Is co-application of municipal sewage sludge and inorganic fertilizer on soils a double-edged sword? Trade-offs among nitrogen kinetics, carbon sequestration and greenhouse gas emissions.

Georgios Giannopoulos[1]*, Elpida Pasvadoglou[1], George Kourtidis[1], Lars Elsgaard[2], George Zanakis[3], and Ioannis Anastopoulos[4]

1 Aristotle University of Thessaloniki, School of Agriculture, Thessaloniki, Greece (george.z.giannopoulos@gmail.com)
2 Department of Agroecology - Soil Fertility, Aarhus University, Tjele, Denmark
3 Corteva Agriscience Hellas SA, Thessaloniki, Greece
4 Department of Agriculture, Kostakii Campus, University of Ioannina, Arta, Greece

* corresponding author; ggiannopoulos@gapps.auth.gr
http://ggiannopoulos.webpages.auth.gr

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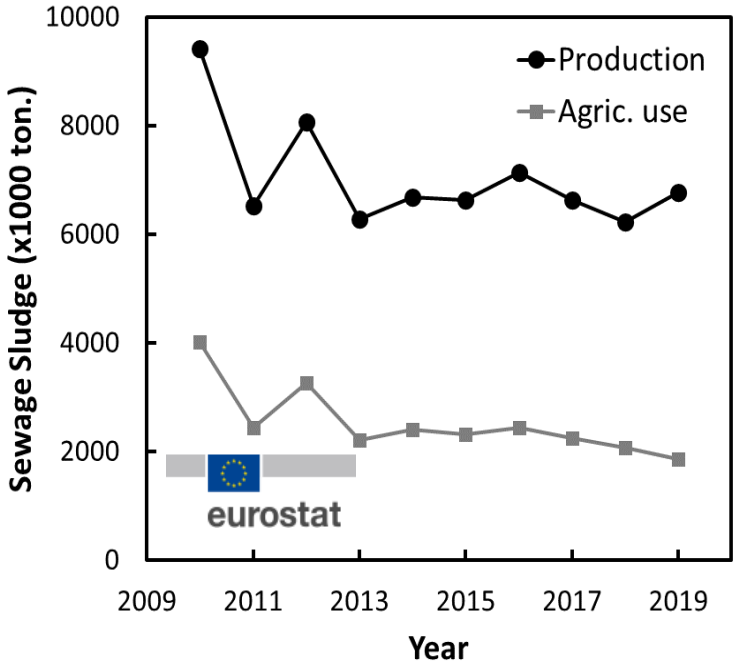
Sewage sludge is an ideal soil amendment under EU Circular Economy and EU Green Deal.



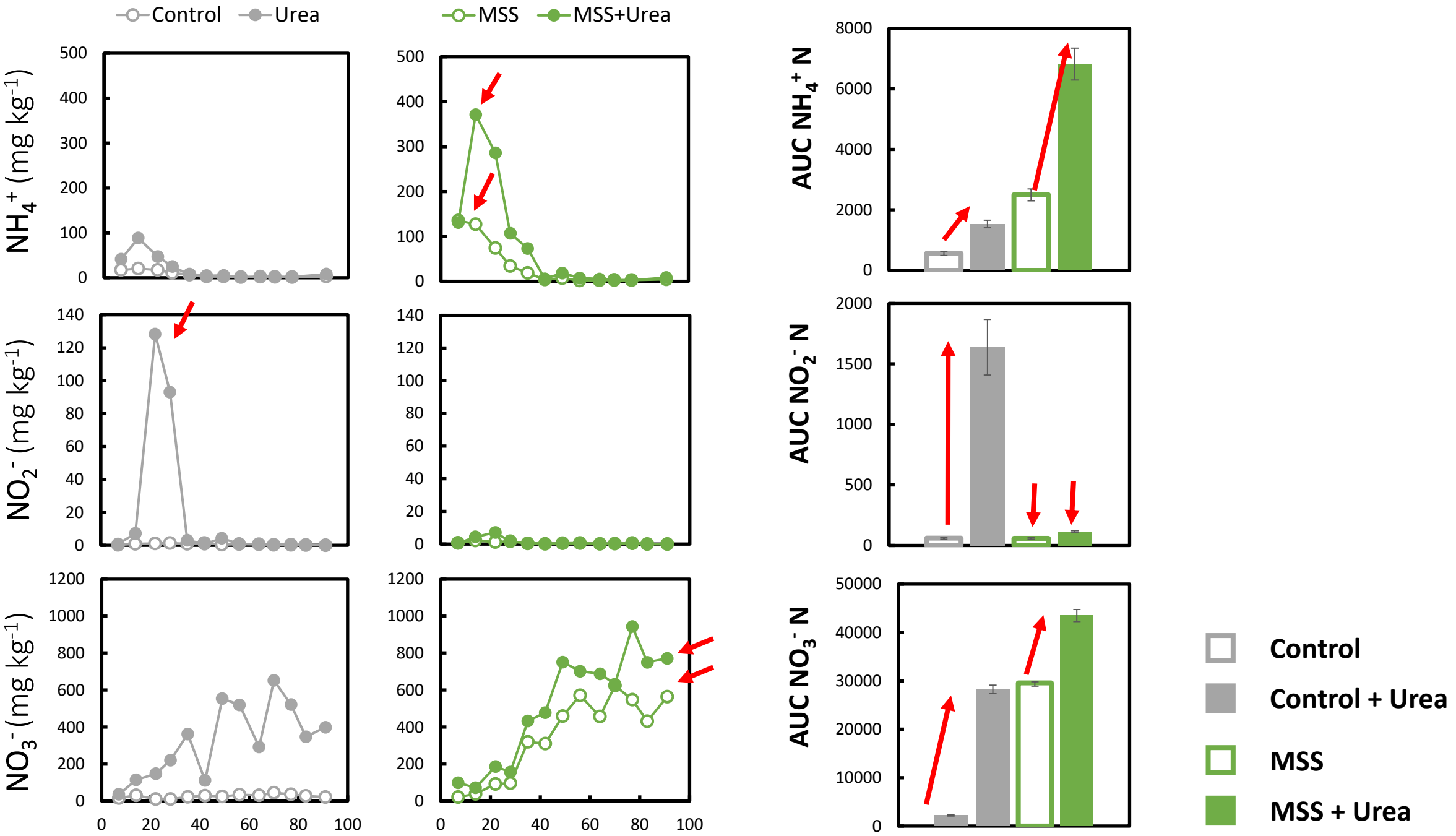
Ideal soil amendment :

- Increase soil OM
- Provide nutrients
- Reduce chemical fertilization
- 7 million ton. p.a. (EU)
- Less than 30% for agricultural use
- Majority disposed in landfills

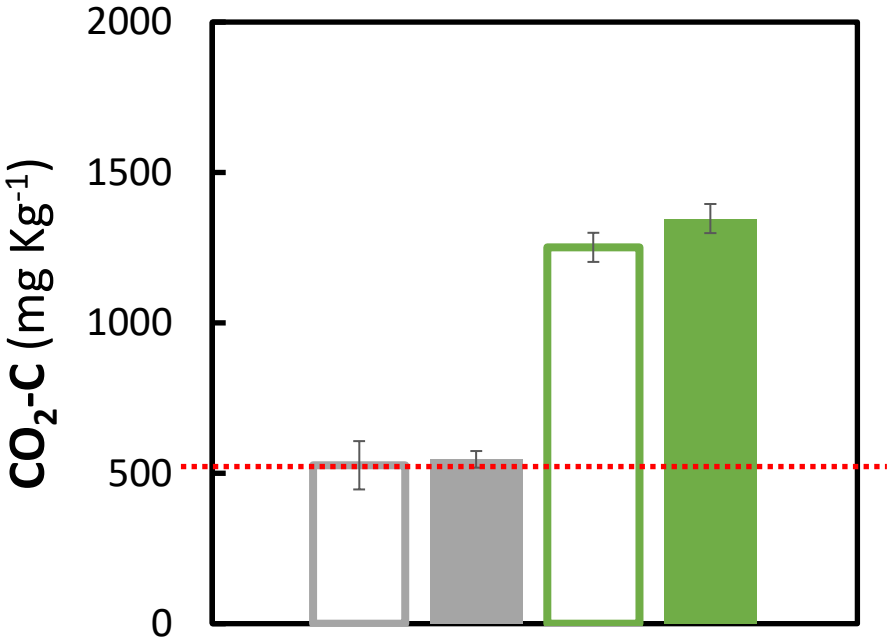
Agronomic uncertainty:

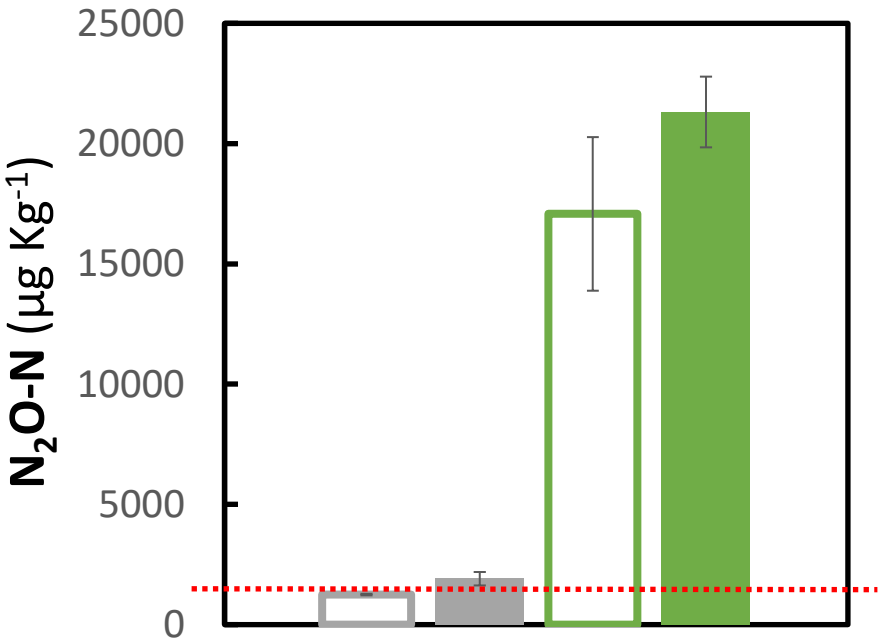
- Provide ample plant available N
- Reduce C & N footprint

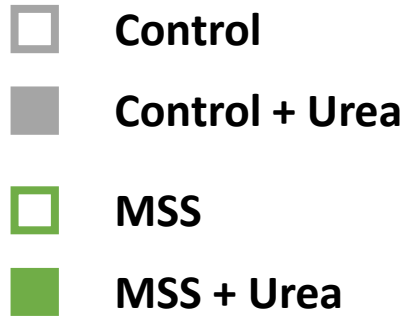
The objective of this study was to decipher N kinetics, assess GHG emissions (N_2O & CO_2) and evaluate C balance of a sandy soil amended municipal sewage sludge.


Control
Urea
MSS
MSS+Urea
NH4+ (mg kg-1)
NO2- (mg kg-1)
NO3- (mg kg-1)
AUC NH4+ N
AUC NO2- N
AUC NO3- N
Control
Control + Urea
MSS
MSS + Urea

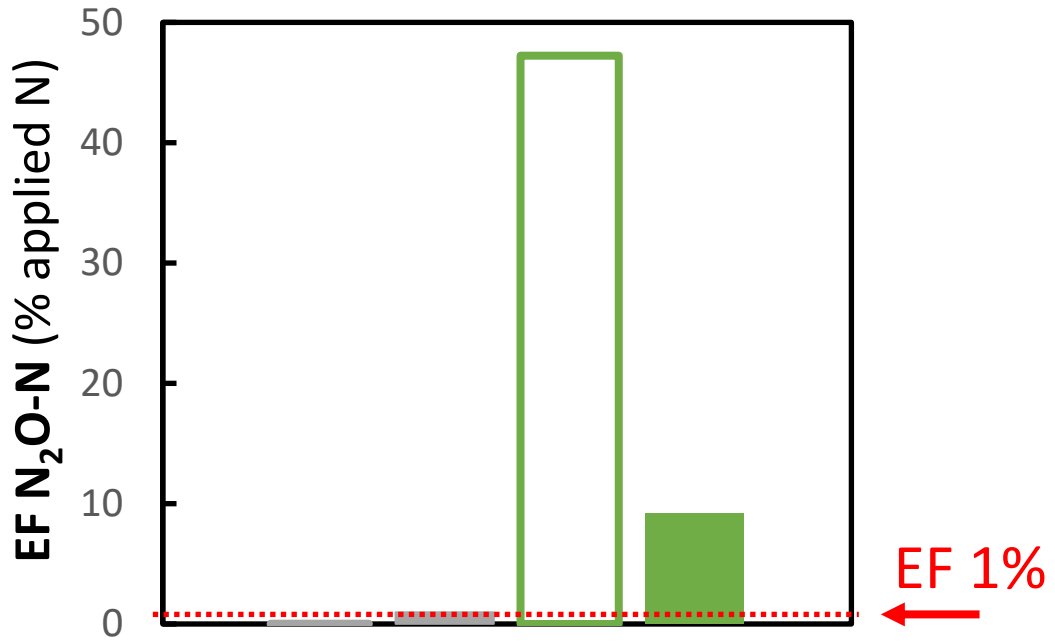
Cumulative CO_2 and N_2O emissions

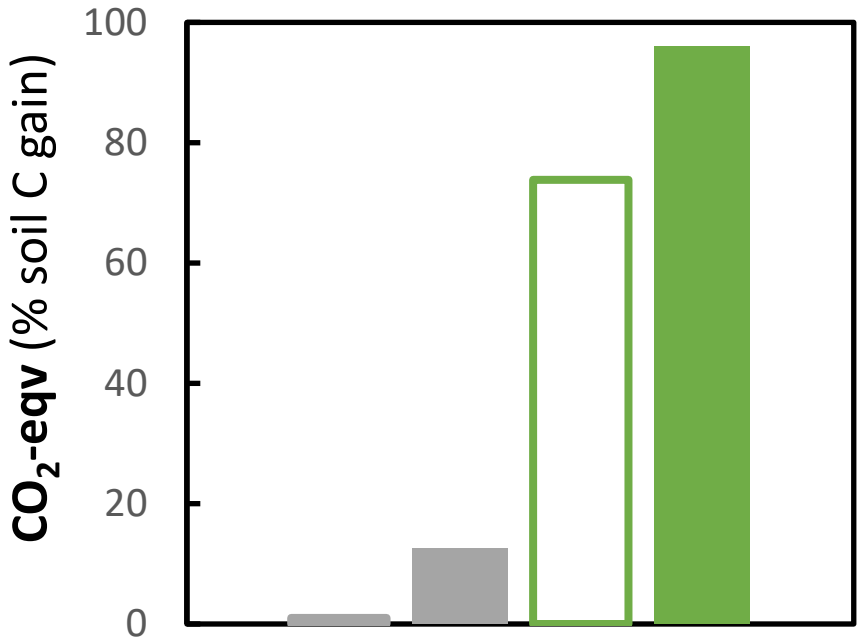






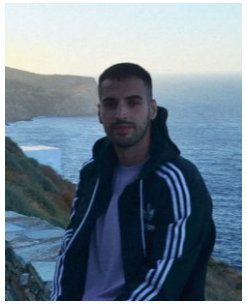
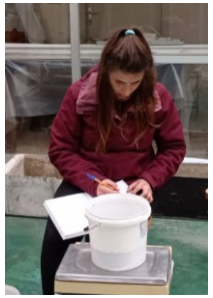
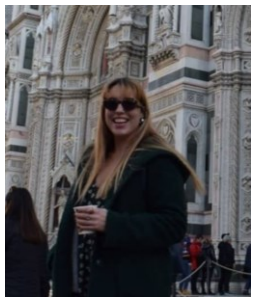
Double-edged sword?





- EF (N_2O-N % Applied N) **decreased** when Urea-N was added in MSS, however >1%
- Co-application of Urea-N **enhanced** CO_2-eqv per soil C gain in MSS
- Complete loss (96%) of organic C added in MSS+Urea as GHG (CO_2-eqv)

Thank you ;)

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Through lab and field, we'll search and find,
The N cycling processes, diverse and combined.
Microbial activity, environment, and more,
Their intertwined dance, we shall explore.

https://ggiannopoulos.webpages.auth.gr/

Nitro-Ag: Towards greater nitrogen use efficiency in agrosystems