SCREENING OF SELECTED BAMBARA NUT (*Vigna subterranea* (L.) Verde)
LANDRACES FOR TOLERANCE TO *Fusarium* WILT AND ITS MANAGEMENT USING
FARMYARD MANURE IN BUSIA COUNTY, WESTERN KENYA

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A Thesis Submitted to the Graduate School in Partial Fulfilment of the Requirements for
the award of Master of Science degree in Plant Pathology of Egerton University

EGERTON UNIVERSITY

November, 2016
DECLARATION AND RECOMMENDATION

DECLARATION

This thesis is my original work and has not been previously presented in this University or any other institution for the award of any degree.

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RECOMMENDATION

This thesis has been submitted with our approval as supervisors according to Egerton University regulations.

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DEDICATION

This thesis is dedicated to my mother Margaret Nanjekho
ACKNOWLEDGEMENT

I thank the Almighty God for granting me the strength and good health during the entire period of the study. My acknowledgement also goes to Egerton University administration for giving me the chance to study at the institution. The work would not have been possible without the help and guidance of my academic supervisors; Prof. I.M. Tabu and Prof. D.O. Otaye; who encouraged and stood by me when things seemed not to be working; I am greatly indebted to them. The continued support and facilitation of my field work by Dr. Victor Wasike is highly appreciated. The technical assistance of Mr. F. Ngumbu from Department of Biological Sciences of Egerton University, for his help in pathogen isolation and identification, is highly appreciated. The author is also grateful to the director Kenya Agricultural and Livestock Research Organization-Alupe station for providing the research site. Besides, the prayers and encouragement from my sisters, friends and relatives is greatly appreciated.
ABSTRACT

Bambara nut (Vigna subterranea (L.) Verdc.) is an indigenous legume crop in Kenya. Fusarium oxysporum f.sp voandzeia is a destructive fungal pathogen affecting Bambara nut in Kenya. An experiment was carried out in the green house and field to determine the incidence and severity of Fusarium wilt on local landraces and evaluate its management using goat farm yard manure (FYM). The field experiment was carried out in Busia County, where four villages (Bufisi, Bukati, Madola and Butunyi) were used to determine Fusarium wilt distribution in farmers’ fields. A completely randomized design (CRD) experiment was conducted in the greenhouse at Egerton University to determine disease incidence and severity. The landraces used included black, red, maroon, maroon speckled, brown light eyed and brown dark eyed. The Fusarium wilt management experiment laid out in a completely randomized block design (CRBD) was conducted in the greenhouse and in the field in Busia County. The black and red landraces of bambara nut were used in the study. The data were subjected to analysis of variance using statistical analysis system (SAS) software version 9 and treatment means separated using least significant different test (LSD). Fusarium wilt incidence ranged from 14.63 to 43.56% and varied with village. Bufisi, Butunyi and Bukati had the highest disease incidences while Madola had the lowest disease incidence. Incidence and severity of Fusarium wilt were significantly different and varied with landrace. There was no tolerant landrace. The maroon speckled and brown dark eyed landraces had the highest disease incidence of 80.5% and 80.0%. The brown light eyed, maroon, black and red landraces had incidences of 79.5%, 78.9%, 78.6% and 76.2% respectively. The maroon and brown dark eyed landraces had the highest disease severity of 45.5% and 44.3% respectively. The red, maroon speckled, black and brown light eyed landraces had severities of 43.5%, 43.1%, 42.8% and 42.6% respectively. The area under disease progress curve (AUDPC) varied with landrace i.e. maroon and brown dark eyed landraces had the highest while the brown light eyed landrace had the least AUDPC. In the greenhouse, FYM reduced the disease incidence and severity by 10.2% and 9.5% for the black landrace compared to 1.9% and 12.8% for the red landrace. In the field, FYM reduced disease incidence and severity by 9.1% and 6.9% for the black landrace compared to 10.4% and 10.4% for the red landrace. FYM had the lowest AUDPC irrespective of the landrace. The study confirmed the virulence of the
pathogen on Bambara nut and the ability to manage the disease using FYM for improved yield performances.

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<tr>
<td>AUDPC</td>
<td>Area Under Disease Progress Curve</td>
</tr>
<tr>
<td>CRD</td>
<td>Completely Randomized Design</td>
</tr>
<tr>
<td>CRBD</td>
<td>Completely Randomized Block Design</td>
</tr>
<tr>
<td>DSI</td>
<td>Disease Severity Index</td>
</tr>
<tr>
<td>FYM</td>
<td>Farm Yard Manure</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>ILRI</td>
<td>International Livestock Research Institute</td>
</tr>
<tr>
<td>IFAD</td>
<td>International Fund for Agricultural Development</td>
</tr>
<tr>
<td>KALRO</td>
<td>Kenya Agricultural Livestock and Research Org.</td>
</tr>
<tr>
<td>LSD</td>
<td>Least Significant Difference</td>
</tr>
<tr>
<td>PDA</td>
<td>Potato Dextrose Agar</td>
</tr>
<tr>
<td>PDI</td>
<td>Percentage Disease Incidence</td>
</tr>
<tr>
<td>PROTA</td>
<td>Plant Resources of Tropical Africa</td>
</tr>
<tr>
<td>SAS</td>
<td>Statistical Analysis System</td>
</tr>
<tr>
<td>SFM</td>
<td>Soil Fertility Management</td>
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