Assessing seed system resilience

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MOTIVATION

Seed systems: seed savers, plant breeders, distributors, and farmers who collectively breed, select, and disseminate the seeds of our food crops

Seed system typologies[1,2]

	informal	intermediate	formal
seed type	local varieties	local and certified	certified cultivars
coordination	Individuals, community	public-private partnerships, NGOs	government or private
dissemination	saving, community exchange	local markets, seed exchanges	extension or private markets

Resilience indicators for agroecosystems[3]

- Ecological: On-farm agrobiodiversity at the varietal level
  - Informal seed systems facilitate biodiversity via exchange networks[4]
- Social: Connectivity and redundancy along the value chain
  - Grower organizations build social capital and influence farmer behavior[5]

QUESTIONS

Q1: How does farmer involvement with varying degrees of seed source formalization affect biodiversity?

Q2: How does formality of grower organizations affect (a) connectivity and (b) redundancy along the value chain?

CASE STUDY

ISAAN, THAILAND

Rice seed sources:

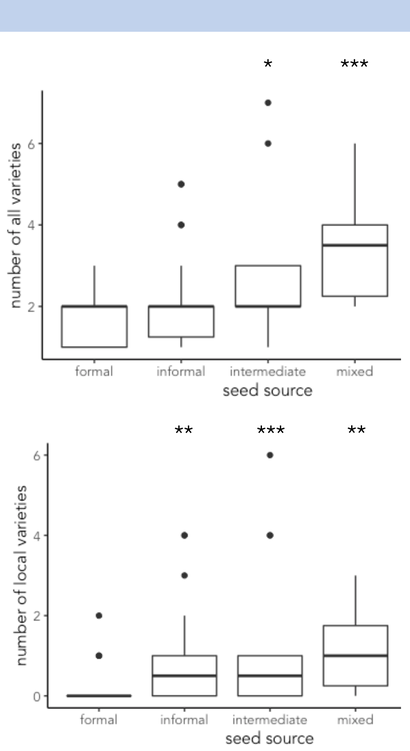
- 35% formal
- 65% informal and intermediate

Mainstream rice: Jasmine 105 and RD 6
Local varieties: 26 reported from sample

CASE & SAMPLE

- 6 Isaan provinces, June-July 2012
- 12 interviews with key players
- 84 structured interviews with farmers in various grower organizations

RESULTS



SEED SOURCE effects on BIODIVERSITY

Formal seed systems = negative outcomes for diversity

All other seed sources contribute to local diversity indicators

Multiple mixed seed sources best promote diversity

ORGANIZATION effects on VALUE CHAIN CONNECTIVITY & REDUNDANCY

Unaffiliated farmers: lack connectivity and redundancy

Formal organizations: strong connectivity but low redundancy

Intermediate organizations and mixed involvement: connect farmers to mills more than seeds, high redundancy

	Supply chain involvement							
	Informal		Intermediate		Formal		Number of sources	
	(seed)	(mill)	(seed)	(mill)	(seed)	(mill)	(seed)	(mill)
NGO	0.274	0.386	0.049	0.554***	-0.393	0.030	0.798**	1.254***
(n = 34)	(0.263)	(0.259)	(0.242)	(0.162)	(0.282)	(0.245)	(0.321)	(0.401)
GO	-0.029	-0.271**	-0.269**	-0.592***	0.577***	0.809***	-0.073	0.106
(n = 28)	(0.111)	(0.107)	(0.102)	(0.067)	(0.119)	(0.101)	(0.135)	(0.167)
NGO+GO	0.085	-0.146	-0.140	0.315***	0.582***	0.346***	0.321**	0.402**
(n = 13)	(0.124)	(0.125)	(0.114)	(0.078)	(0.133)	(0.118)	(0.152)	(0.186)
Unaffiliated	0.216	0.066	-0.309**	-0.522***	0.174	0.289**	0.003	-0.016
(n = 9)	(0.154)	(0.149)	(0.142)	(0.093)	(0.165)	(0.141)	(0.188)	(0.232)
Rai (farm size)	-0.002	-0.002	0.007**	-0.001	0.004	0.006*	0.0004	0.007
	(0.004)	(0.004)	(0.004)	(0.002)	(0.004)	(0.004)	(0.005)	(0.006)
Age	-0.003	-0.0002	0.001	0.003	0.010**	-0.001	0.007	-0.003
	(0.004)	(0.004)	(0.004)	(0.003)	(0.005)	(0.004)	(0.005)	(0.006)
Observations	84	82	84	82	84	82	84	83
Log Likelihood	-26.580	-22.812	-19.516	15.797	-32.508	-18.131	-43.437	-59.840
Akaike Inf. Crit.	75.160	67.624	61.033	-9.595	87.016	58.263	108.874	141.680
Note:								*p **p ***p<0.01

CONCLUSIONS & DISCUSSION

Intermediate and integrated/mixed seed systems best promote resilience via diversity, connectivity, and redundancy

Formal seed systems are tightly connected along the value chain, but at the expense of redundancy and diversity

Future research: Governance theory for managing intermediate and integrated seed systems & understanding farmer-decision making across the value chain

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