IECPS 2024
The 3rd International Electronic Conference on Plant Sciences
15–17 January 2024 | Online

Enhancing fertility in acid Luvisol & sunflower (*Helianthus annuus* L.) yield with fly bioash application

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INTRODUCTION & AIM

Fly bioash (FBA) is a solid, complex by-product from biomass-fuelled plant facilities with specific physico-chemical and mineralogical properties. As it is very alkaline (pH>12) and contains a high concentration of nutrients, FBA emerges as a promising transformative solution for revitalizing acid nutrient-deficient agricultural soils ultimately increasing crop production yields.

This study investigated the impact of FBA application at increasing rates (0-17.2 t/ha) on chemical pedovariables and sunflower (*Helianthus annuus* L.) yield, during one vegetation season in an acidic Luvisol (pH=4.3) under open-field conditions (Ivan Dvor, Slavonia, Croatia).

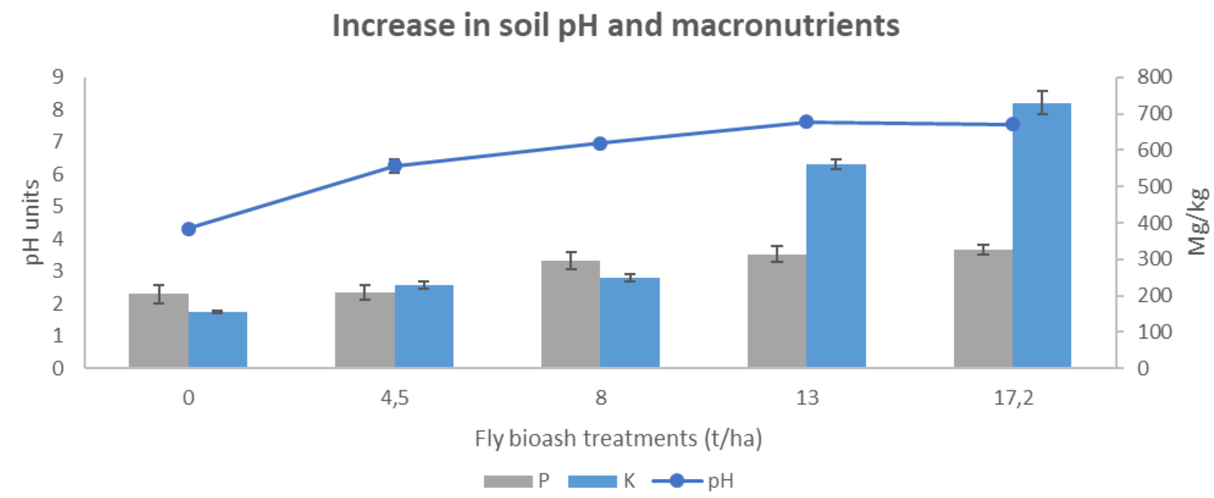
RESULTS & DISCUSSION

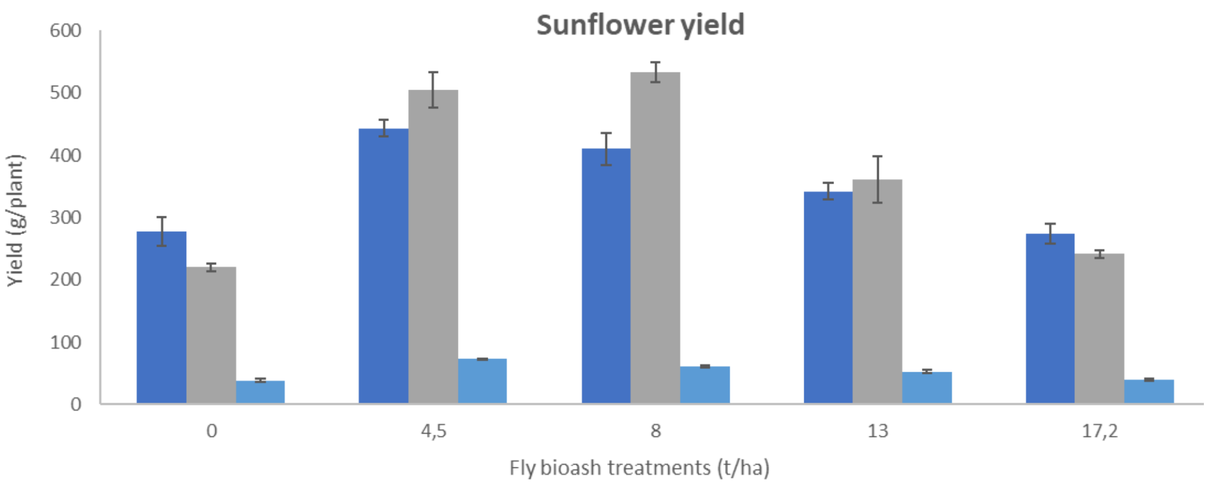
The results demonstrate a significant positive increase in soil pH (up to 7.6) and macronutrients (P up to 1.6-fold, K up to 4.8-fold, Ca up to 4.2-fold) with FBA addition. Moreover, FBA substantially enhanced sunflower grain yield (by 60%) and vegetative growth parameters, including root biomass (by 89%) and shoot biomass (by 142%), compared to unamended control soil.

METHOD

Random block design with 5 FBA treatments: 1) 0.0 t/ha, 2) 4.5 t/ha, 3) 8.0 t/ha, 4) 13.0 t/ha and 5) 17.2 t/ha in 3 repetition, total 15 experimental plots. Dimension of the experimental plot of one treatment: 6 m x 50 m.

Within each experimental plot – 4 randomly selected calculation plots from which soil (0 – 30 cm) and all plant material was sampled. From the calculation plots were obtained: composite soil sample (n=20), plant material (n=15). We determined soil pH, macro-microelements, dry yield/matter content in grain, shoot and root of sunflower.





CONCLUSION

These findings underscore the potential of FBA to ameliorate soil acidity, replenish phytonutrients, and boost both crop grain yield and vegetative growth parameters.

FUTURE WORK / REFERENCES

For sustainable FBA application, extensive long-term field experiments are crucial, evaluating additional soil variables, including physical properties and microbiome, to comprehensively address potential negative environmental impacts and ensure responsible agricultural practices.