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K-REGIO-ZENTRUM FÜR BIOLOGISCHE BEHANDLUNGS- UND RECYCLING-TECHNOLOGIEN

Wood ash as grassland nutrient source

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1. Objectives
2. Experimental design
3. Results
4. Conclusions

Objectives

- To test the suitability of wood ash as a soil nutritional supplement alone and combined with agricultural residues, and pave a sustainable way for nutrient recycling
- To investigate the effects of wood ash amendments compared to traditional soil liming, in grassland soil and hay properties
- To study the influence of wood ash on the N-Cycle

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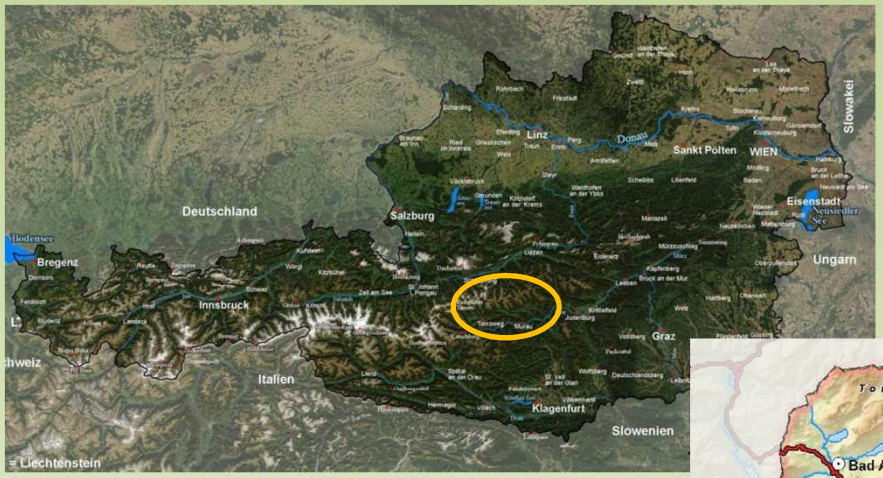
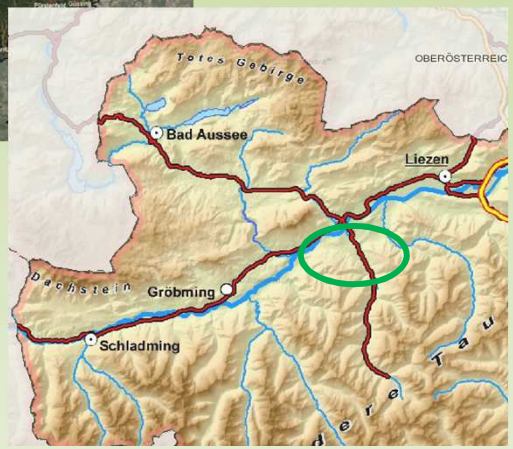
Experimental design

Field trial in Gumpenstein (Styria, Austria)



http://www.zonu.com/detail/2011-06-29-13978/Mapa-satelital-de-Austria.html



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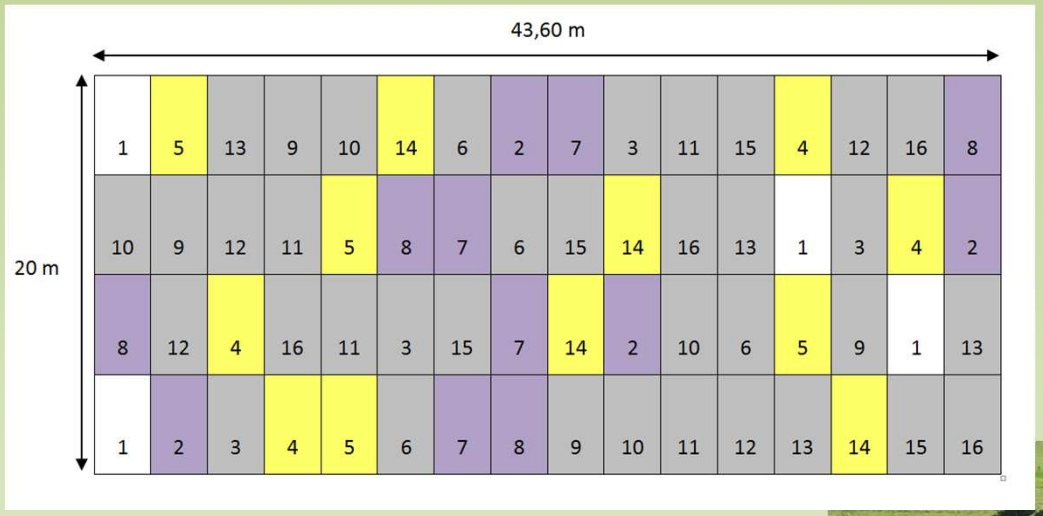


Control	Liming (CaO) + Organic fertilizer
Organic Fertilizer	Ash + Organic Fertilizer

Fertilizing Area 12.05 m^2
Clipping Area 9.16 m^2

1. Non-fertilized (Control)
2. Non-fertilized + calcium carbonate (500 kg /ha and year)
3. Non-fertilized + biomass ashes (500 kg/ha and year)
4. Compost (90 Kg N_{tot}/ha and year)
5. Cattle slurry (90 Kg N_{tot}/ha and year)
6. Cattle slurry (90 Kg N_{tot}/ha and year) + biomass ashes (500 kg/ha and year), mixed (3 applications)
7. Cattle slurry (90 Kg N_{tot}/ha and year) + calcium carbonate (500 kg/ha and year), mixed (3 applications)
8. Cattle slurry (90 Kg N_{tot}/ha and year) + calcium carbonate (500 kg/ha and year)
9. Cattle slurry (90 Kg N_{tot}/ha and year) + biomass ashes (500 kg/ha and year)
10. SANOFERT (vermiculite, wood ash, alginite, humic acids) (1000 kg/ha and year)
11. Anaerobic slurry (90 Kg N_{tot}/ha and year) + SANOFERT (vermiculite, wood ash, alginite, humic acids) (1000 kg/ha and year)
12. Biomass-ash-compost (12% Biomass ash) (90 Kg N_{tot}/ha and year)
13. FerTirol HK (biomass-ash-compost 6% Biomass ash) (90 Kg N_{tot}/ha and year)
14. Anaerobic slurry (90 Kg N_{tot}/ha and year)
15. Anaerobic slurry (90 Kg N_{tot}/ha and year) + biomass ashes (500 kg/ha and year)
16. Anaerobic slurry (90 Kg N_{tot}/ha and year) + biomass ashes mixed 500 kg/ha and year), mixed (3 applications)

500 kg/ha year

Wood ash characterisation

TOC	P tot	K tot	Ca tot	Mg tot	Cu	Zn	Cr
21500	3020	20400	152000	34200	73.1	200	154
Pb	Ni	Co	Mo	Cd	As	V	
16.3	68.9	16.7	3.3	1.3	5.4	53.8	

Values in mg/kg db

pH 12.4
EC 4.7 mS/cm

500 kg/ha year

Sampling

Once a year
(autumm)

Soil analysis:
chemical and microbiolological properties

pH, EC,
microbial biomass,
ammonium, nitrate

Three times a year

Grass analysis

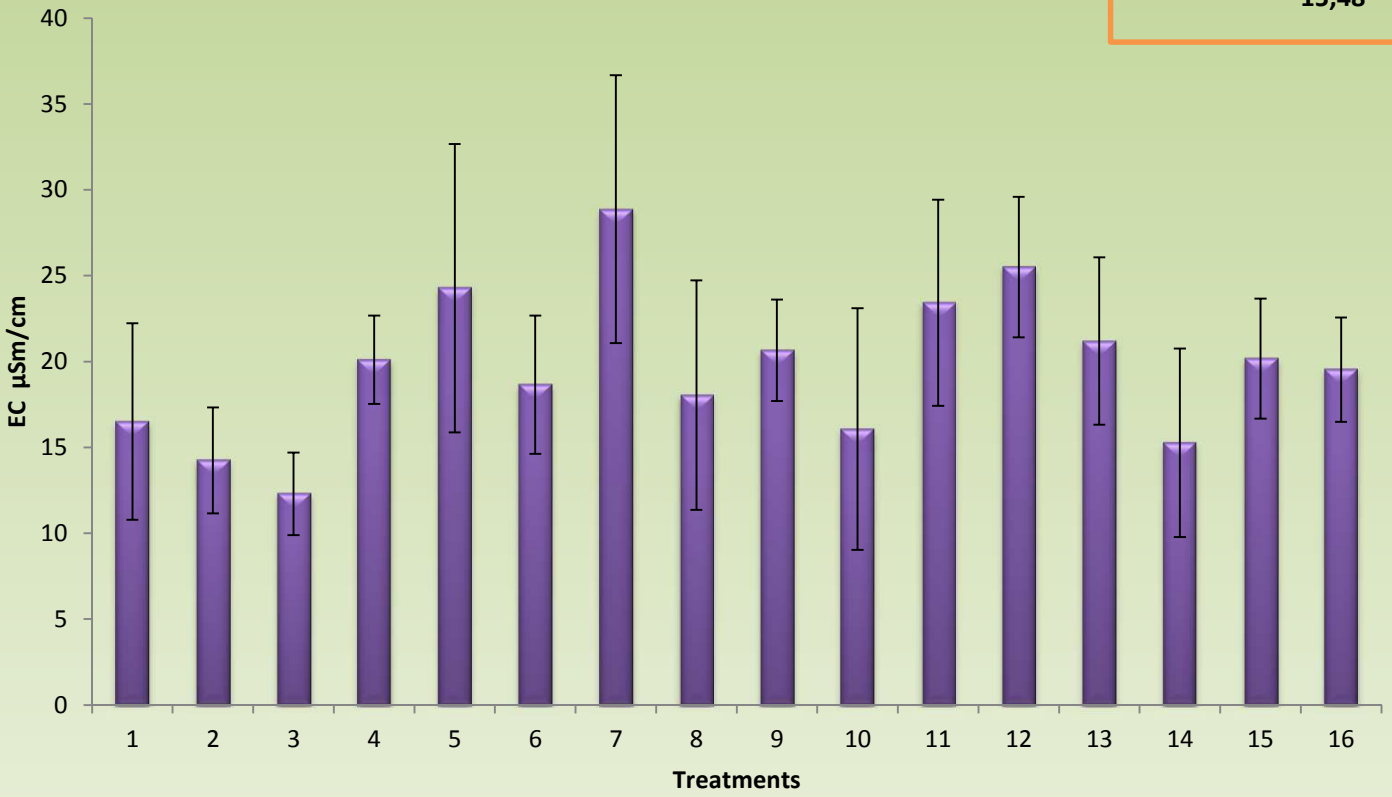
- hay quantity
- species distribution
- nutritional values: crude protein, crude fat, fiber

ANOVA

Results

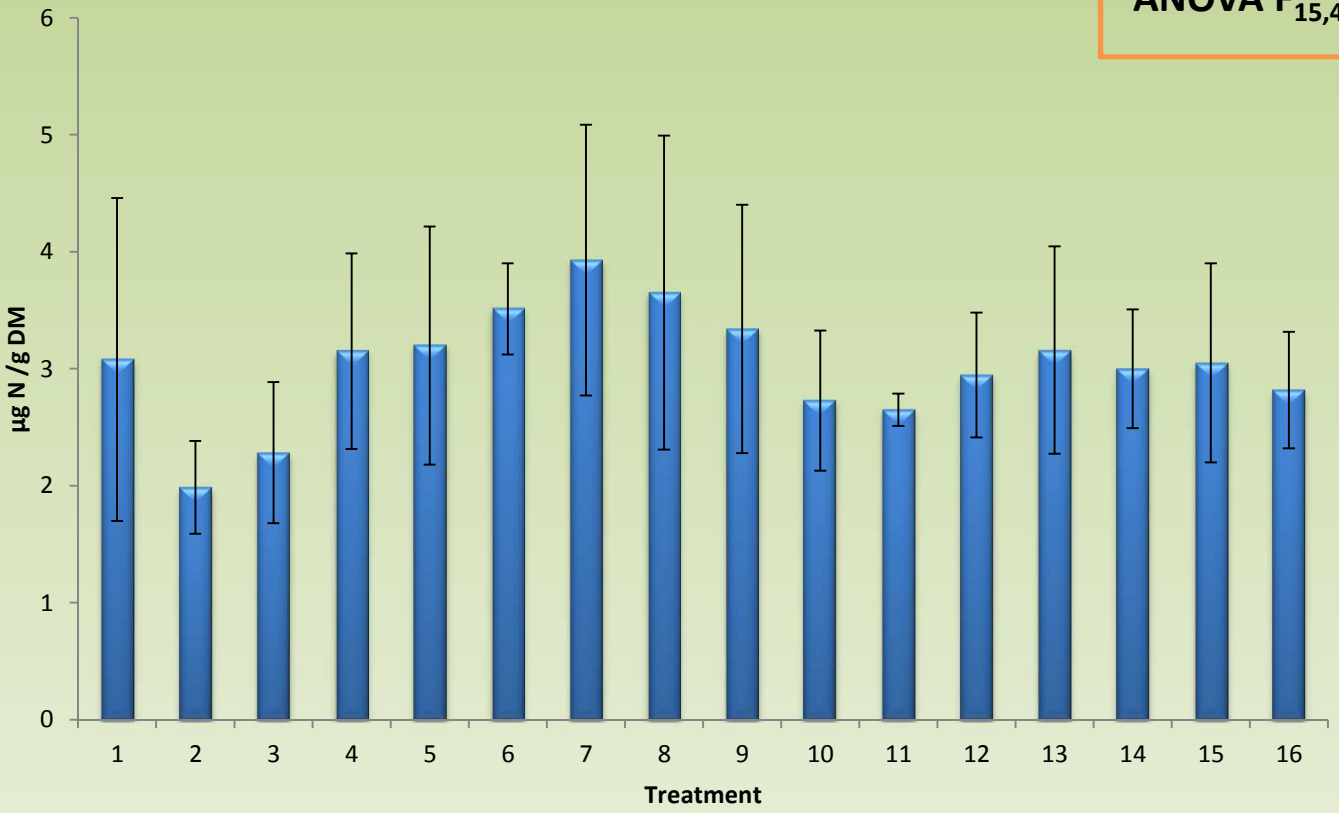
Soil salinity

ANOVA $F_{15,48}$ =2.83, P=0.0031



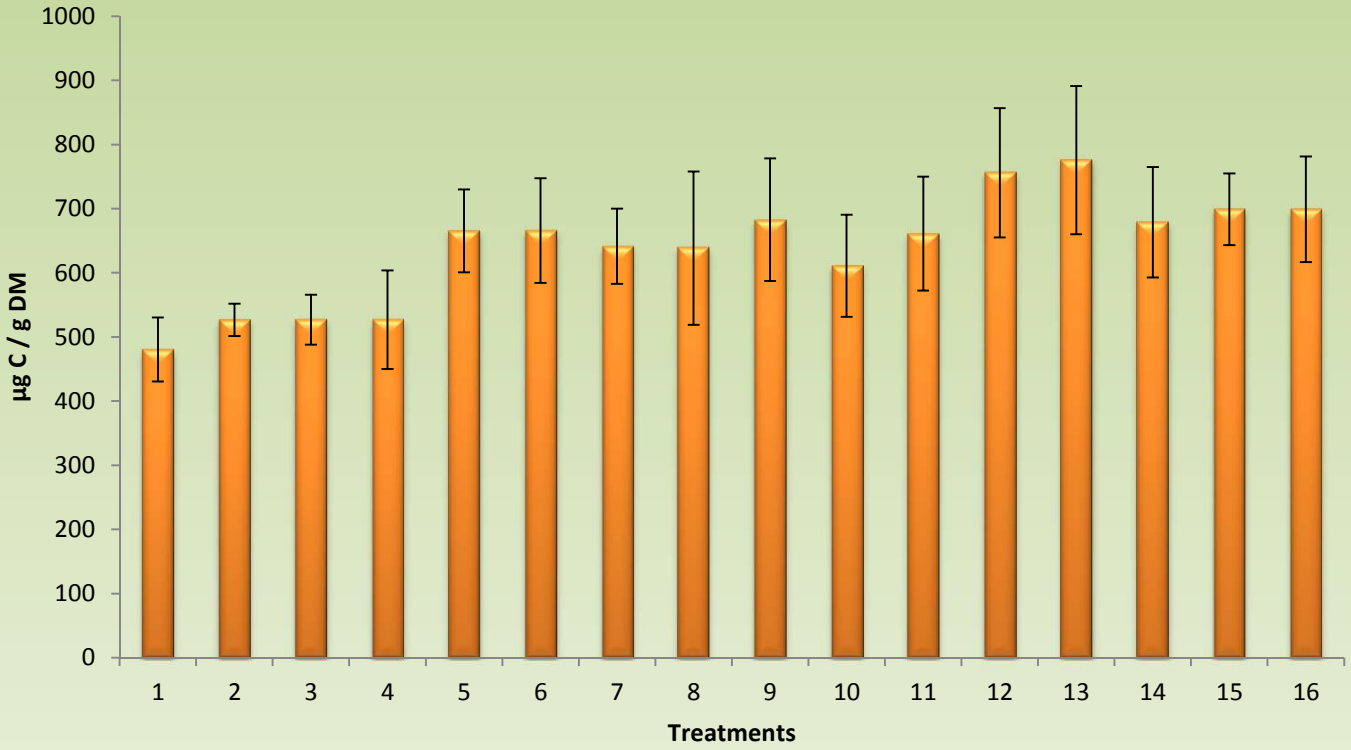
Nitrate

ANOVA $F_{15,48}$ =1.33, P=0.219

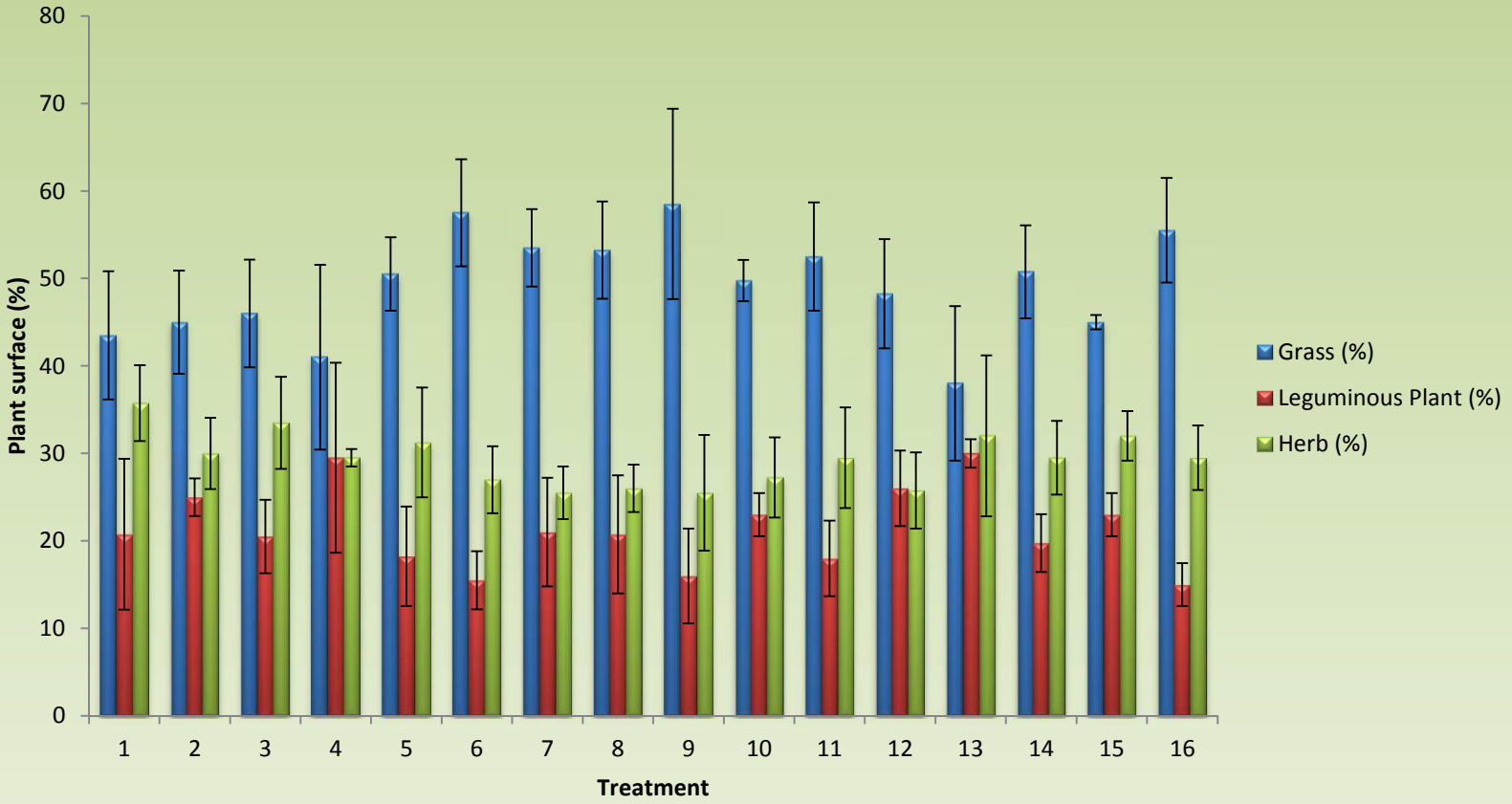


SIR (Substrate Induced Respiration)

ANOVA $F_{15,48}$ =3.58, P<0.001

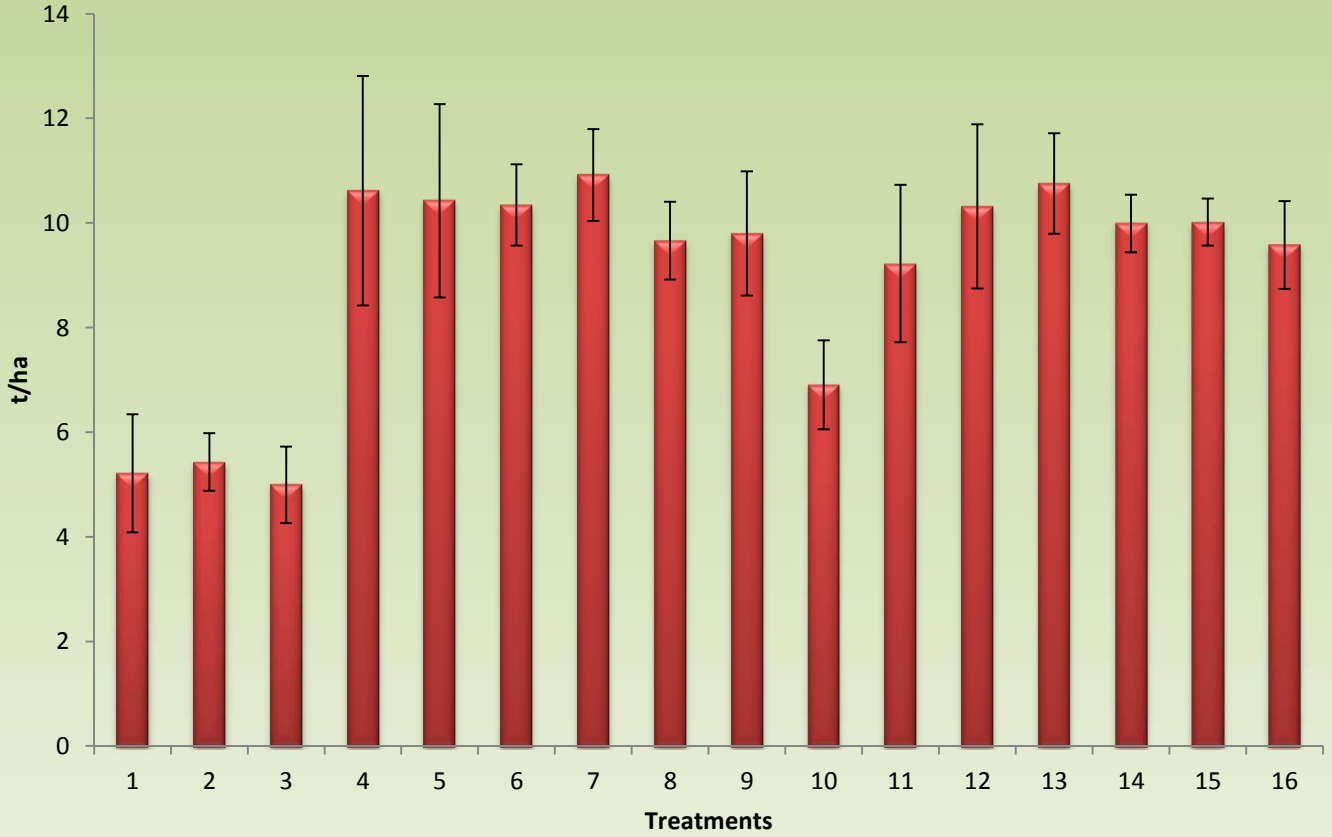


Plant distribution 3rd clipping



ANOVA $F_{15,48}$ =13.22, P<0.001

Biomass 3rd clipping



Conclusions

- Wood ash played a similar role as calcium carbonate in grassland soil properties
- Soil microbial biomass was not affected by wood ash application alone, but ws enhanced in application of wood ash and organic amendments
- Plant growth was not affected by wood ash application

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