Climate change and teff production in Ethiopia: *The role of Indigenous Knowledge Systems*

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BACKGROUND

As climate is undeniably changing, and Ethiopia is facing challenging climatic conditions that are new to the region, small scale teff (*Eragrostis tef*) farmers face the loss and degradation of natural resources they have relied upon for generations.

Indigenous societies have built up knowledge over long periods of time about changes in the environment and have developed strategies and techniques to cope with these changes. Recognition, documentation and use of indigenous knowledge systems (IKS) in climate change mitigation and adaptations is therefore not only logical but invaluable.

OBJECTIVE

The objective of this study is to describe and assess IKS in relation to the effect of climate change on small scale farmers, with a special focus on cultivation of *Eragrostis tef,* in order to guide scientific, policy and farm level interventions as well as draw inferences and implications for food security.

RESULTS

Small scale farmers have first-hand knowledge of climate change impacts due to their long-term observation and engagement with their environments. This study showed that farmers have adapted to climate change and responded by developing efficient environmental management practices such as soil and water conservation, and adoption of early maturing and drought tolerant varieties.

Based on GIS simulations and modelling (Yumbya *et al.* 2011), yield drop in future (2050) is expected as compared to the current predicted yield distribution (Figure 1, 2). The model confirmed future teff distribution changes and yields reductions due to climatic changes. There will be an average loss of approximately 24% (236,975.65 Km²) of the current suitable area for teff by year 2050. It has become clear that rainfall (Figure 3) is an important climatic factor in determining teff yields. Expected higher temperatures in the region will exacerbate rainfall decrease, making water stress an even more common phenomena.

Farmers have observed temperature and rainfall changes as some of the most important indicators of climate change (Bij de Vaate *et al.* 2011).

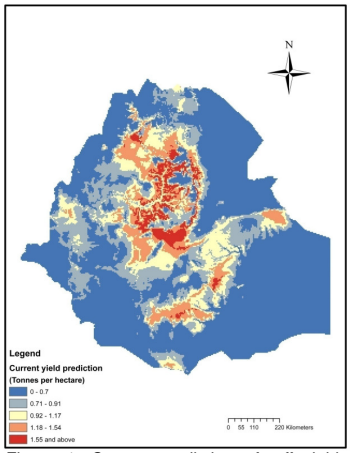

Figure 1: Current prediction of teff yield using present climate data sets (Yumbya *et al.* 2011).

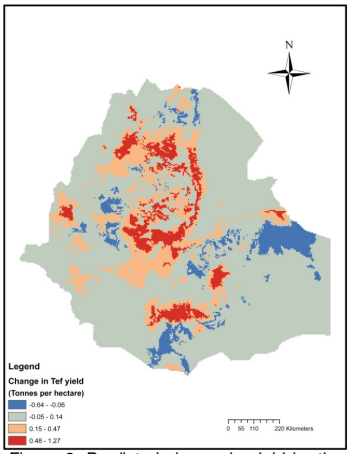

Figure 2: Predicted change in yield by the year 2050 (Yumbya *et al.* 2011).

ACKNOWLEDGEMENTS

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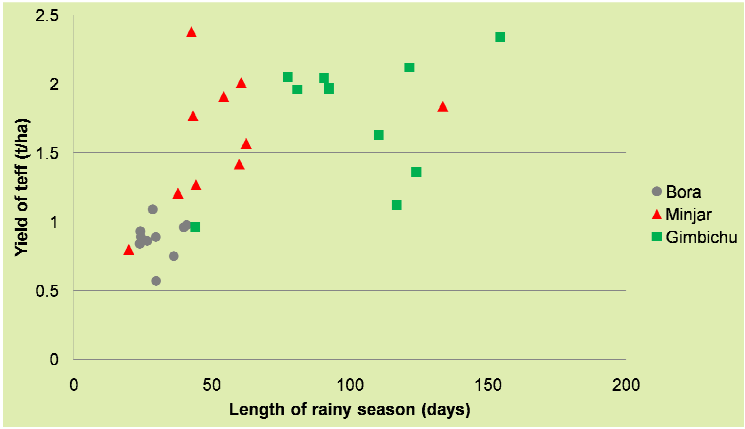

Figure 3: Yield of teff (today) changing with length of rainy season, as reported by respondents in the three study districts

CONCLUSION

Teff is a local, traditional, and important crop for people's livelihoods. The study districts appeared rich in local teff varieties that are currently cultivated (Table 1). Such local varieties have adapted to local conditions, and developed beneficial characteristics during the many years of cultivation.

		Bora	Gimbichu	Minjar	Overall
Farmers growing **local varieties**		**n=88** (88%)	**n=97** (99%)	**n=97** (99%)	**n=282** (95%)
Average number of local varieties grown by a farmer		1.56	1.45	1.48	1.5
	white teff*	64	21	92	59
	brown, red or black teff*	39	61	29	43
	Hado or Enatite*	0	22	12	12
	mixed/ Abolse teff*	19	7	9	12
	local teff*/**	16	15	3	11
	Magna*	17	0	0	5
	Buniye or Bunge*	1	20	0	7
	Gorade*	0	0	3	1
Farmers growing **improved varieties**		**n=57** (57%)	**n=22** (22%)	**n=11** (11%)	**n=90** (30%)
Average number of improved varieties grown by a farmer		1.04	1.00	1.00	1.02
	DZ-Cr-37*	95	23	18	68
	Quncho*	5	77	82	32
	Koledima/ DZ-01-196*	4	0	0	2
Farmers growing **local *and* improved var.**		**n=45** (45%)	**n=21** (21%)	**n=11** (11%)	**n=77** (26%)
		** rates in percentage % of respondents (n)*			
		*** local teff can either be white, brown or mixed teff*			

Table1: Teff varieties grown in the three districts (Bij de Vaate *et al.* 2011)

To counteract the adverse effects of climate change on future yields, scientists would need to work with local people to develop appropriate climate ready technologies. Recognition, documentation and use of (teff) genetic diversity and the indigenous knowledge of cultivation, storage and agronomic qualities is vital for development of new teff varieties that are better adapted to harsh climatic conditions.

In addition, research is needed to generate more information on other factors affecting teff yields, such as varietal selection, tillage methods and use of inputs, as well as to increase understanding of decision making processes and risk aversion strategies through crop selection, among other things. Such information, combined with scientific findings could be helpful to farmers in adapting to climate change, thereby enhancing teff yields and food security.

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