

Supplementary Material

Supplementary Tables

Supplementary Table S1. Soil characteristics and sorghum cropping systems in different agro-ecological zones of lower eastern Kenya

Agro-ecological zone	Counties/Locations	Soil characteristics	Cropping system
UM3/UM4	Machakos: Kithimani, Mua and Mumbuni north; Makueni: Mbooni; Kitui: Kitui township	Good drainage, Moderately deep to deep, dark- reddish brown to yellowish brown, firm, many areas with topsoil characterized by sandy-loam to sandy and sandy-clay to clay; on slopes, orthic on flat interfluves Ferralic ARENOSOLS (low humus, subsurface clay accumulation, variable pH, moderate to low CEC) Ferralo-chromic/orthic LUVISOLS ($\geq 0.2\%$ organic matter, high CEC of 1 M NH ₄ OAc at pH 7.0 and 50-100CM base saturation) ACRISOLS (acidic with pH less than 4.5 on the top soil, top soil dominated by Aluminium ions, sub soil with pH ranging 4.5 to 5.5. base saturation of less than 50% in 1M NH ₄ OAc at pH 7.0, Kaolinitic clay-rich subsoil)	Intercropping of maize or sorghum and cow pea, green gram or pigeon pea multiple cropping, Ratooning of sorghum
UM4	Machakos: Muvuti/Kiima-Kimwe; Makueni: Wote, Kathonzweni	Good drainage, good depth, dark red, friable clay, sandy-loam to sandy-clay, chronic acrisols to medium textured ferralic arehosols and mostly Ferralo-chromic acrisols Ferralo-chromic/orthic/ferric ACRISOLS (low humus, subsurface clay accumulation, variable pH, moderate to low CEC) LUVISOLS ($\geq 0.2\%$ organic matter, high CEC of 1 M NH ₄ OAc at pH 7.0 and 50-100CM base saturation) FERRALSOLS (low soil organic matter, pH >4.0, low CEC due to variable charged Kaolinitic and Fe/Al-oxides)	Intercropping of maize or sorghum and cow pea, green gram or pigeon pea multiple cropping (sorghum, millet, and maize together with legumes), Ratooning of sorghum
LM3/LM4	Makueni: Kithungo/Kitundu, Kiima Kiu/Kalanzoni; Makueni: Waita;	Varies from good drainage, imperfectly to poorly drained, grey to black, very firm, moderately calcareous, sodic, cracking clay with deeper saline subsoil, saline sodic with pellic vertisols.	Intercropping of maize and legumes such as cow pea, green gram or pigeon pea multiple cropping,

	<p>Kitui: Nzambani, Kyanwithya East</p>	<p>Ferralic ARENOSOLS (low humus, subsurface clay accumulation, variable pH, moderate to low CEC)</p> <p>Ferralsol-chromic/orthic LUVISOLS ($\geq 0.2\%$ organic matter, high CEC of 1 M NH₄OAc at pH 7.0 and 50-100CM base saturation)</p> <p>ACRISOLS (acidic with pH less than 4.5 on the top soil, top soil dominated by Aluminium ions, sub soil with pH ranging 4.5 to 5.5. base saturation of less than 50% in 1M NH₄OAc at pH 7.0, Kaolinitic clay-rich subsoil)</p>	<p>Ratooning of sorghum</p>
LM4	<p>Machakos: Muthesya and Ndalani; Makueni: Makindu; Kitui: Kyethani/Kiomo, Matuu and Masinga central</p>	<p>Good to poor drainage, varied depth, brown, friable, slightly calcareous, friable sandy clay to clay, clay loam to sandy loam and eutric FLUVISOLS in places with saline-sodic and deeper subsoil and patches of pellic vertisols</p> <p>LUVISOLS ($\geq 0.2\%$ organic matter, high CEC of 1 M NH₄OAc at pH 7.0 and 50-100CM base saturation)</p> <p>Rhodic and orthic FERRALSOLS (low soil organic matter, pH >4.0, low CEC due to variable charged Kaolinitic and Fe/Al-oxides)</p>	<p>Intercropping of sorghum and cow pea, green gram or pigeon pea, multiple cropping, Ratooning of sorghum</p>
LM5	<p>Machakos: Kivaa; Makueni: Mavindini; Kitui: Mutomo, Ikanga/Kyatune, Ikutha</p>	<p>Good to imperfectly drainage, moderately to shallow in (low soil organic matter, pH >4.0, low CEC due to variable charged Kaolinitic and Fe/Al-oxides depth, deep red, yellowish to brown, friable to firm, compact clay.</p> <p>Chronic LUVISOLS to partly lithic phase LUVISOLS ($\geq 0.2\%$ organic matter, high CEC of 1 M NH₄OAc at pH 7.0 and 50-100CM base saturation)</p> <p>On flat interfluvies: Orthic and xanthic FERRALSOLS (low soil organic matter, pH >4.0, low CEC due to variable charged Kaolinitic and Fe/Al-oxides)</p>	<p>Intercropping of sorghum and cow pea, green gram or pigeon pea multiple cropping, Ratooning of sorghum</p>

Supplementary Table S2. Management practices used by farmers to manage fungal diseases in lower eastern Kenya

Methods for management of fungal diseases in sorghum	Proportion of farmers using control methods (%)	Effectiveness of control methods (%)			
		Very effective	Partly effective	Not effective	damaging
Fungicide	13	10	67	20	3
Crop rotation	15	1	33	64	2
Rouging off	16	1	16	50	33
Traditional methods	23	0	27	58	15
Don't manage the disease	33	-	-	-	-

Traditional methods (dusting plants with ash & burning tobacco leaves)

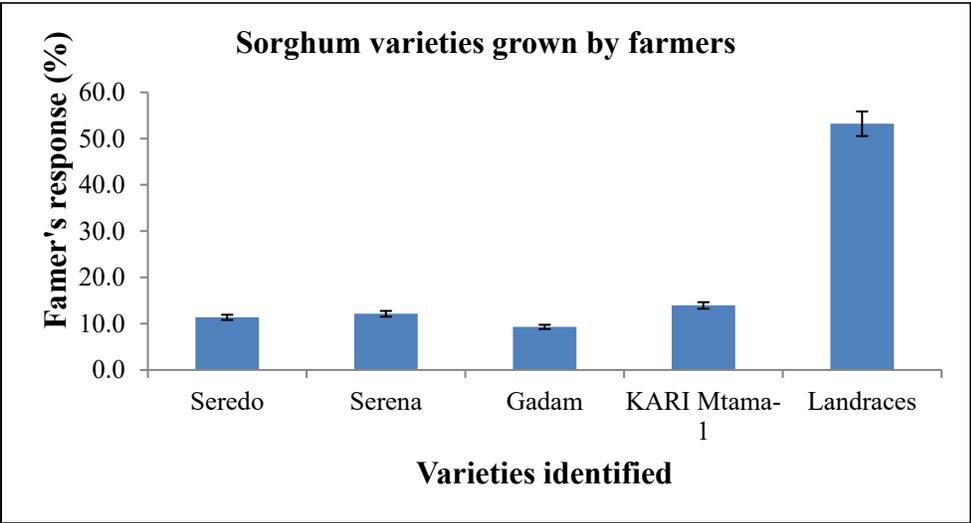
Fungicide effectiveness. $\chi^2 = 386.798$, $df = 3$, Fisher's Exact Sig. 0.000

Crop rotation effectiveness. $\chi^2 = 406.540$, $df = 3$, Fisher's Exact Sig. 0.001

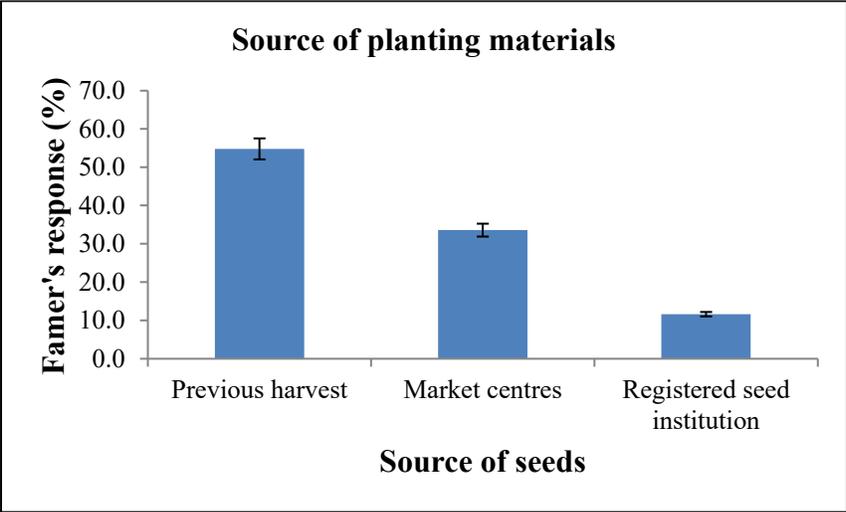
Traditional effectiveness. $\chi^2 = 275.171$, $df = 3$, Fisher's Sig. 0.001

Rouging effectiveness. $\chi^2 = 211.171$, $df = 3$, Fisher's Sig. 0.001

Supplementary Figures



Supplementary Figure S1. Sorghum varieties grown by farmers in different agro-ecological zones of lower eastern Kenya



Supplementary Figure S2. Source of sorghum seeds for planting in different agro-ecological zones of lower eastern Kenya