



Long-term *Piliostigma reticulatum* intercropping in the Sahel: Impact of the density of shrub on sorghum yield

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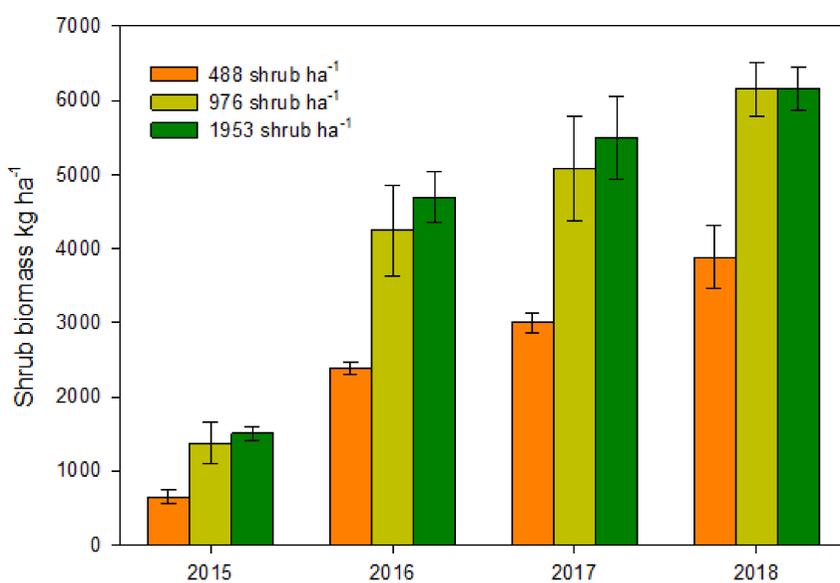
Intercropping of cereals with native evergreen woody shrubs

Continuous cropping of cereals and reduction of fallow periods contribute to soil degradation in Africa drylands, altering the soil functions and the systems' resilience.

Alternatively, appropriate intercropping of cereals with native evergreen woody shrubs is proposed as a way to restore degraded lands and, ultimately, positively impact crop yields (Lahmar et al., 2012)



The effect of the density of shrubs (*Piliostigma reticulatum*) was tested on a continuous sorghum crop (*Sorghum bicolor*)



The experimentation is located in the 2iE Campus – Kamboinsé, Burkina Faso (12°28.031'N; 1°32.929'W) including randomized block design with four replicates.

Shrubs were installed in August 2012 with different shrub densities: 0, 488, 976 and 1953 shrub ha⁻¹; Sorghum was cultivated since 2012 season. Fertilizers were provided on the sorghum crop only in the first 2 years. Each year, the shrubs were coppiced before the start of the rainy season in June, and during the cropping season. All the shrub biomass was used as soil cover of each plot where it was produced.

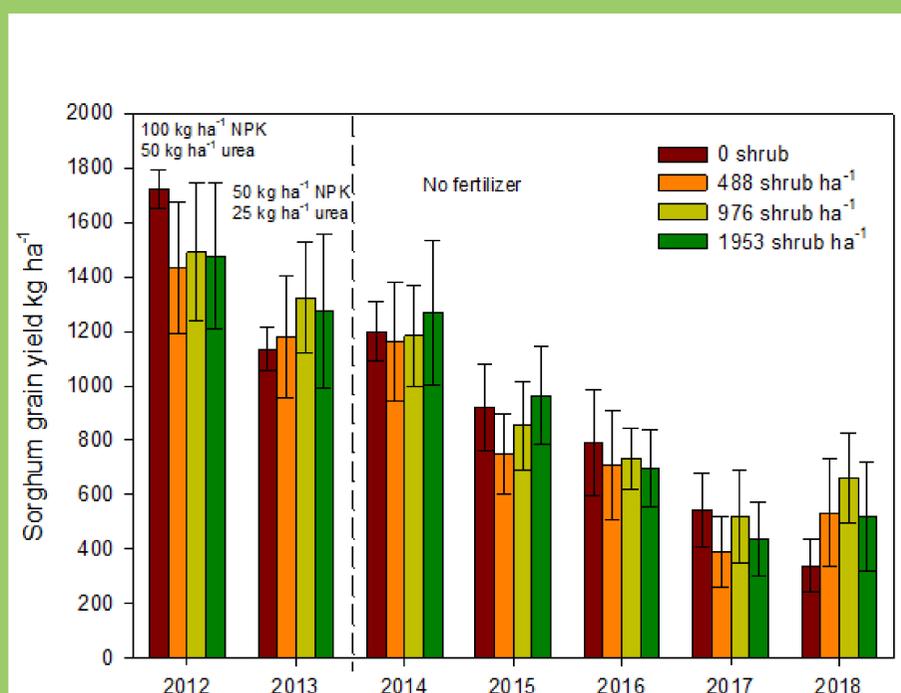
➤ ***Piliostigma* aboveground dry matter has increased during the 4 years of monitoring, reaching in 2018 a production of 6160 kg ha⁻¹ for both the highest shrub densities, and 3890 kg ha⁻¹ for the lowest density.**

After a 5-year trial, *Piliostigma* intercropping alone still do not significantly increase sorghum yield

- Further researches combining *Piliostigma* with other sources of nutrient would need to be tested. For example in 2018 we started to study the effect of adding cowpea (*Vigna unguiculata* L. Walp) to the intercropping of shrub with sorghum.
- Another consideration is the time required to achieve measurable benefits. It was observed that it took more than 4 years to obtain consistently increased yields when shifting to an optimized *Piliostigma* system (Bright et al., 2017).

This experiment is the support for various studies on hydrology of soil and on nutrient cycling (LeapAgri “Ramses II” project, CGIAR Research Program “Grain Legumes and Dryland Cereals”).

➤ **Sorghum grain yields declined progressively since 2014 when we stopped using fertilizers, and for all treatments.**



Reference

Bright et al., 2017. Agric. Ecosyst. Environ. 242, 9–22. doi:10.1016/j.agee.2017.03.007

Lahmar et al., 2012. F. Crop. Res. 132, 158–167. doi:10.1016/j.fcr.2011.09.013