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## Nitrogen Fixation and Balance in Burned Versus Mulched *Mucuna pruriens* Var. *utilis* and *Pueraria phaseoloides* Relay Maize Cropping Systems

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### Abstract

The cover crops *Mucuna pruriens* var. *utilis* and *Pueraria phaseoloides* are gaining importance in annual sole maize cropping and horticultural systems in the humid forest zone of West and Central Africa. Their contribution to the N balance of a sole maize relay cropping system was estimated. Over four consecutive years (1998 to 2001), amounts of N in 8–9 months old aboveground *M. pruriens*, *P. phaseoloides* and natural fallow biomass and litter were determined. In all years fallow biomass was either burned or retained as mulch and a sole maize crop was grown. Maize aboveground N-accumulation and N-export with grain was determined. The amount of N<sub>2</sub>-fixed was estimated with the N difference method. In 1998, 1999, and 2000, nitrogen content in biomass of *M. pruriens* and *P. phaseoloides* fallow was higher than in natural fallow. In 2000 and 2001 fallow biomass in previously burned plots contained less N than when biomass had been retained. There was no fallow-type × biomass management interaction. Maize N uptake was higher in the biomass burned treatments in 1998, yet thereafter higher in the biomass retained treatments. Fallow type had only in 1999 an effect with highest maize N uptake in the *P. phaseoloides* system, followed by the *M. pruriens* system and the natural regrowth. The estimated amounts of N<sub>2</sub>-fixed were higher in the *P. phaseoloides* system; biomass management had no effect. Nitrogen export with maize grain was highest in the *P. phaseoloides* system, followed by the *M. pruriens* system; biomass management had no effect across years. Nitrogen uptake into the aboveground maize biomass and N export with grains was balanced by the amount of N in fallow biomass and litter in all systems where biomass was retained. The amount of N<sub>2</sub>-fixed did not balance the amount taken up by the maize. In the *M. pruriens* system the N exported with grains was not balanced by N<sub>2</sub>-fixation. Only the *P. phaseoloides* system had a positive balance of N export in grain versus the amount of N<sub>2</sub>-fixed.

**Keywords:** Cameroon, cover crop, maize, *Mucuna pruriens*, N balance, *Pueraria phaseoloides*, symbiotic N fixation, Ultisol