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Enhancing Conservation agriculture through various agroforestry woody species densities and zaï technique for improved soil fertility in Burkina Faso'northern sudanian

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Enhancing Conservation agriculture through various agroforestry woody species densities and zaï technique for improved soil fertility in Burkina Faso'northern sudanian

Introduction

Land degradation as a major threat of food production in Sub-saharan africa

Mulching

Minimum tillage

Enhancing Conservation agriculture through various agroforestry woody species densities and zaï technique for improved soil fertility in Burkina Faso'northern sudanian

Introduction

Agroforestry could strengthen CA by reduction of crop residues competitions

and promoting mulching with

Vitellaria paradoxa leaves

Combretum micranthum leafy branches

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Introduction

Farmers in nord-sudanian of Burkina Faso combine zaï technique with mulching of various agroforestry aboveground biomass.

We present the combine effects of woody material mulching with zaï technique of woody and shrubby trees at different densities on soil structural, hydrodynamic properties and on soil macronutrients.

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Material and methods

Field works were conducted in two villages of the district of Guibaré (13° 06' N, 1° 36' W).

Table 1: Experimental design in farmers area

Dominante species	Low Density	Hight density	Soil type	Soil tillage
Balanites aegyptiaca	15-30 trees/ha	30-60 trees/ha	Endoplinthic lixisol	Zaï
Vitellaria paradoxa	3-12 trees/ha	12-15 trees/ha	Chromic lixisol	Zaï
Piliostigma reticulatum/Combretum micranthum	30-60 trees/ha	60-120 trees/ha	Endoplinthic lixisol	Zaï

Additionnal mulching of V. *paradoxa* leaves collected under forest in *B. aegypitiaca* an *V. paradoxa* plots

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Material and methods

Cropping system: *Sorghum bicolor* and *Vigna unguculata* intercropping

Total porosity = (Actual density- bulk density)/ Actual density

Coarse fragment ratio = (weight of coarse fragment)* 100 / total soil sample weight

Infiltration rate (Brauman and Thoumazeau, 2020)

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Material and methods

Soil analysis: Laboratoire d'étude et de recherche sur la fertilité du sol (Université Nazi BONI)

Soil chemical properties

Total N (Hillbrand et al., 1953), P (Novansky et al., 1983), K (Walinga et al., 1989

Available P (Bray I and Kurtz, 1945), K (ammonium acetate)

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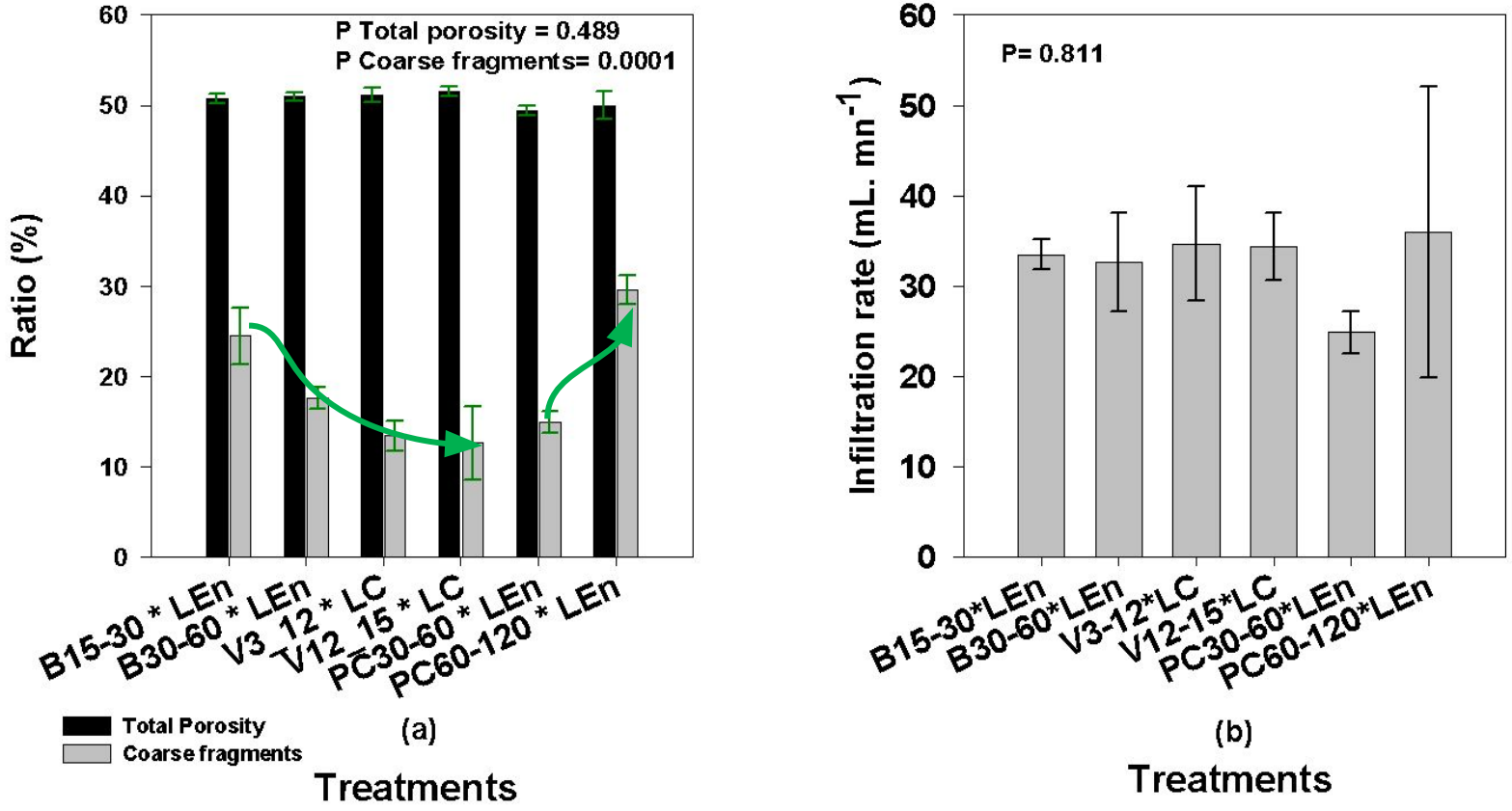
Results & Discussion



Hight content of coarse fragments in shallow shallow soil Izeki et al (2020)

Contrast in infiltration rate with Gnissien et al (2023)

Figure 1: Variation of soil physical characteristics according to the treatments

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Results & Discussion

Table 2: Variation of soil chemical characteristics according to the treatments

Treatments	Total N ($g.\ kg^{-1}$)	Total P ($mg.\ kg^{-1}$)	Total K ($mg.\ kg^{-1}$)	Available P ($mg.\ kg^{-1}$)	Available K ($mg.kg^{-1}$)
BA 15-30*LEn	0.38 ± 0.02	97.78 ± 13.04	1497.36 ± 98.60^{b}	4.67 ± 0.39^{b}	135.66 ± 12.0 ^{b}
BA 30-60* LEn	0.29 ± 0.03	91.50 ± 8.55	2153.06 ± 212.73^{a}	5.47 ± 0.53^{a}	162.29 ± 11.36^{a}
VP 3-12*LC	0.28 ± 0.05	70.19 ± 13.29	2397.73 ± 404.11^{a}	1.93 ± 0.19^{d}	99.15 ± 8.17^{c}
VP 12-15*LC	0.28 ± 0.02	105.47 ± 16.70	2534,74 ± 297.81^{a}	2.49 ± 0.16^{c}	96.19 ± 5.96^{c}
PC 30-60*LEn	0.32 ± 0.03	68.54 ± 13.29	2378.16 ± 138.06^{a}	3.25 ± 0.69^{b}	75.47 ± 4.57^{d}
PC 60-120*LEn	0.36 ± 0.05	83.81 ± 20.11	1468 ± 278.10^{b}	2.10 ± 0.23^{c}	78.43 ± 3.12^{d}
P	0.242	0.237	0.020	< 0.0001	< 0.0001

Increase of total N and P (Sitters et al., 2020)

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Conclusion & Perspective

the different shrubs and trees densities have similar effect on soil total porosity and infiltration rate of water under different soil types.

Most of soil chemical caracteristics increase with increasing density for the same species.

Value of soil chemical characteristics vary according to soil type

Assessement of aboveground woody biomass production according to different densities of woody species

Thank you for your attention!

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