

Effects of soil management and cropping options on yields of drought tolerant bush bean varieties in two agro-ecologies in central Malawi

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Key messages

- Use of chicken manure on small farms would significantly increase bean yield.
- Soil management options are variety specific in common beans.

Objectives and approach

Assess the influence of various soil fertility management options and cropping systems (maize-bean intercrop and bean sole crop) on the yield of 2 drought tolerant bush bean varieties (SER45 and SER83) in Dedza and Ntcheu districts, in central Malawi.

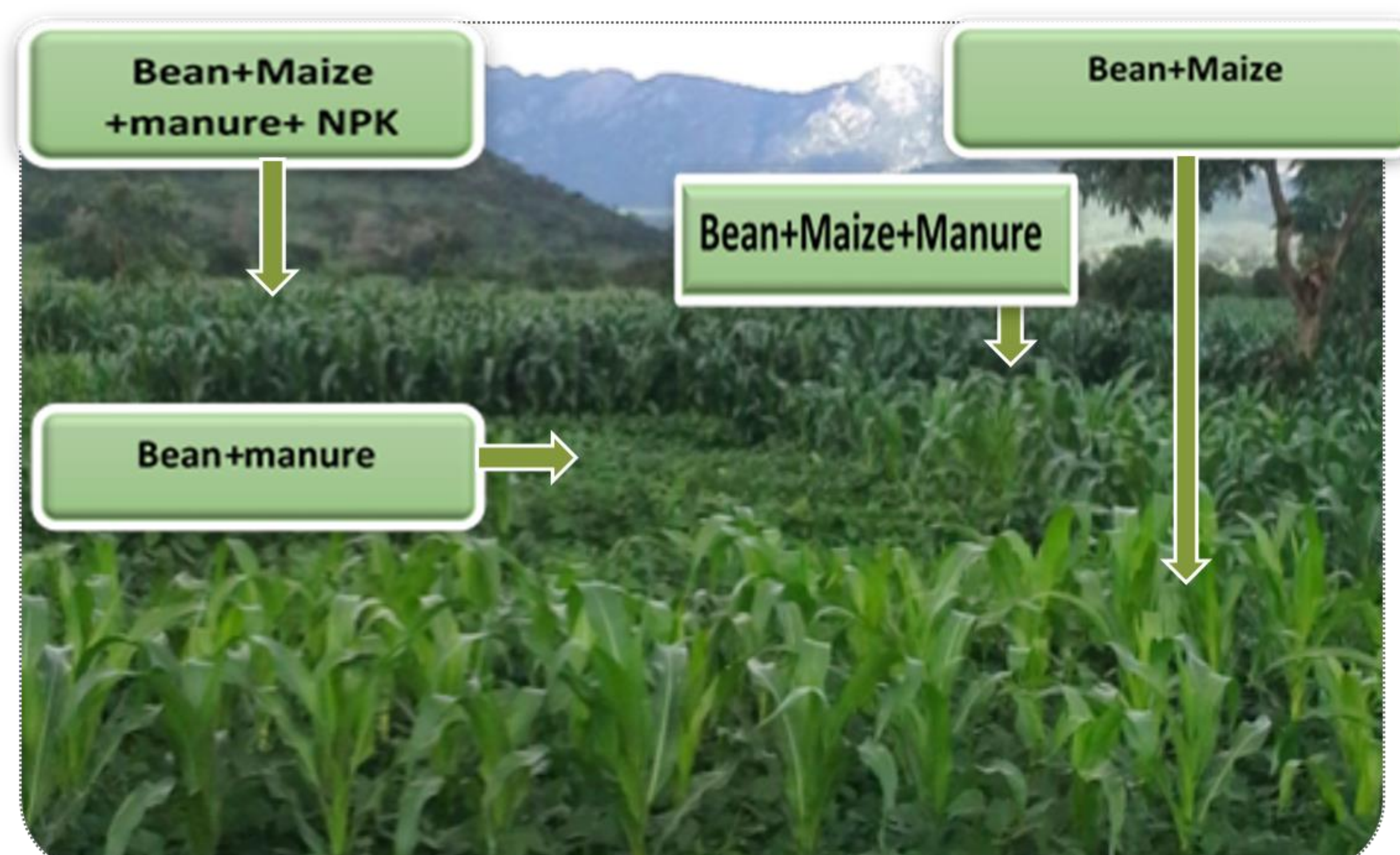
Five soil fertility management options:

- Control (no soil fertility amendment)
- 7.0 Mg ha⁻¹ of chicken manure (98 kg N, 112 kg P₂O₅ and 70 kg K₂O ha⁻¹) on bean and maize bean intercrop,
- 23 kg N and 21 kg P₂O₅ ha⁻¹ fertilizer on bean sole crop,
- 115 kg N and 21 kg P₂O₅ ha⁻¹ fertilizer on maize and maize-bean intercrop
- Combination of 7.0 Mg ha⁻¹ of chicken manure and 23 kg N and 21 kg P₂O₅ ha⁻¹ fertilizer on bean sole crop or 115 kg N and 21 kg P₂O₅ ha⁻¹ fertilizer on maize and maize-bean intercrop.

Table 1: Yield performance (ton/ha) of SER45 and SER83 under different management options in the LL and RV agro-ecological zones based on mother trials BM,EP,CM and FM

		Linthipe EPA		Kandeu EPA	
Variety	Trtnt	BM2015	EP2015	CM2015	FM2015
SER45	B	0.93ab	0.775b	0.932a	0.775abc
	Bc	1.348bcde	1.966ef	2.007ef	1.966ef
	Bcf	1.544de	2.127f	1.328abcd	2.127f
	BM	0.746a	0.365a	1.03ab	0.365a
	BMc	1.011abcd	1.087c	1.594cd	1.087bcd
	BMcf	0.926ab	1.384cd	2.231f	1.384cde
	BMf	0.813ab	0.938b	1.288abcd	0.938abcd
	CV	27.9	36.6	28.6	25.6
SER83	B	1.058abcd	0.534ab	1.612de	0.534ab
	Bc	1.507cde	1.656de	1.235abc	1.656def
	Bcf	1.847e	2.294f	1.402cd	2.294f
	BM	1.083abcd	0.248a	0.939a	0.248a
	BMc	1.007abcd	1.242cd	1.051ab	1.24cd
	BMcf	1.833e	0.965bc	1.363bcd	0.96abcd
	BMf	0.953abc	0.753b	1.112ab	0.753abc
	CV	27.9	36.6	28.6	25.6
LSD0.05%	0.555	0.438	0.403	0.628	
Sign (p<0.05)	**	**	**	**	

Key: B=beans, c = chicken manure, M = Maize, B = sole bean, Bc = sole beans with manure, Bcf = sole beans with manure+fertiliser, BMc= Bean and maize with manure, BMcf = beans and maize with manure+fertiliser, BMf = bean and maize with fertiliser



Key results

- Both bean genotypes had higher yields in sole crop than under intercrop (P< 0.01).
- SER45 was responsive to manure application in a sole crop leading to 44.4% yield increase over no manure application.
- Under sole cropping with fertiliser and manure yield improved by 40.1% (SER45) and 78.3 % (SER83) relative to the control. The
- Manure application significantly increased overall grain yield by 60% in sole bean stands and 53% in bean-maize intercrops over the control.
- Combining manure and NPK resulted in 9% yield gain over manure treated stands in sole crops while in intercrop, the yield gain was 27 and 11% over the merely fertilizer and manure treatments, respectively.
- The land equivalent ratios were 1.84 (SER45) and 2.09 (SER83).

Significance and scaling potential

- This study demonstrated the potential of increasing bean productivity through promotion of appropriate soil fertility management and cropping systems options, which will vary depending on the genotype of the drought tolerant bean. These lessons need to be scaled out to benefit more farmers

Partners

