ABSTRACT

Striga hermonthica weed is the most widespread and noxious species that parasitises many economically important cereal crops including maize (*Zea mays* L.) in sub-Saharan Africa. *Striga* is also called witchweed in the family Orobanchaceae. *Fusarium oxysporum* f. sp. *Strigae* is a fungus of the genus *Fusarium* that causes fusarium wilt disease on *S. hermonthica.* Most control methods against *Striga*; chemicals, cultural and resistant maize are expensive, ineffective and toxic to environment hence need for a locally available, cheaper and environmentally friendly biocontrol method. Despite the existence of various control methods, the weed infestation continues to persist causing low yields in maize in Siaya County leading to poverty and hunger. There remains exigent unanswered questions regarding efficacy of local *Fusarium oxysporum* strains on *Striga* weed control and their effects on agronomic properties of maize in Siaya County. No research has been tested under field conditions on response of local strains of *Fusarium* on *Striga* infestation for local maize and to reveal their effects on growth and yield of maize in Siaya County. The purpose of this study was to determine the efficacy of five *Fusarium oxysporum* strains in controlling *Striga* weed to improve maize productivity in Siaya County. The objectives were to determine the efficacy of five pathogenic *Fusarium* strains on *Striga* infesting maize fields and to determine the effects of *Fusarium* strains infection on *Striga* on growth and yield of maize grown in Siaya County during the long and short rain seasons of 2013. Five different *Fusarium oxysporum* (FK) strains were coated on the seeds of susceptible local cultivar of Kenyan maize; "Rachar" before planting in three farm sites and a parallel control where the maize seeds were planted without *Fusarium* strain treatment, which was also replicated in the three farm sites. A complete randomized block design was used where three replications were used at each site. Data was collected between week 4 to 10 on *Striga* emergence, counting 15 cm radius around tagged maize plants and infection rates; as a percent of infected *Striga*, maize plant height (cm) from base height to youngest leaf apex, number of leaves; counting number of all leaves per tagged maize plant. Stover, cob weights (g) and grain yield (ton ha^{-1}) were determined at week 14. Statistical analysis was carried out using SAS 9.1 software using ANOVA at $P \leq 0.05$. Significant means were separated by Fishers $LSD_{(0.05)}$. The soil characteristics of the three sites varied based on geological coverage. All local *Fusarium oxysporum* (FK) strains significantly decreased *Striga* emergence ($P \leq 0.05$) to a mean of 3.7 for FK3 and a mean of 4.8 for FK5 strain. FK5 had the highest *Striga* infection rate ($P \leq 0.05$) at 77.4%, FK3 had 61.3% both at Sagam site short rain season while the lowest rates were Bar Olengo sites with FK4 at 14.2% and FK2 at 12.7% during the long rain season. There was significant higher cob weight ($P \leq 0.05$) and yield ($P \leq 0.05$) in FK3 and FK5 strains at Sagam site during the short rain season with control having the least cob weight and yield. FK1 and FK2 strains had the least effects on *Striga* emergence, cob weight ($P \leq 0.05$) and grain yield ($P \leq 0.05$) while FK5 and FK3 strains had highest pathogenicity in all sites hence are good candidates for adoption based on their performance by farmers in Siaya County to improve maize yield. The significant difference in *Striga* emmergence and infection rates were due to efficacy of FK strains to control *Striga* emmergence and hence effective infection, more so by performance of FK3 and FK5 strains, therefore most recommended strains for adoption by farmers in Siaya County. The non significant differences in maize performance were attributed to microclimatic and edaphic factors; these factors could be due to erratic rains (Appendix 2), high acidic soils with $pH < 5.5$; a minimum requirement for maize growth conditions (Appendix 3) leading to low plant height, stover and cob weights and grain yield due to unavailable minerals for maize growth. Sagam had higher rainfall contributing to better yield. Future studies should focus on monitoring of edaphic and climatic conditions to elucidate the non significant differences among the *Fusarium* strains in maize agronomic properties and integration of FK strains with other methods of control for more effective *Striga* control in Siaya County.