



Participatory on-farm demonstrations on food legumes in Afghanistan: Role in enhancing food and nutrition security

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Introduction

- Per capita availability of pulses was 2.4 kg in 2013 against the annual per capita requirement of 18.25 kg to fulfill the recommended pulse dietary requirement of 50 gm per capita per day (FAOSTAT, 2013) resulting in chronic malnutrition in Afghanistan.
- Productivity of locally grown food legumes (chickpea and mung bean), an important protein source in Afghanistan is less than one t ha⁻¹ (0.8 t ha⁻¹) and the current production (60,000 t) does not meet the demand of growing human population.
- Low yields, narrow portfolio of improved varieties, poorly adopted improved varieties & the associated good agricultural practices and non-availability of quality seed are some of the constraints in pulses production in Afghanistan.
- Objective of this study was to assess the performance of introduced improved varieties of chickpea and mungbean with associated agronomic practices in comparison with local varieties through farmers' participatory evaluation and the effect on food and nutritional security.

Materials and Methods

- A total of 272 farmers' participatory demonstrations laid out in eight districts of Baghlan, Mazar and Uruzgan provinces from 2009 to 2012 (Table 1).
- Data were recorded on yield of chickpea and mungbean.
- Analysis of data using mixed models fitted through REML (restricted maximum likelihood) method was done using the Genstat software.
- Impact of the introduced improved varieties on enhancing food and nutrition security, and on improving the income of farmers adopting was assessed using partial budgeting approach with discounting rate of 10%.

Table 1: Number of farmers participatory demonstrations for chickpea and mungbean during 2009-2012 in various districts of the three provinces of Afghanistan

Province	District	Chickpea				Mungbean				Total
		2009	2010	2011	2012	2009	2010	2011	2012	
Baghlan	Baghlan-e-sannati	-	4	-	2	-	30	-	-	36
	Pul-i-khumiri	-	-	-	8	-	9	-	-	17
Mazar-e-sharif	Balkh	5	8	-	-	-	-	-	-	13
	Dawlatabad	5	-	-	-	-	-	-	-	5
	Khulm	5	-	-	-	-	-	-	-	5
	Dehdadi	-	8	-	-	14	26	-	-	48
Uruzgon	Dehrawood	-	-	15	-	-	-	20	39	74
	Trinkote	-	-	15	-	-	-	20	39	74
Total		15	20	30	10	14	65	40	78	272

Results

- Two improved chickpea cultivars, Sehat and Madad, and two mungbean varieties (Mai-2008 and Mash 2008) individually and overall yielded significantly higher than the local ones in each of the demonstrations and were also more stable compared to the local varieties over the environments evaluated.
- On an average, improved varieties out yielded local ones by 38 and 51% in case of chickpea varieties Sehat and Madad, respectively over the analysis period while in case of mungbean, Mai 2008 and Mash 2008, yielded 12 and 35% more, respectively.
- REML method revealed a non-zero variance component for variety type x year within district interaction on the yield of chickpea while none of the interactions in mungbean had positive variance component (Table 2).
- There is significant yield difference between improved and local varieties in case of chickpea. However the two varieties, sehat and madad were not significantly different (Table 3 and 4).
- In mungbean, there is significant yield difference between improved and local varieties. Performance of two varieties Mai2008 and Mash 2008 was significantly different.

Table 2: Estimates of variance components due to year within districts and interaction with varieties

Crop	Variance components	Estimates	Standard Error
Chickpea	Year within districts	0.297	0.357
	(Improved vs Local) x Year with district interaction	0.060	0.044
	Residual	0.065	0.009
Mungbean	Residual	0.039	0.003

Table 3: Significance in terms of p-value for variety differences

Crop	Source	d.f (numerator)	d.f (denominator)	F-statistic	F-probability
Chickpea	Improved vs Local	1	5.6	18.82	0.006
	Between improved	1	21.6	0.69	0.415
Mungbean	Improved vs Local	1	373	117.00	<0.001
	Between improved	1	373	4.74	0.03

Table 4: Estimated means of varieties over all the districts

Crop	Variety	Mean	SE
Chickpea	Madad	1.335	0.215
	Sehat	1.506	0.227
	Local	0.809	0.213
Mungbean	Mai 2008	1.073	0.019
	Mash 2008	1.145	0.027
	Local	0.882	0.017

- Findings of this study are in agreement with a previous study from Afghanistan (Rizvi *et al.*, 2012) reporting substantial year to year variations for mungbean. This study provided similar information for chickpea.
- As evident from Fig. 1 and 2, probability of meeting the target productivity is much higher in case of improved varieties in comparison to local varieties in chickpea and mungbean respectively.
- Assuming an adoption of 30% to 50% of the introduced varieties of chickpea and mungbean in three provinces, it is likely that per capita availability of these pulses increases by 88-146 gm per annum, a step towards nutritional and food security.
- Assuming an adoption of 30-50% of the introduced varieties of chickpea and mungbean in the three provinces, present value of income from the additional yield gains in grain was estimated at USD 6 million during 2013 to 2015.

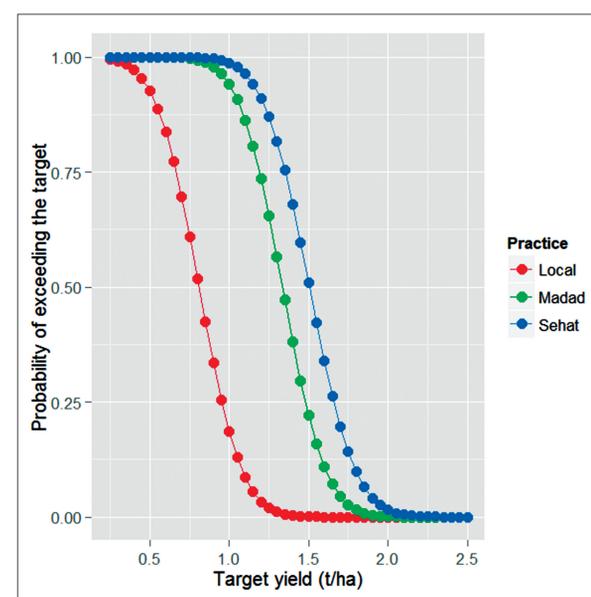


Fig. 1: Risk associated with grain yield from chickpea varieties

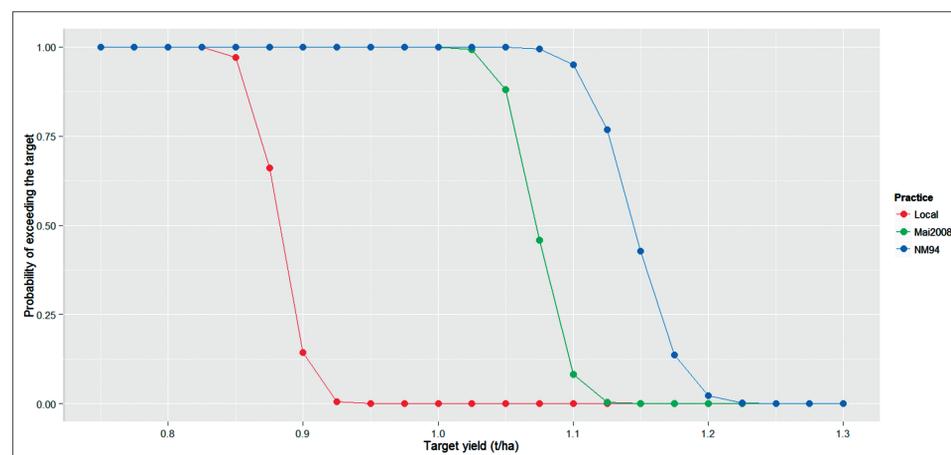


Fig. 2: Risk associated with grain yield from mungbean varieties

Conclusions

- Efforts should be made to introduce varieties of chickpea and mungbean that have more yield potential than the existing improved varieties to enhance the productivity further.
- Highlights the scope to improve the food and nutrition security along with increments in the farm income in Afghanistan through pulses.

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