

# Soil carbon content effect on soil nitrates

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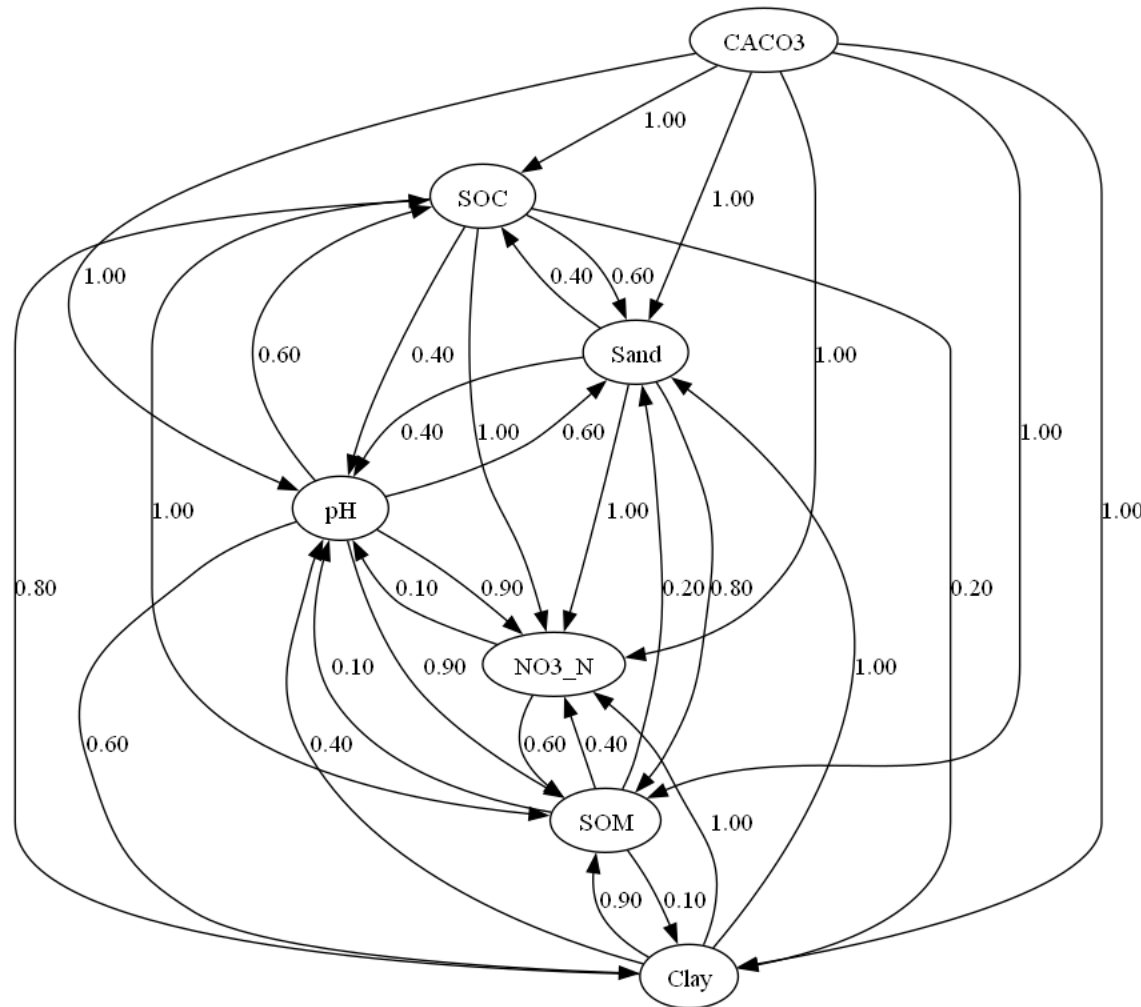
Soil and Water Resources Institute -  
Hellenic Agricultural Organization  
"DIMITRA"



## Description of the study

- 510 peach field parcels with known soil properties were matched with soil organic carbon (SOC) data taken from the worldsoil project
- For the analysis, data were limited to nitrate concentrations below 10 ppm, as there is linear relationship between nitrate levels and SOC for this range of nitrate levels.
- When nitrate levels are above 10 ppm, the expected correlation disappears. This typically occurs as excessive nitrogen application by farmers disrupts the expected association between SOC and nitrogen availability in the soil.

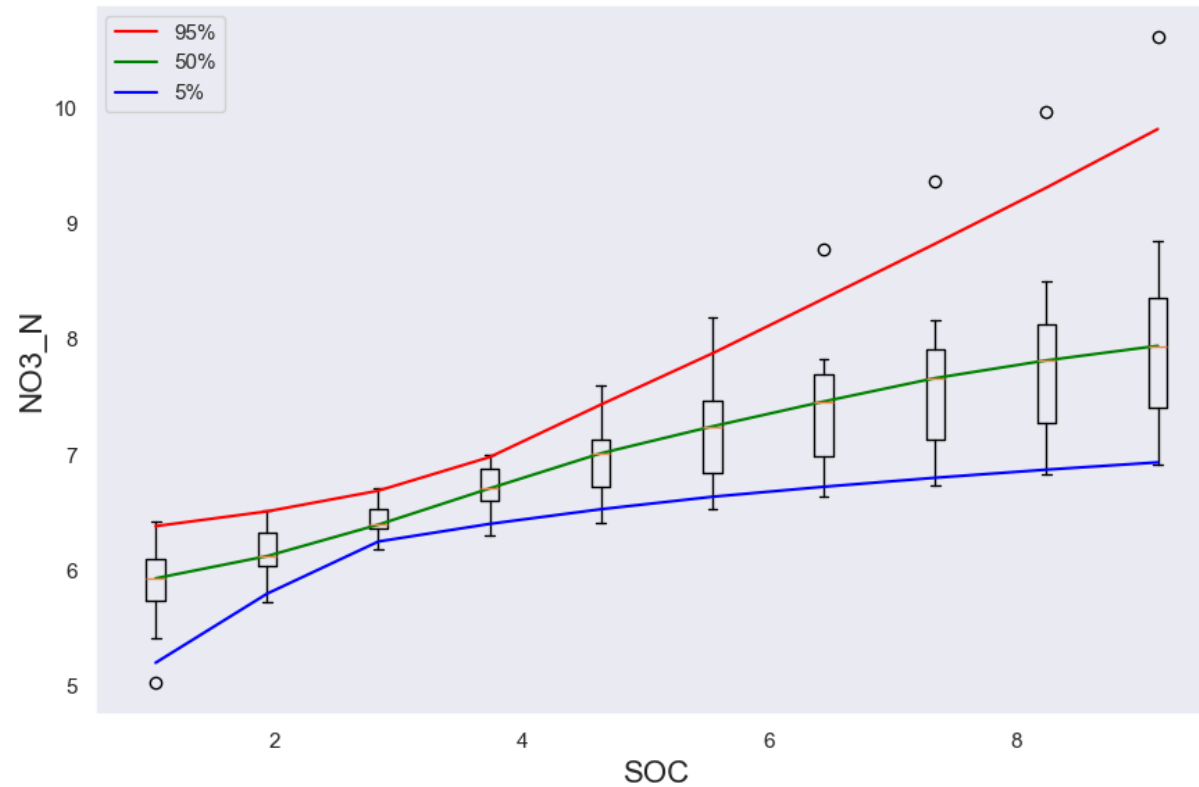
# Directed acyclic graph of soil variables and SOC



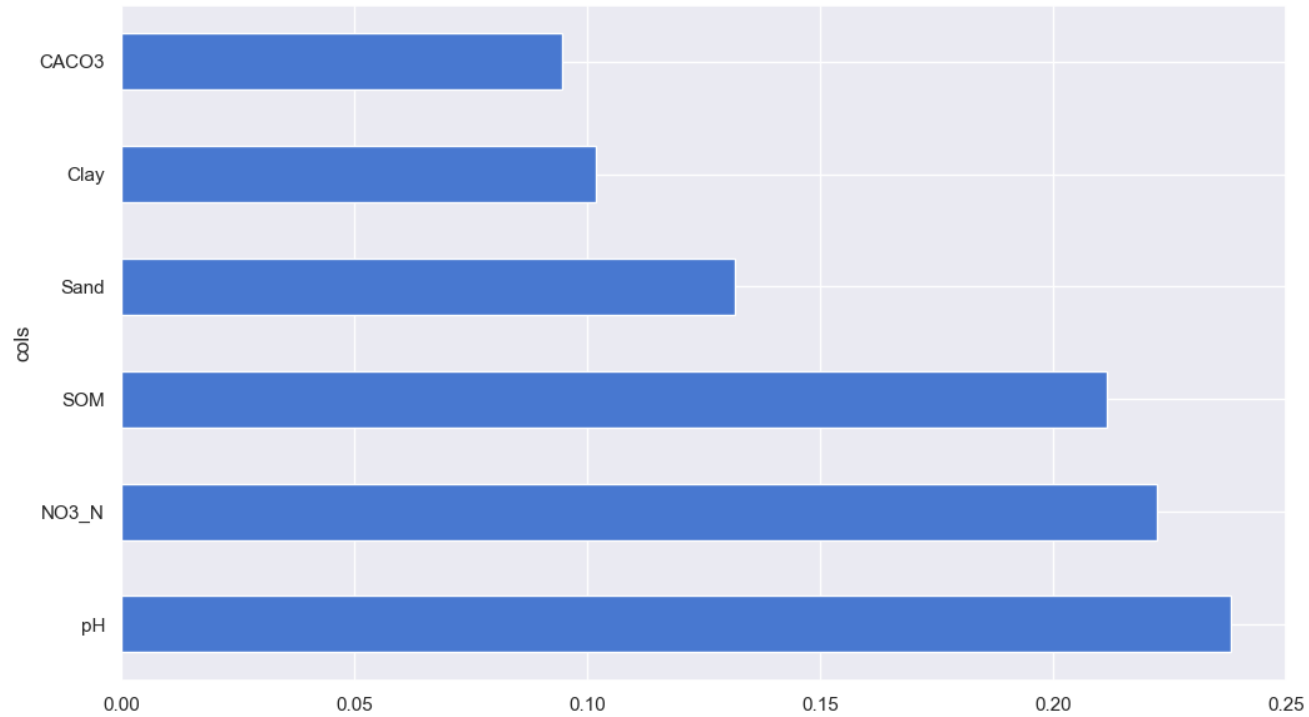
- There is a causal effect of Soil Organic Carbon (SOC) on soil nitrates which is expected
- There is a causal effect of Soil Organic Matter (SOM) on soil nitrates which is also known from the domain knowledge



# Effect of Soil Carbon Content on nitrate levels in the soil



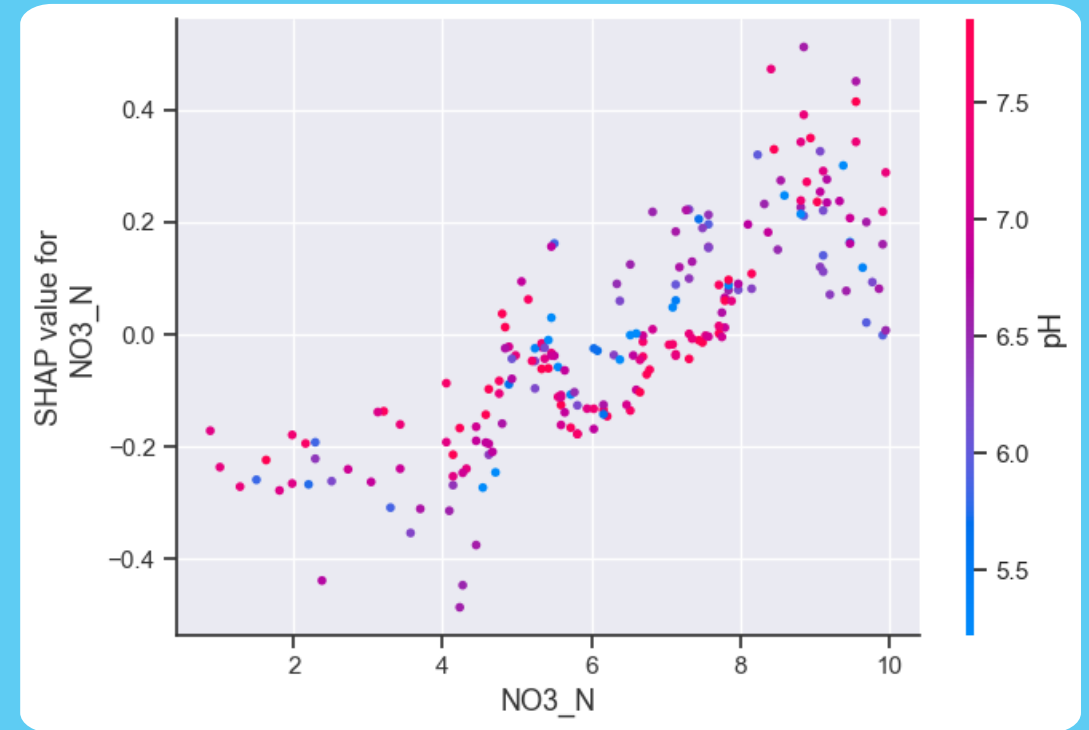
# Random forest regressor




- Relationship between soil variables and SOC
- Feature importance plot
- Mean Absolute Error = 1.1



# Shap dependence plot showing the relationship between soil nitrates and SOC



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- SOC variable should be included in a nitrogen prediction model for crops
  - However, more information needs to be included in the model (e.g. yield, crop nitrogen rates as broadcasting and topdressing, etc.)
  - As SOC correlates with soil nitrates, higher nitrogen rates should be recommended for low SOC levels



**Future work**