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Optimal Herbicide Application Rate for *Pueraria Fallow* Recalculation: Effects on Vine Growth, Soil Cover and Weed Suppression

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Abstract

Demographic growth in combination with increased prices of food imports demand an increased output of local agricultural systems in the humid forest zone of Cameroon. Leguminous fallow systems based on *Pueraria phaseoloides* (tropical kudzu) are a promising technology to intensify land use in the traditional slash and burn fallow systems by speeding up fertility restoration in the fallow period. Reclaiming the fallowed land by direct planting into an undisturbed mulch layer is labour efficient and has other advantages, including prolonged arable weed suppression and soil erosion protection. Herbicide treatment could be an appropriate technology to control *P. phaseoloides* in commercial food crop fields where labour is scarce. However, the dosage of herbicide needs to be balanced between effectively delaying recovery of *P. phaseoloides* without killing the cover crop. Objective of this study was to find the optimal pre-planting herbicide application rate reducing early competition for resources and crop damage caused by climbing vines, but avoiding the loss of benefits of in-situ mulch production. An experiment was set up in a 3-year-old *P. phaseoloides* dominated fallow where soil cover and vine growth were monitored after Glyphosate was applied at a rate of 0, 360, 720, 1440 and 2880 g ha⁻¹. None of the treatments was lethal. *P. phaseoloides* climbing activities were effectively delayed for 29 days by the 720 and 1440 g ha⁻¹ treatments followed by a 81 days delay by the 2880 g ha⁻¹ treatment. The 360 g ha⁻¹ treatment did not postpone *P. phaseoloides* regrowth compared to the control although it reduced the initial growth rate considerably. Weed cover was low in all treatments resulting in no significant difference over all treatments in weed biomass at 123 days after treatment. Interestingly, also the dry weight of litter layer did not show differences over the treatments, suggesting that *in-situ* litter production in the control treatment may have been compensated by a higher decomposition rate under the standing crop. Overall, these results show the potential of a single herbicide application of 720 g ha⁻¹ to create a closed semi-live mulch layer suitable for direct planting of maize crops with zero pre-planting labour requirements.

Keywords: Glyphosate, improved fallow, kudzu, pueraria