the adsorption of each element.



1 g biochar



100 mL of 50 mg/L NaNO_3 ,
 KH_2PO_4 or KCl

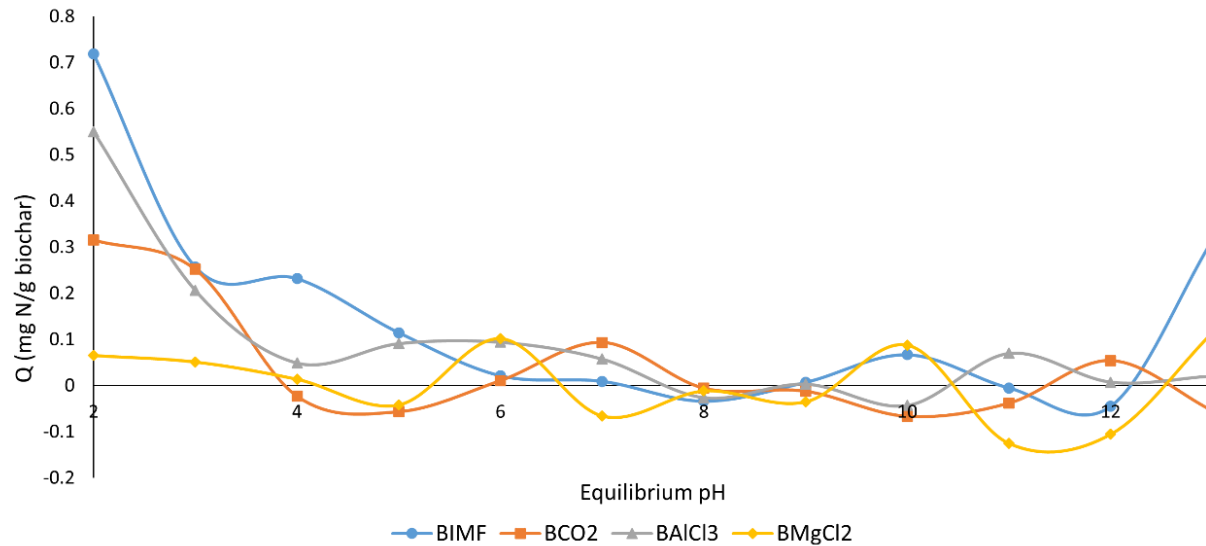


24 h



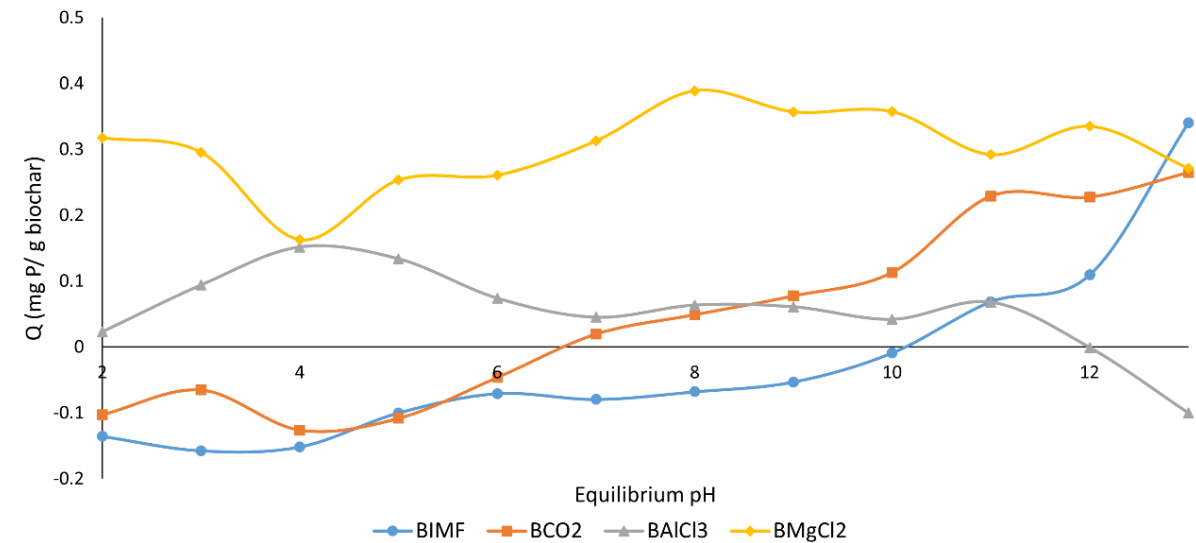
From 2 to 13

N adsorption in function of pH



The highest value was 0.72 mg N/g biochar for BIMF at pH 2.

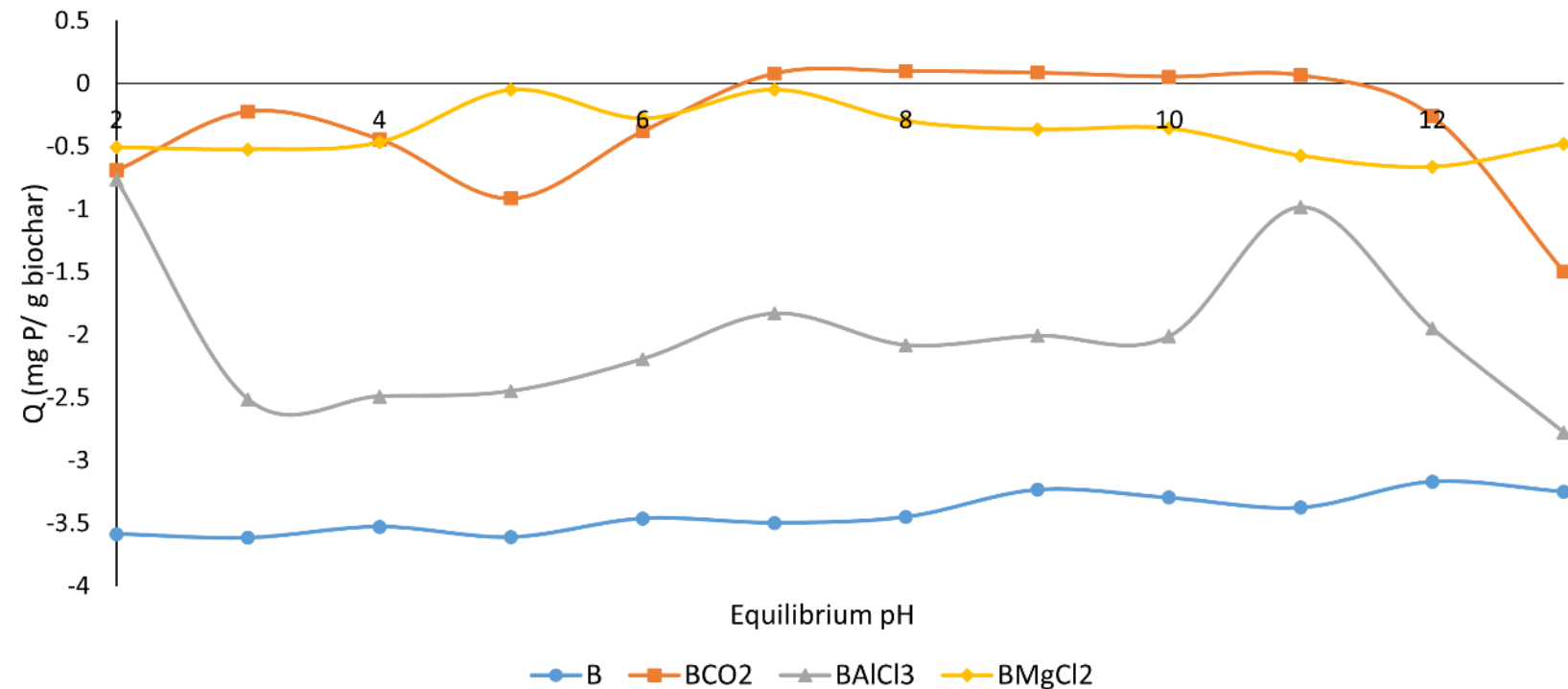
P adsorption in function of pH



In general, BMgCl₂ presented higher values of P adsorption than the other biochars, with the highest value corresponding to 0.39 mg P/g biochar at pH 8.

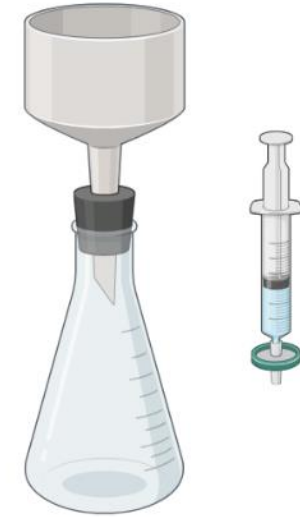
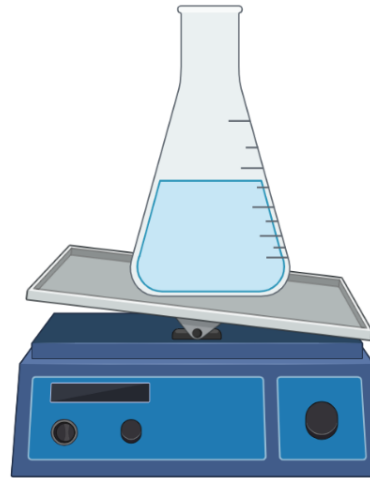
K adsorption in function of pH

The obtained results suggest that the biochar prepared from vineyard pruning was initially rich in K and instead of adsorbing, it release K into the solution.



After selecting the best pH for the adsorption of each nutrient, the following parameters were optimized:

- biochar weight/solution volume ratio;
- amount of nutrient adsorbed in function of contact time;
- concentrations of N and P in solution.



Between 0.0625 and 2.5 g



100 mL of NaNO_3 and KH_2PO_4 with concentrations between 25 and 750 mg/L

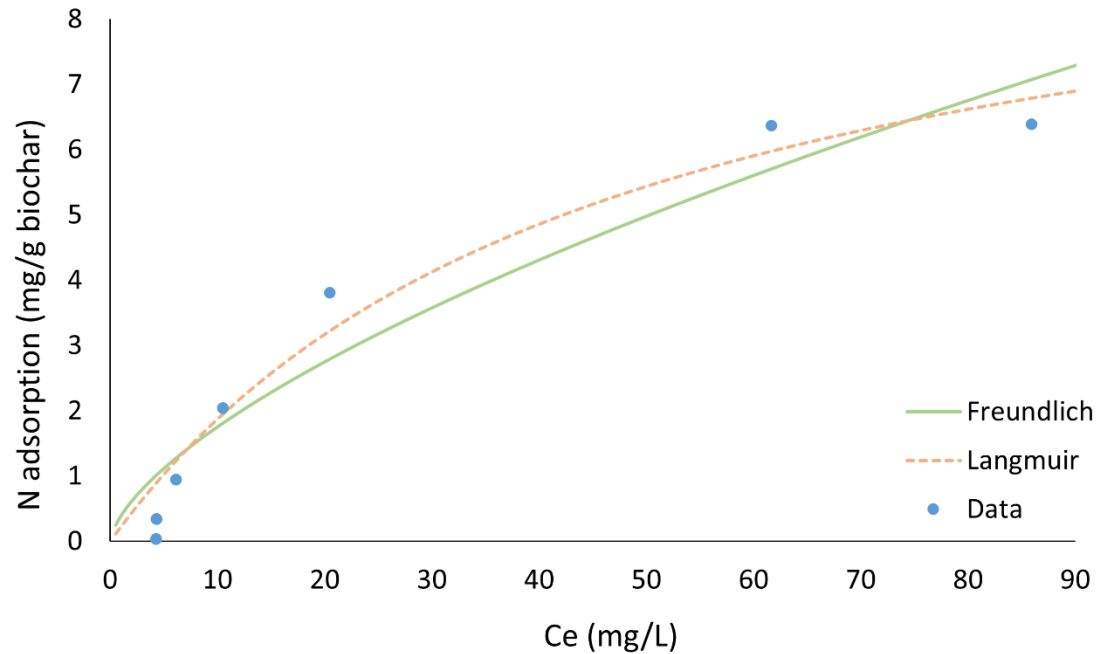


0.5 to 24 h

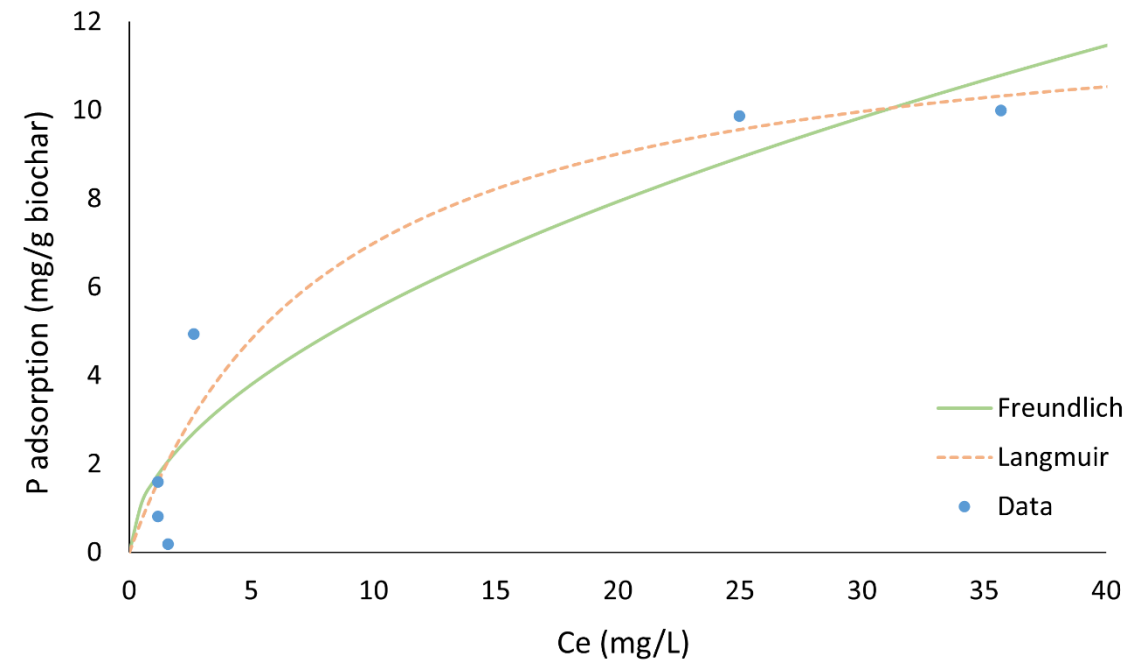


pH 2 and 8 for N and P adsorption, respectively

N adsorption isotherms



P adsorption isotherms



The highest adsorption capacities determined by Langmuir model were 10.4 mg N/g of biochar with BIMF and 12.7 mg P/g of biochar with BMgCl₂.



Vineyard pruning biochars can adsorb plant nutrients.



Are a more environmentally friendly alternative.



Residue valorization.



Economically advantageous.



Can be adapted to the plant and soil necessities.



ACKNOWLEDGMENTS



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*THANK
YOU!*