

Indicators to assess traditional crop genetic diversity in dryland agricultural systems

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Indicators to determine and monitor when and where the conservation and use of traditional crop varieties can benefit dryland farmers and support ecosystem resilience

- 1. Amount and distribution of crop variety diversity in the farmers production system
- 2. How this diversity plays a role in crop productivity and ecosystem resilience
- 3. Whether diverse materials are accessible to farmers and other stakeholders
- 4. How farmers benefit from the value of their materials

Jarvis, Hodgkin, Sthapit, Fadda, Lopez-Noriega et al., Cri. Rev. Plant Science, 2011



Diversity Indices: A means to compare amounts and distribution of diversity across sites, time, crops, and to measure the impact of PPB

The concepts of richness and evenness

Farm A

Farm B



Different varieties (v)

Richness = 9 (local varieties): A=B Evenness (less dominance): A>B

Divergence: The potential of any two randomly chosen households within the same community to grow different varieties



Percent of each landrace grown on farm by farming household



frequency of types, low Simpson = dominance of few types)



Global use: any crop, any agroecosystem

Amount and distribution of traditional crop varietal diversity at farm level

Above the line:

High dominance with much richness at low frequencies: *Diversity maintained as an insurance to meet change*





Below the line

More even frequency distribution: *Farmers are selecting varieties to serve current needs*

Black circle = staples
Gray circle = pulses, vegetables, etc

• -LN(1-Farm evenness)

Minimizing risk for unpredictable environmental conditions





4-5 traditional sorghum varieties per farm (1.2 ha) and 23 per community with any two plants drawn at random within a farm differed in 69% (within a community 91%) *Burkina faso*

Indicators to compared to diversity to damage at household level – monitoring system resilience



Indicators that community institutions have the capacity to access, conserve and benefit from diversity

Community Seed Bank

(monitoring improved seed access particularly for the poor)

Year	Number	of farmers o econo	No. of landrace	Seed (Kg)		
	Rich	Medium	Poor	Total	S	
2007	23 (23)	34 (33)	45 (44)	102	28	103
2006	7 (11)	25 (39)	32 (50)	64	21	80
2005	17 (20)	37 (42)	33 (38)	87	23	197
2004	6 (17)	14 (40)	15 (43)	35	13	69
2003	5 (12)	19 (48)	16 (40)	40	11	87

Sthapit et al., 2007



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Monitoring the impact of interventions



Formally released and registered through the Nepalese Seed system as Nepal's first farmer bred registered variety (*Gyawali et al., 2010, Euphytica*)

	Farm Richnes s	Farm Simpson (Evenness)	Community Simpson (Evenness)	Divergence
2005 Baseline	4	0.44	0.72	0.39
2008 with PPB	4.2	0.58	0.73	0.21
2008 without PPB _	3.2	0.40	0.60	0.34



Enhanced Rice PPB product, Nepal

Pitambar, et al., unpublished data

Indicators that community institutions have the capacity to access, conserve and benefit from diversity

Diversity Field Fora

- Supporting seed systems in low heritability environments
- Participatory varietal evaluation
- Fora for learning and exchange
- Building trust in seed systems



Village	01	02	03	04	05	06	07	
Bogoro	X	Х	Х		Х	A	А	
Sadien	Х	Х	X		A	A	A	
Sokoro	X	Х	X		Х	А	А	
Diagani	X	X	X		Х	A	A	
Bomboro	Х	х	Х		х	х	х	
Somo	X	x	X		х	x	x	
Nougosso	X		Х					
						douh	e et al	2008

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