

STEM Education for Sustainable Development

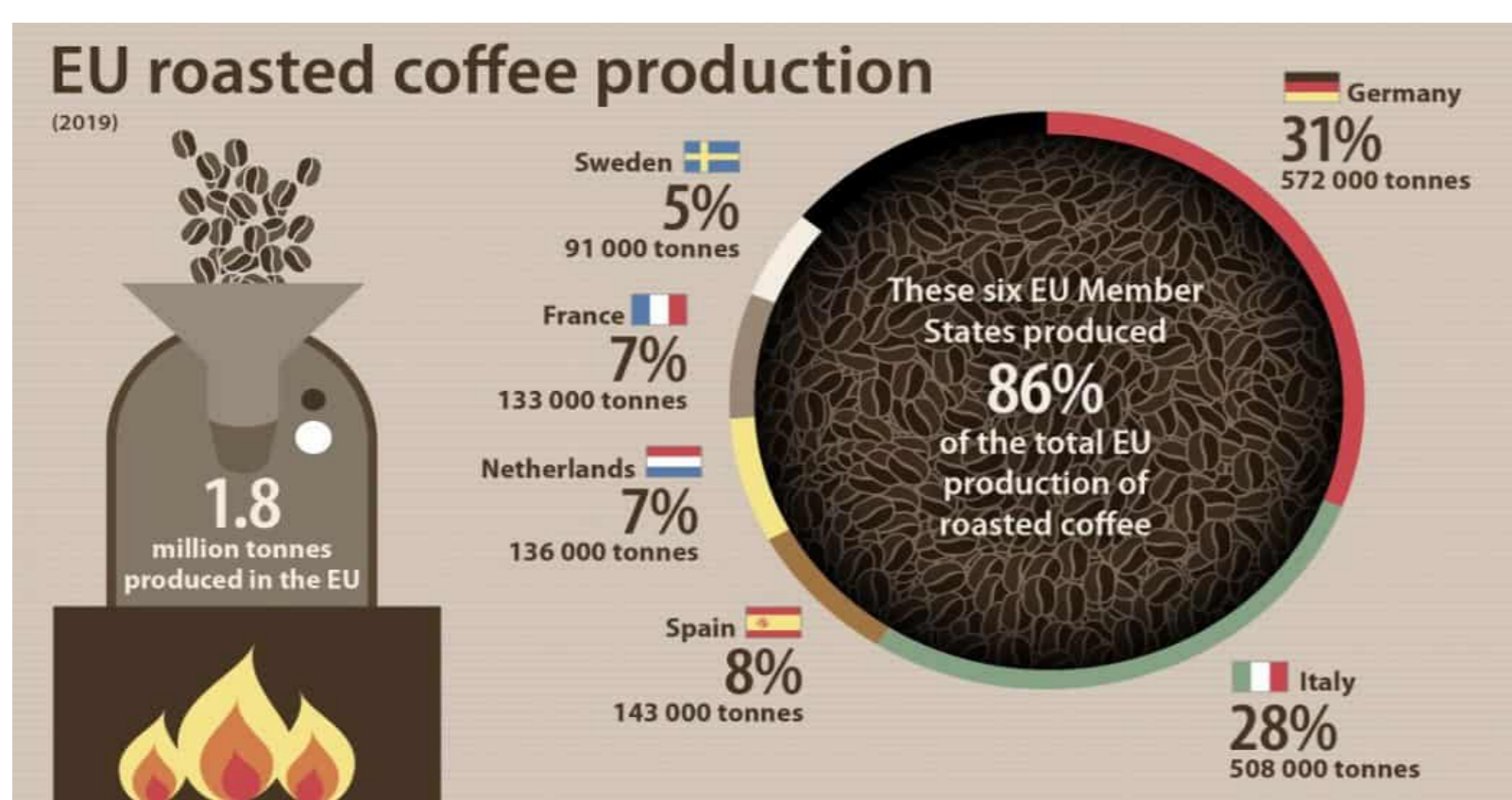
SCIENCE ON STAGE
TURKU 2024

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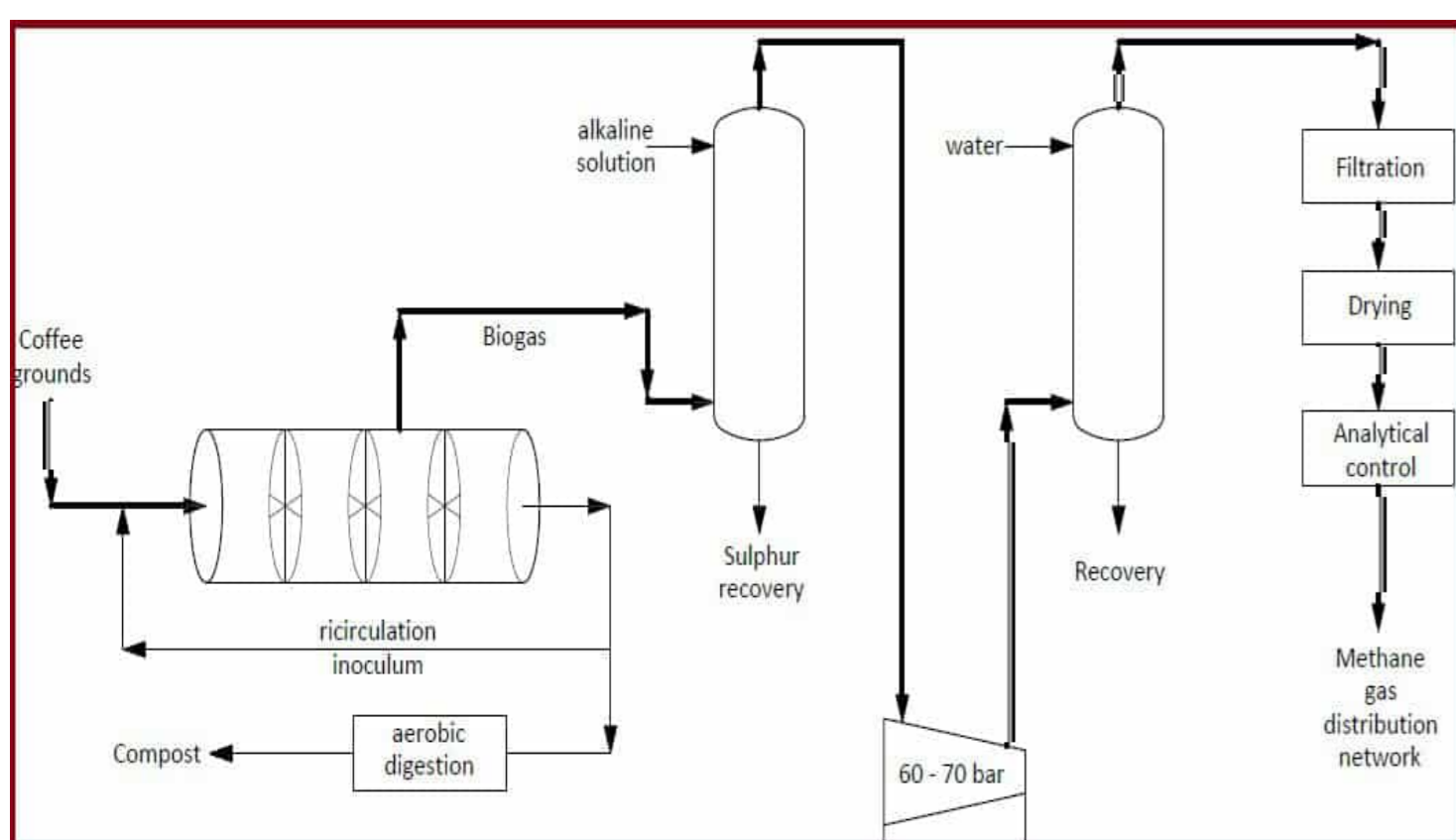


A Cup of Coffee Coffee waste as fertiliser

A simple question to the students about what happened to the coffee grounds from the School Café, triggered their curiosity to better understand how the 4Rs Rule (reduce, reuse, recycle, recovery) can be applied to this waste. After collecting coffee waste, we started with nutrients analysis and search how could be valorised and used as fertilisers and much more.



The "coffee" project involved several students in two different classes; each group studied one aspect, such as the extraction of the oils and their characterization, the use of this waste in an anaerobic digester for the production of gas and the production of pellets and their use as fuel.



Age 14-16

HUMANS vs ENVIRONMENT

Along with human growth there was an increase in the need of new places to live in, and the humanity started to consider general human activities in their own. By doing so we entered an economic growth period, which led to the development of the modern world. The world population has grown from 1 billion in 1800 to 8 billion today. This growth has led to a significant increase in the use of resources and the production of waste. We need to extract some elements used in fertilizers from organic scraps like coffee.

12 ZERO WASTE

13 CLIMATE ACTION

15 LIFE ON LAND

Coffee roasting (torrefaction process) requires fuel and can be partly covered by the combustion of the biogas produced or biodiesel obtained from the recovered oils or pellets obtained from the solid waste.

2022 October-December



SDG target 4.7: classroom lectures and debates

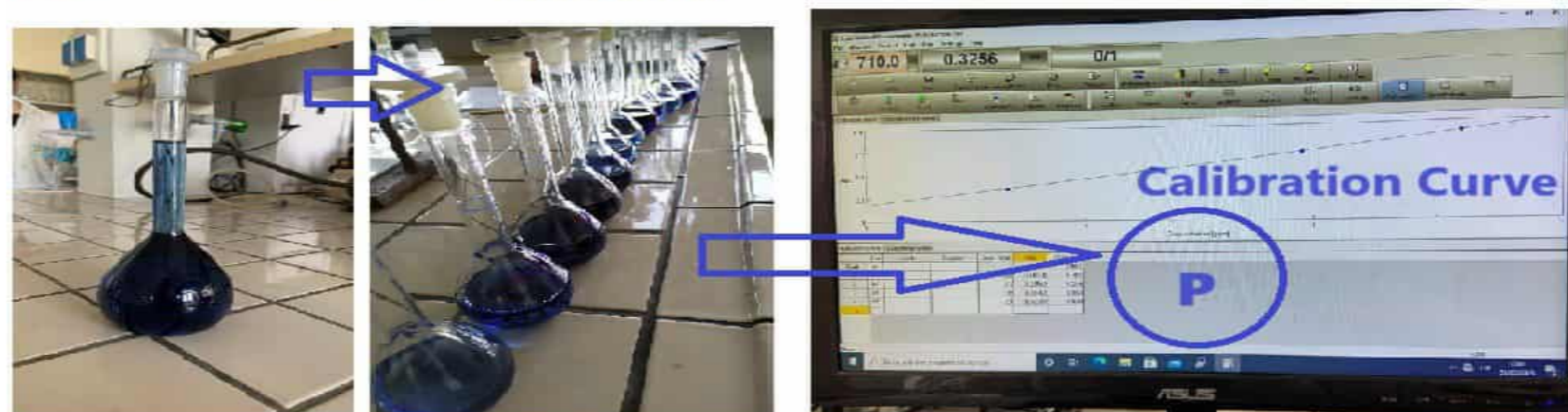
2023 January-February

Work in progress: lab work or circular economy experiment design, poster presentation and final report

2023 September




Phosphorus is a nutrient element that plays an important role in root growth and also enters as a supply in seeds and fruits



Determination of phosphorus by the molybdenum blue method

LOOK INTO SPENT COFFEE GROUNDS Nutrients

Nitrogen is useful to plants because it promotes their growth as well as their leaves

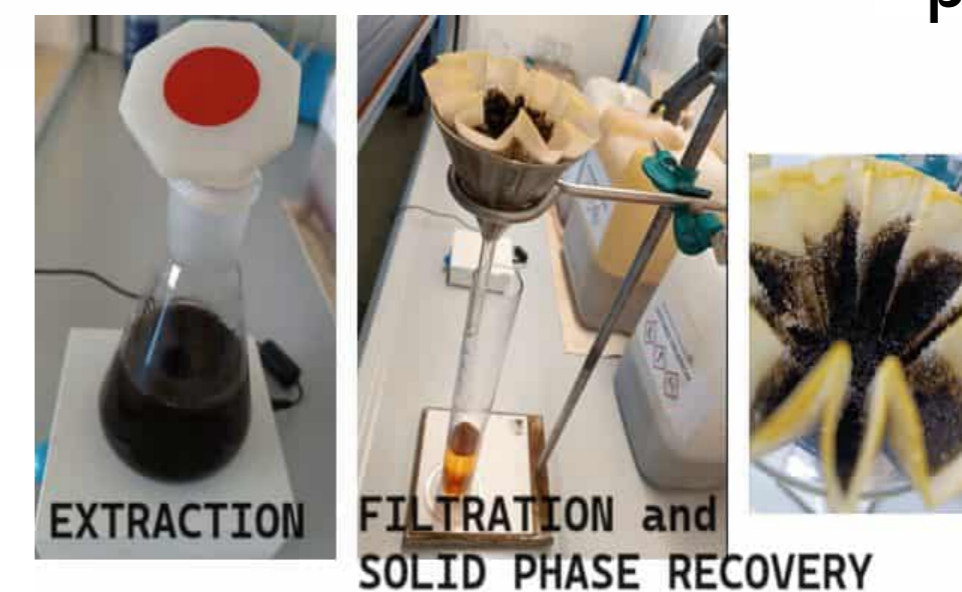
Age 14-18

7 N Nitrogen 14,0067 %N

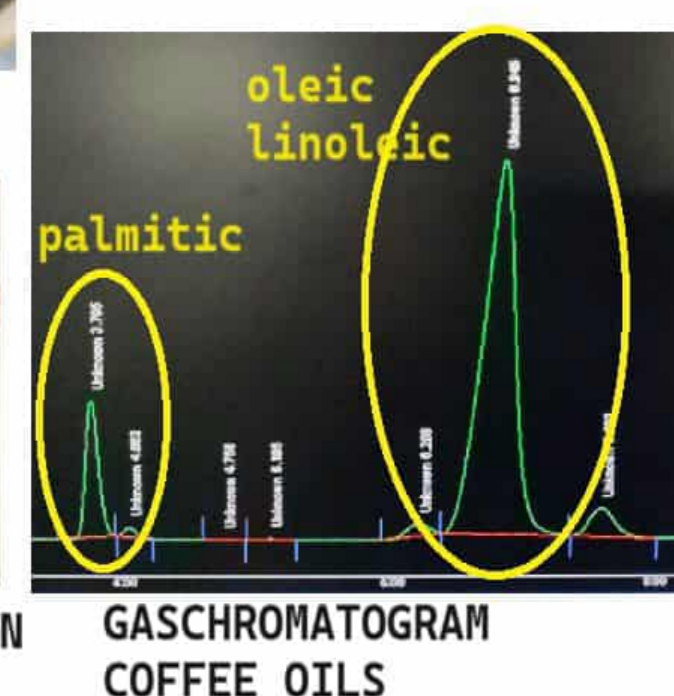
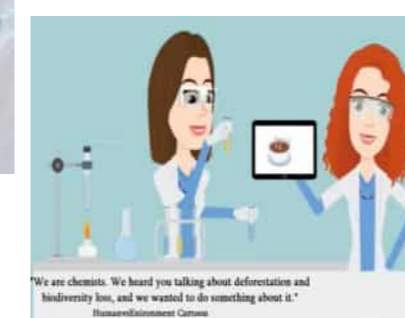
15 P Phosphorus 30,97376 %P2O5

19 K Potassium 39,0983 %K2O

Potassium regulates water exchange, sugar transport and respiratory processes



RECOVERING COFFEE OILS



Age 11-14

To explain human impact on the environment students created a sort of fairy tale for younger about how to optimise waste and the role that a young chemist has in protecting the environment.