The parasitic weed *Striga hermonthica* is one of the major threats to food security in Sub-Saharan Africa affecting about 100 million people, including many farmers in western Kenya. Conventional control methods (hand pulling, trap crops) alone have not been successful. Alternatively, biocontrol agents show promise to control *Striga*. The putative, soil-borne mycoherbicide, *Fusarium oxysporum* f.sp. *strigae* (Foxy 2) has been shown to be an effective and specific biocontrol for *Striga.* Previous greenhouse experiments at University of Hohenheim confirmed Foxy 2 to be pathogenic to *Striga*, but not to maize when applied through seed coating. However, for its application in the field, it is important to assess if the biocontrol agent, which primarily acts in the rhizosphere of its host plant, induces undesired side-effects on maize root-associated soil microbial populations that regulate crucial processes underlying soil fertility, plant nutrition and thus crop yield. The objective of this proposed PhD study is to evaluate the effects of Foxy 2 in maize-based agro-ecosystems in Kenya on beneficial microbial communities associated with the maize rhizosphere and on processes mediated by these. Rhizosphere microbial communities interacting with Foxy 2 versus untreated controls will be monitored under controlled greenhouse and field conditions through the application of innovative molecular techniques. Effects on microbial communities particularly involved in nitrogen cycling, including proteolysis and nitrification, will be assessed by measuring the abundance and diversity of relevant functional genes. To evaluate the effects of season, soil, and climate, three rhizosphere samplings will be done in contrasting agro-ecological zones and data analysis will be conducted using multivariate statistics. This PhD study will essentially contribute to a better understanding of the effects of Foxy 2 on non-target soil microbial communities which is important information in promoting this environmentally friendly biocontrol technology as a crucial contribution to food security in the study area.