



Locally Adapted Parasitic Weed Management Strategies Based on Soil Fertility Amendments

BY

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Introduction:

The root parasitic weeds *Striga asiatica*(L.) Kuntze and *Rhamphicarpa fistulosa* (Hochst.) Benth are among the important biotic constraints hindering rice production under rainfed systems.

Loss in yield is a result of competition and extraction of water, nutrient and metabolites caused by the parasite

- ✳ Improving soil fertility
- ★ Inorganic fertilizers (NPK or DAP and urea)
- ★ Application of cattle manure
- ★ Organic fertilizer rice husks.

Table 1. Nutrient status of the applied cattle manure and rice husks.

	pH	N	P	K	OM	Ca	Mg	S	Mn	Fe
	%	%	%	%	%	%	%	ppm	ppm	ppm
C manure	8.65	1.68	0.25	2.29	24.9	0.62	0.41	0.23	1450	8130
Rice husks	5.17	2.15	1.29	1.34	40.2	0.17	0.62	0.11	306	1150



Methodology:

Two experiments for *Striga asiatica*(in uplands) and *Rhamphicarpa fistulosa*(in lowlands)

Altitude: *Striga* - 527 m a.s.l.

Rhamphicarpa - 525 m a.s.l. (900 m apart)

Soils: *Striga* – loamy sand (sand:clay: silt -66:11: 25)

Rhamphicarpa-field loamy-clay sand (sand:clay: silt - 57:21:22) soil.

The experiment had 7 soil fertility treatments and 2 weeding regimes in a split-plot Design with 5 replications. The treatments were randomized for the first season, in the second season each treatment was repeated at the same plot as in year 1.

Plot size was 3.0 × 4.0 m, with 15 crop rows of 20 hills each following a spacing of 20 × 20 cm. Each of the *Rhamphicarpa* plots were banded to avoid mixture of soil fertility treatments due to early floods.

✳ Farmers choose a good treatment for practice



Striga Soil Fertility Trial (SSFT)



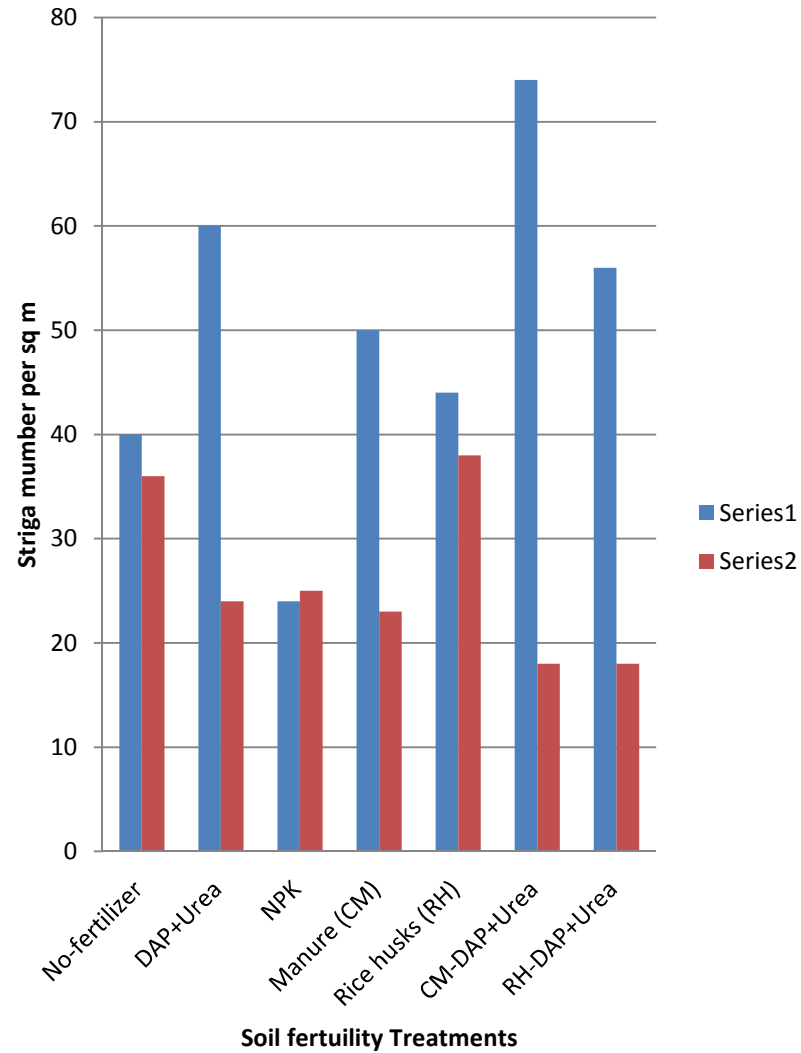
Rhamphicarpa Soil Fertility Trial (RSFT)

Soil fertility treatments

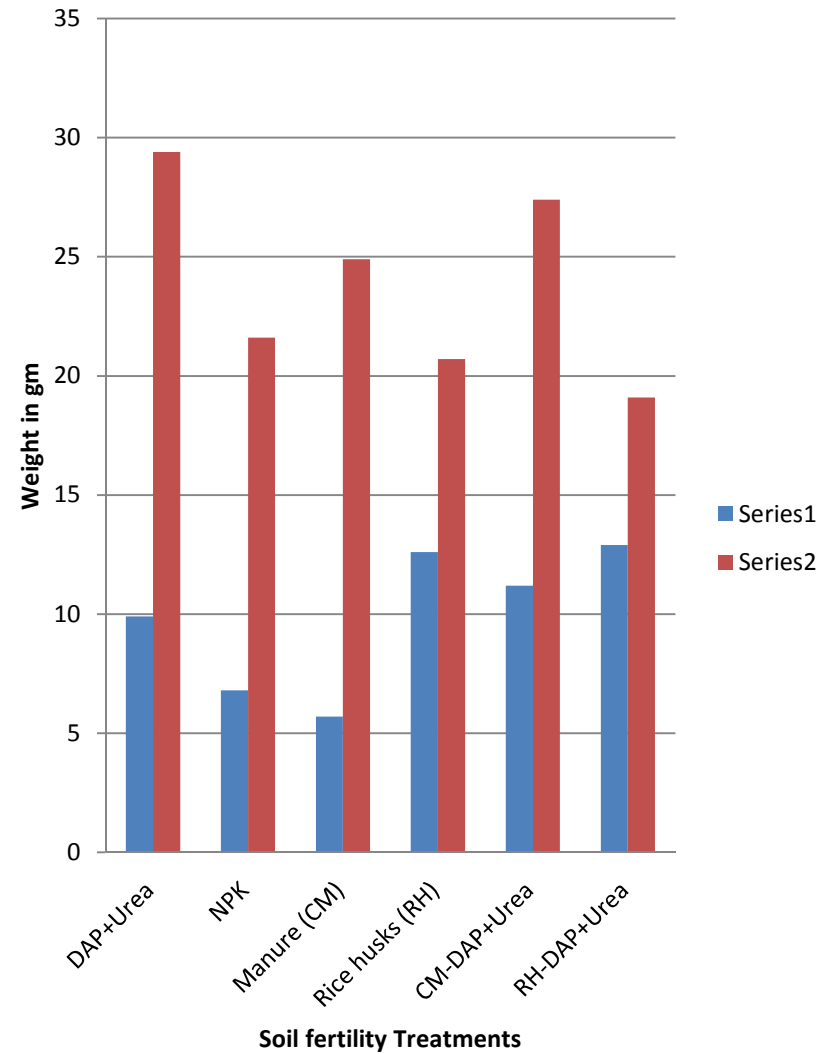
1. No fertilizer (negative control)
2. DAP (18:46:0 - N:P₂O₅:K₂O) was applied at a rate of 125 kg ha⁻¹ by broadcasting at planting. Urea (46% N) was broadcasted at a rate of 125 kg ha⁻¹ at 70 DAS.
3. NPK fertilizer (20:10:10 – N:P:K) was applied at a rate of 200 kg ha⁻¹ by broadcasting in 2 splits 58% was applied at 21 DAS and 42% at 70 DAS.
4. Cattle manure at a rate of 10 t ha⁻¹ by mixing with the top 20 cm soil at 3 days before sowing.
5. Fine rice husks applied at a rate of 10 t ha⁻¹ by thorough mixing with the top 20 cm soil at 3 days before sowing
6. Combination of cattle manure and half the locally recommended rate of DAP plus urea.
7. Combination of rice husks and half the recommended rate of DAP plus urea.

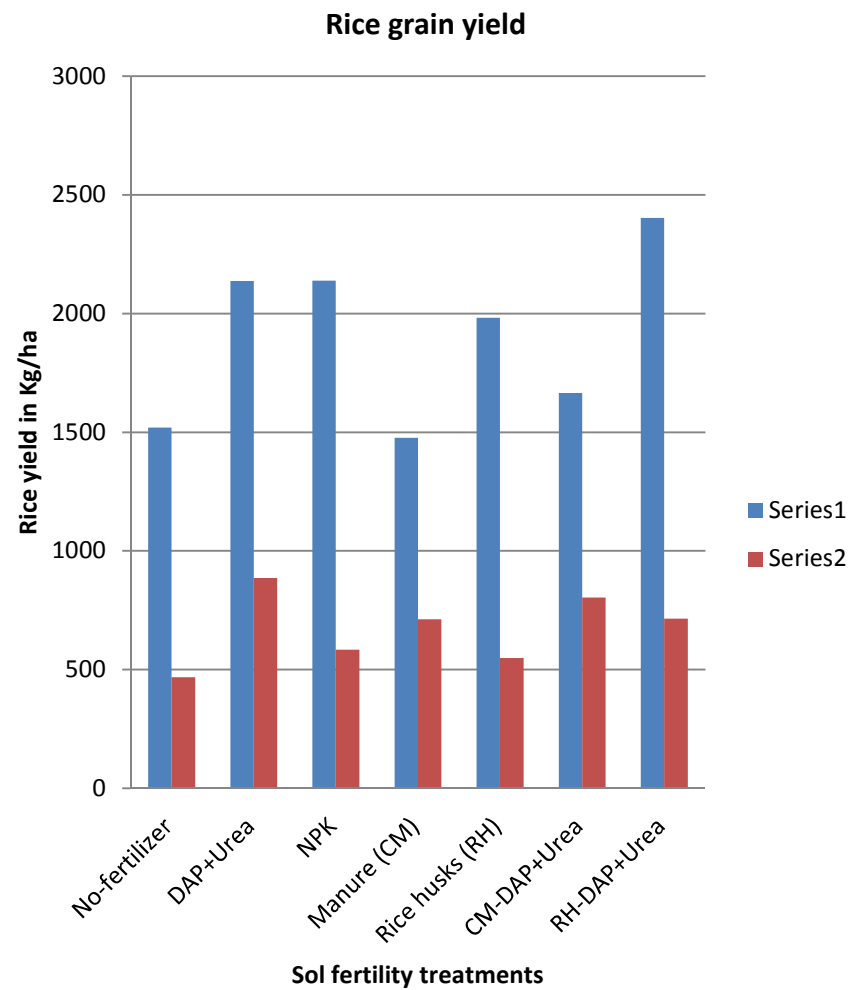
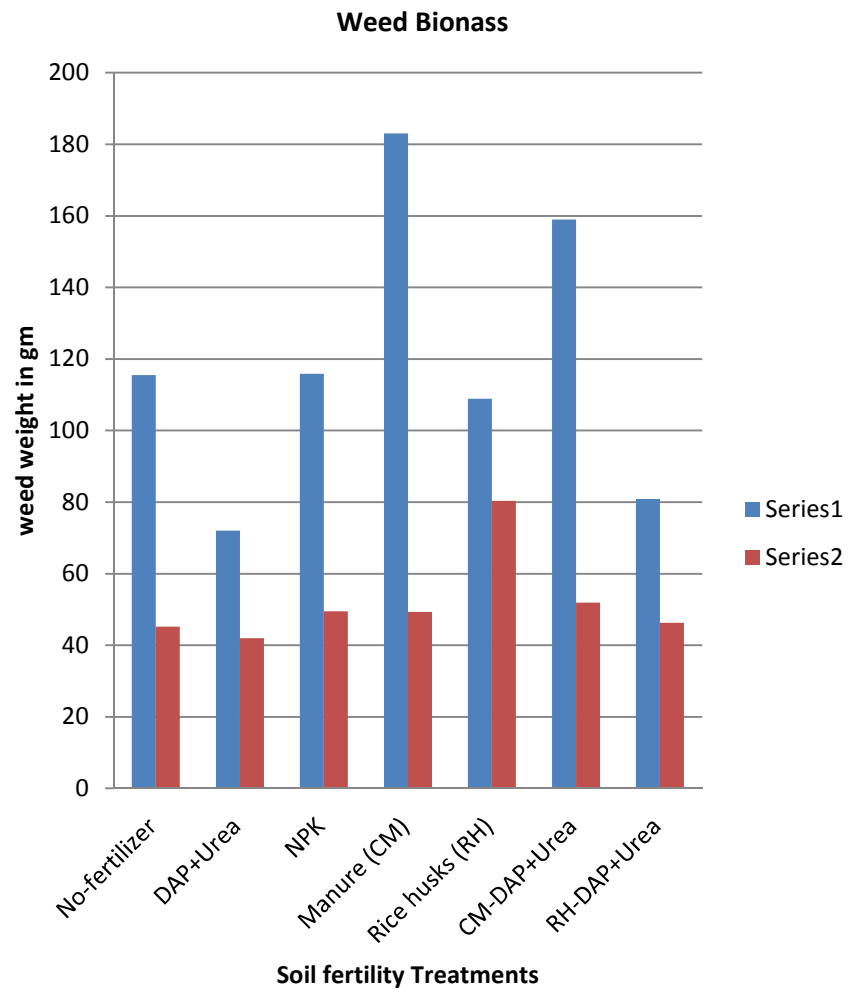


Striga infestation



Striga Dry weight





Maximum *Rhamphicarpa* numbers(m⁻²) and *Rhamphicarpa* dry weights at harvest (g m⁻²) observed during season 1 (2012) and season 2 (2013)

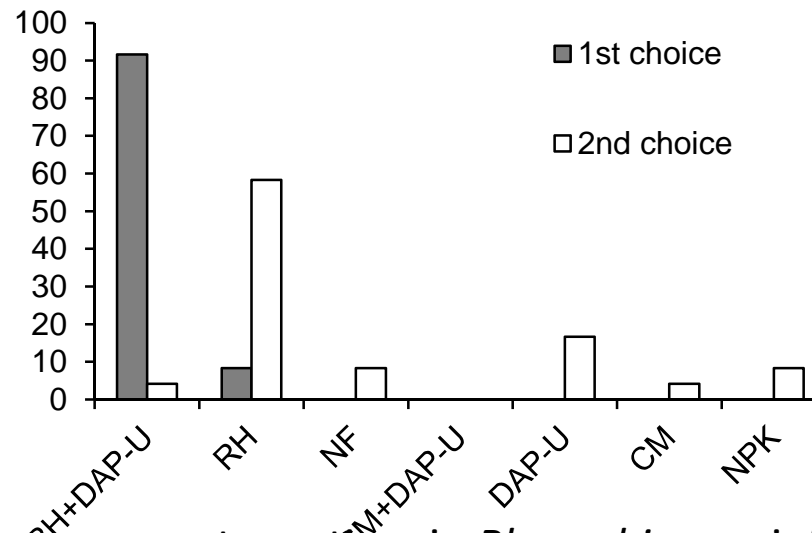
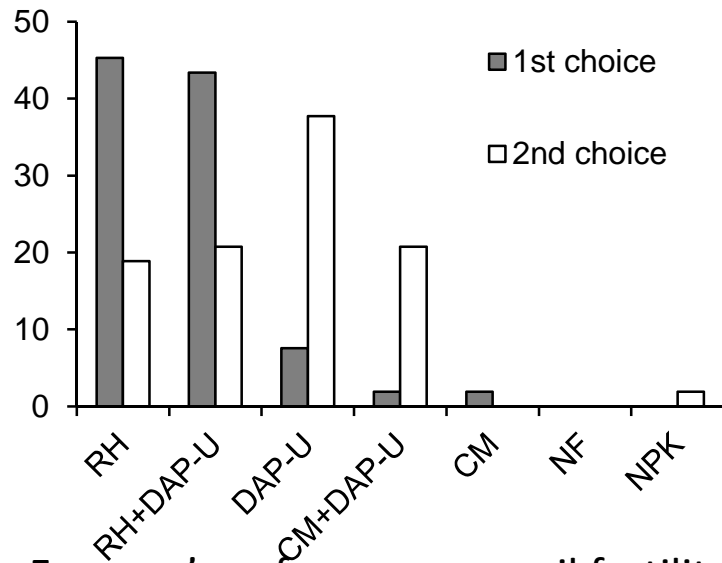
Soil fertility treatments	<i>Rhamphicarpa</i> numbers				<i>Rhamphicarpa</i> dry weights			
	2012		2013		2012		2013	
No-fertilizer	84	cd	11	b	112	c	42	b
DAP+Urea	164	bc	6	b	212	b	10	c
NPK	50	d	6	b	95	c	28	bc
Manure (CM)	179	b	17	a	254	ab	70	a
Rice husks (RH)	158	bc	10	b	225	ab	29	bc
CM-DAP+Urea	267	a	10	b	297	a	21	bc
RH-DAP+Urea	216	ab	10	b	257	ab	23	bc
P	<0.001		0.016		<0.001		0.005	

Weed biomass dry weight at harvest (g m^{-2}) in the *Rhamphicarpa* experiment during season 1 (2012) and season 2 (2013)

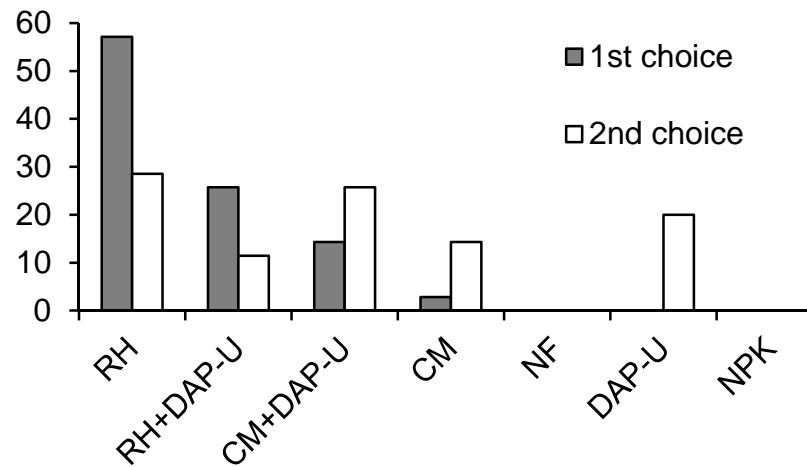
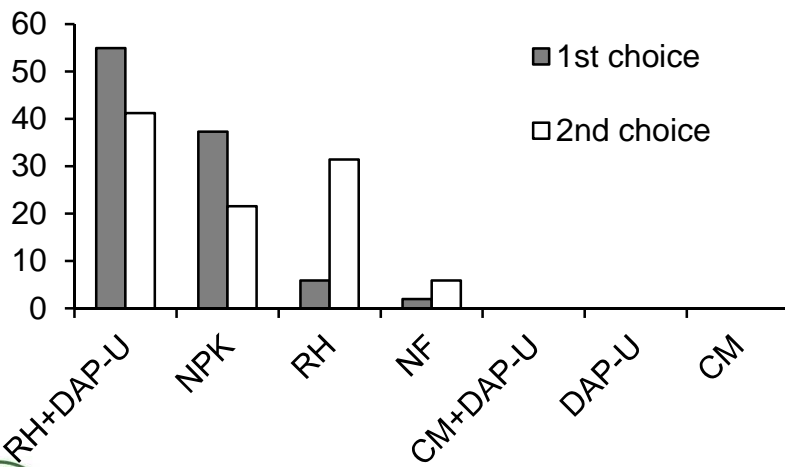
Rice grain yield (kg ha^{-1}) from the *Rhamphicarpa* experiment during season 1 (2012) and season 2 (2013)

	Weed biomass DW					Rice yield			
Soil fertility treatments	2012		2013		Soil fertility treatments	2012		2013	
No-fertilizer	30.4	a	49.0*	ab	No-fertilizer	676.7	bc	1485.5	d
DAP+Urea	13.2	b	26.8	b	DAP+Urea	906.8	b	5260.4	a
NPK	42.4	a	100.9	a	NPK	1359.2	a	2362.9	cd
Manure (CM)	15.3	b	88.1	a	Manure (CM)	382.17	c	2964.3	c
Rice husks (RH)	13.6	b	29.1	b	Rice husks (RH)	1773.0	a	4110.3	b
CM-DAP+Urea	17.9	b	24.8	b	CM-DAP+Urea	523.5	bc	4662.6	ab
RH-DAP+Urea	17.7	b	22.9	b	RH-DAP+Urea	1787.4	a	4473.0	ab
<i>P</i>	<0.001		<0.001		<i>P</i>	<0.001		<0.001	

Farmers' preferences on soil fertility management practices in *Striga* infested fields in 2012 (A) and 2013 (B). RH= rice husks, CM= cattle manure, NF = no-fertilizer



Farmers' preferences on soil fertility management practices in *Rhamphicarpa* infested fields in 2012 (A) and 2013 (B). RH= rice husks, CM= cattle manure, NF = no-fertilizer



Conclusion

Partly confirmed reluctance of rice farmers in Kyela to use cattle manure as a soil fertility amendment in the fight against parasitic weeds as it stimulates infestation of non parasitic weeds

Cattle manure, may help controlling *Striga* but not *Rhamphicarpa*.

The use of cattle manure resulted in sub-optimal rice yields when used without inorganic fertilizer supplements

Results from the upland rice field were more indecisive therefore the longer-term effects still need to be investigated in the coming years

Acknowledgements

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Thank you for your attention
Merci beaucoup
Muito obrigado
Asante sana



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