ABSTRACT

Although Kenya is among the leading common bean producers and consumers worldwide, the crop still faces several challenges including root rot disease. The disease is caused by several soil borne pathogenic fungi and oomycetes. The pathogens include: *Fusarium*, *Macrophomina*, *Pythium* and *Rhizoctonia* spp. Bean root rot disease can cause yield loss of up to 75 %. The farmers face several challenges in managing the disease through use of cultural practices, fungicides, and tolerant varieties. Cultural practices are less effective and use of fungicides is expensive to majority of small-scale farmers, and detrimental to the environment. Breeding for root rot disease resistance is hampered by the diversity of the disease pathogens. Seeking alternative, effective and environmentally friendly strategies to manage the disease is urgently needed. Use of vermicompost is one of such promising methods. However, there is little information on prevalence of bean root rot disease and utilization of vermicomposts for the disease management in bean production in Kenya. The objective of this study was to determine the prevalence and severity of bean root rot in different agroecological zones in Tharaka Nithi County, characterize the pathogens that were isolated from diseased bean plants, and ascertain the control potential of cattle manure vermicompost against the root rot pathogens. A descriptive survey design was used to assess prevalence and severity of the disease in different bean growing agro-ecological zones of Tharaka-Nithi County, Kenya. Disease severity was assessed based on the number and size of the lesions on the roots and hypocotyls and then scored using a scale of 0-4. A factorial experiment, laid out in a complete randomized design was used to determine the effect of cattle manure vermicompost on the bean root rot pathogen isolates in pot experiments under greenhouse conditions. For isolation, culturing and identification of the root rot pathogens, 94 symptomatic bean plants were collected from the 378 randomly selected farms in the study area. The diseased plant samples were transported to the laboratory for isolation, culturing and characterization. Data on the disease prevalence and severity was subjected to one-way analysis of variance using Statistical Analysis Software (SAS) version 9.4 to determine if there was a significant difference in prevalence and severity between different agro-ecological zones. Analysis of variance was also used to determine if there is significant effect of cattle manure vermicompost on bean root rot pathogens in the greenhouse pot experiments. The Least Significant Difference was used for separation of significant means at $\alpha = 0.05$. The study showed that bean root rot disease was prevalent in all bean growing agro-ecological zones in Tharaka Nithi County, Kenya. However, root rot disease prevalence and severity, varied significantly ($p < 0.05$) across the agroecological zones. Morphological characterisation of the root rot isolates revealed that the disease was caused by *Fusarium* spp., *Pythium* spp., *Rhizoctonia* spp and *Macrophomina* spp. *Fusarium* spp had the highest (57.2 %) prevalence and severity index (38.4 %) in upper midland 3 agroecological zone. Also, the study showed that cattle manure vermicompost significantly reduced severity of bean root rot disease in greenhouse pot experiments ($p < 0.05$). Maximum suppression effect of root rot disease (lowest severity index between 0 to 3.3) was observed at 40 % of vermicompost. Also at 40 % of vermicompost amendment the plant had maximum growth (plant height between 59.6 to 67.3 cm) and the highest number of pods (31.24 to 34.22). Therefore, cattle manure vermicompost should be used for management of root rot and increasing yields in bean production. The findings of this study provide useful information on prevalence, severity of bean root rot disease and its potential management through use of cattle manure vermicompost.