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The Potential Economic Impact of Guinea-Race Sorghum Hybrids in Mali: A Comparison of Research and Development Paradigms

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Motivation

- Sorghum is a major food staple
- Low average yield growth rate (0.49%)
- Guinea race hybrids for high yield increase and preferred traits (grain et panicles)
- Two research and diffusion approaches
- Compare potential returns to investment

Context

Previous approach (FPB-S)

- Initially, exotic introductions, purification of superior landraces
- Later, successful improved varieties
- State-managed, centralized seed supply

Current approach (PPB-F)

- Farmer participatory selection, on-farm trials
- Improved varieties and first hybrids largely based on Guinea landraces
- Linkage to local farmer associations, decentralized

Context

- Rattunde et al. (2013) found that individual Guinea-race sorghum hybrids yielded 17 to 47% over the local check, with the top three hybrids averaging 30% based on farmer field trials.

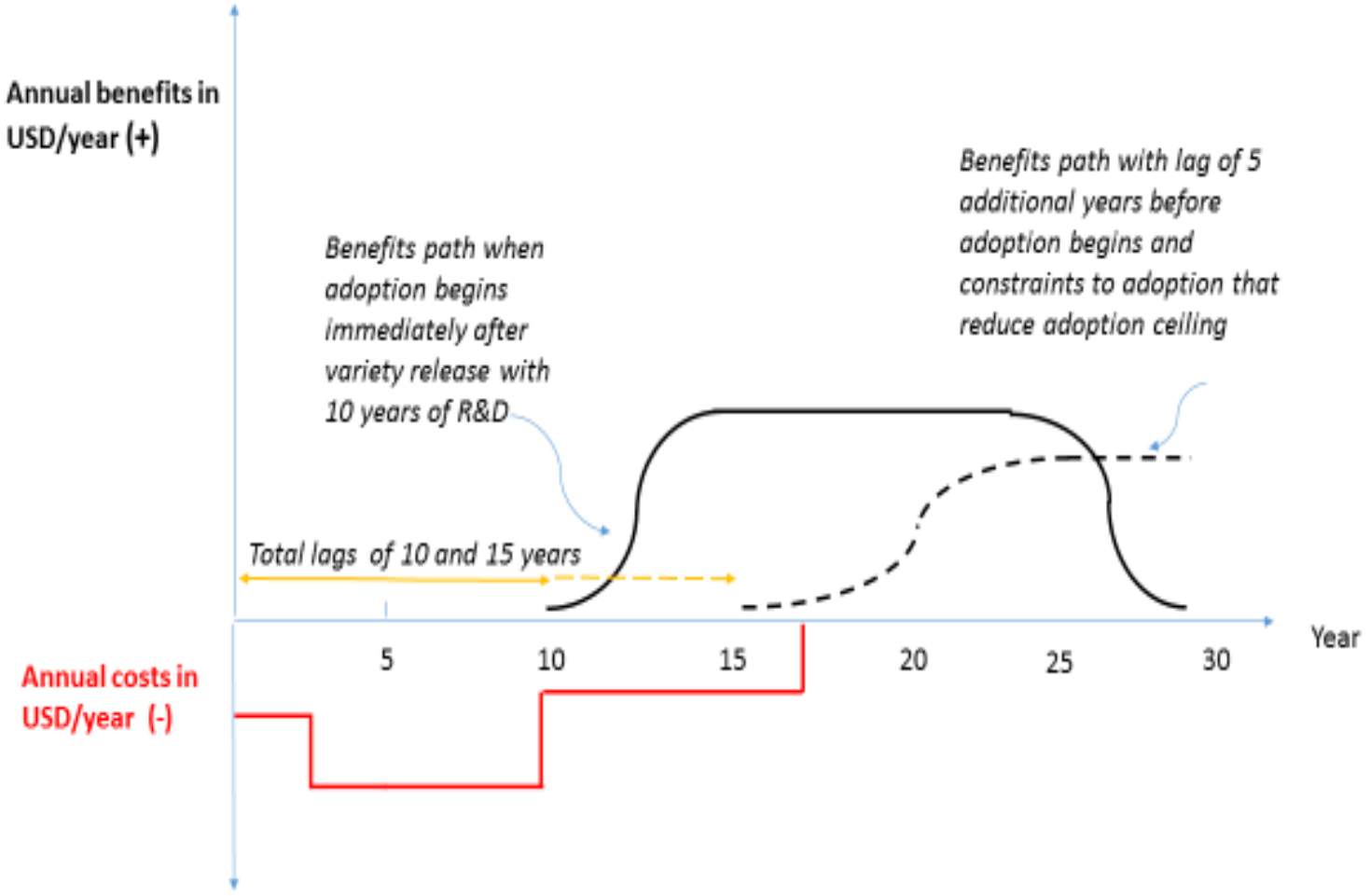
Methods

- Census of 58 villages and 2430 farm families to inventory sorghum varieties
- Economic surplus model
  - Ex ante
  - Limitation: parameters constant
- @Risk to introduce variability in parameters
  - Triangular distributions

Assumptions

- Closed economy for sorghum in Mali - augmented economic surplus model
- Triangular distributions of parameter values based on literature and expert opinion

Temporal distribution of costs and benefits

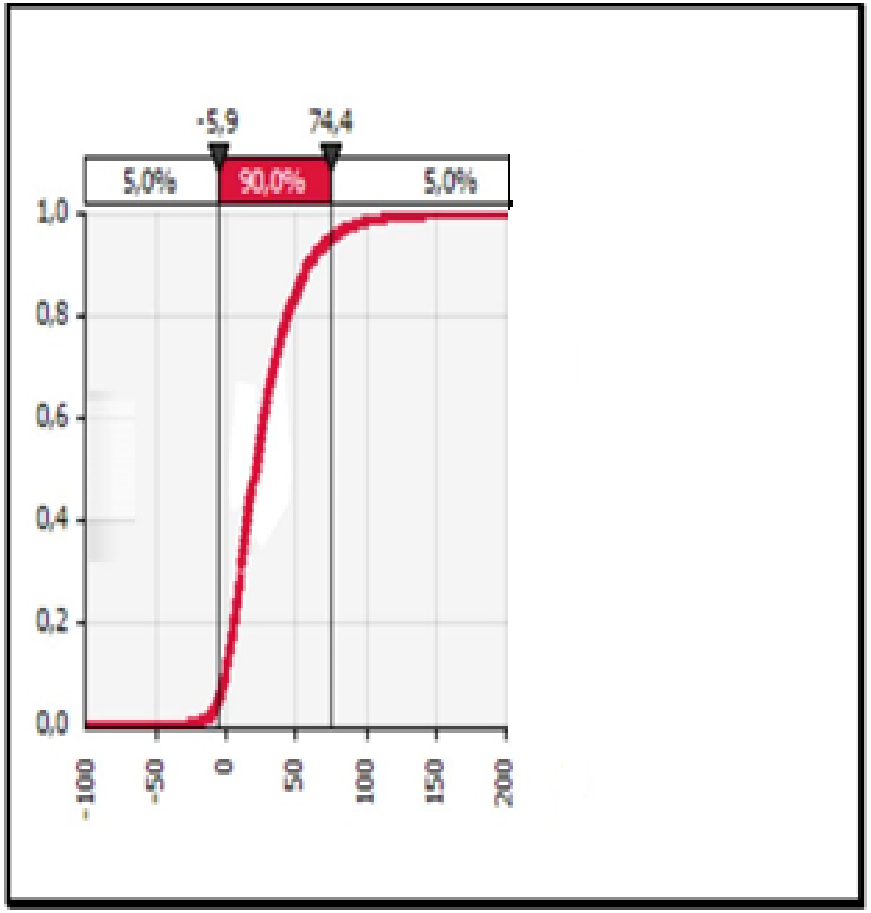


% of sorghum area by type of variety

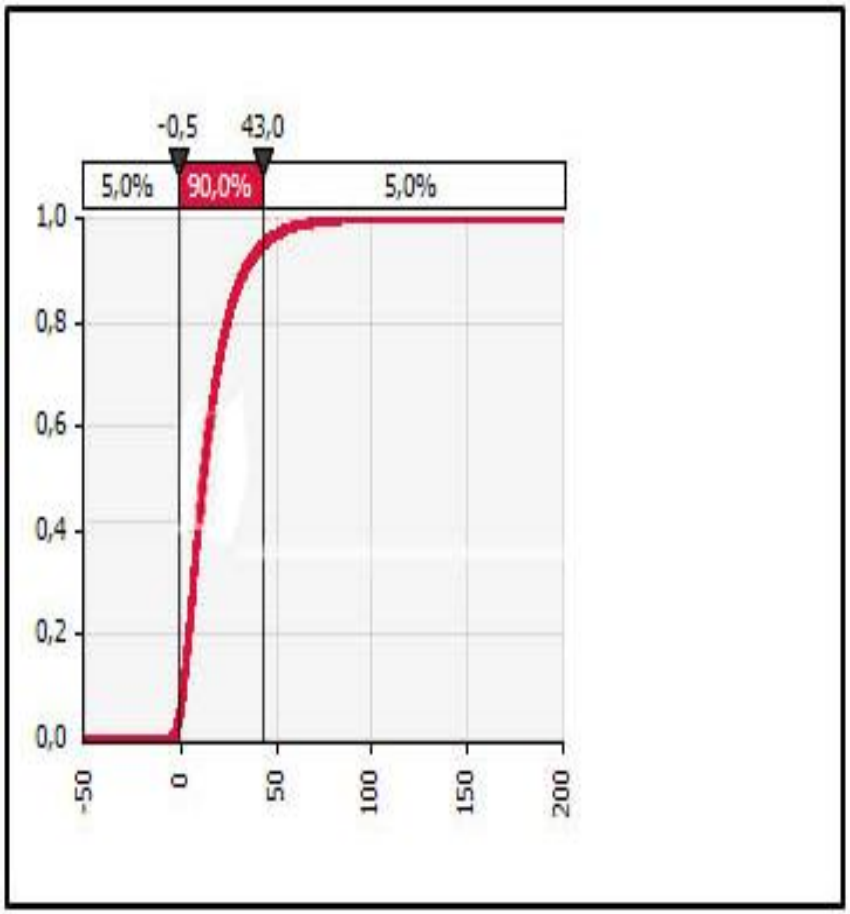
	(%) of total sorghum area				
	2009	**2010**	**2011**	**2012**	**2013**
hybrids	1.21	1.14	1.48	1.40	2.28
improved varieties	18.5	18.7	19.3	19.9	22.0
local varieties	80.3	80.1	79.2	78.7	75.7
all sorghum varieties	100	100	100	100	100

Comparison of NPV for Scenario PPB-F and FPB-S

PPB-F

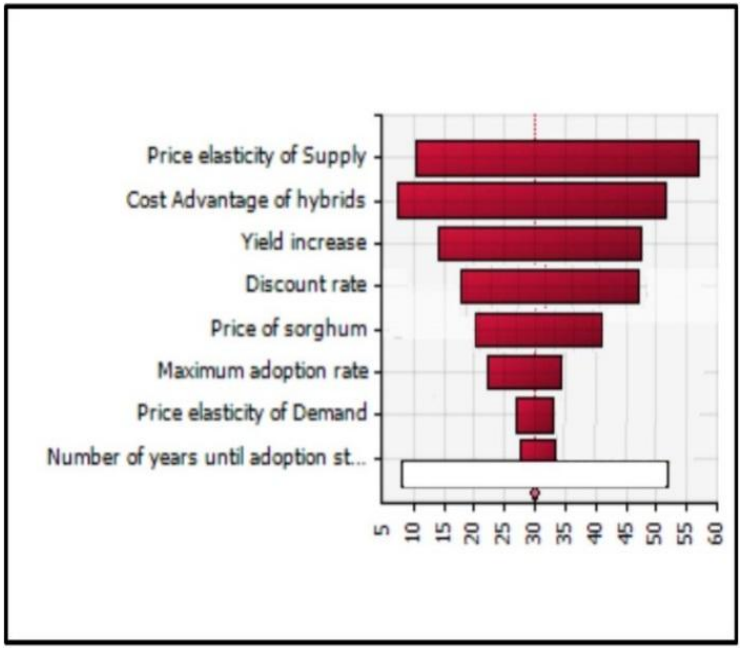


FPB-S

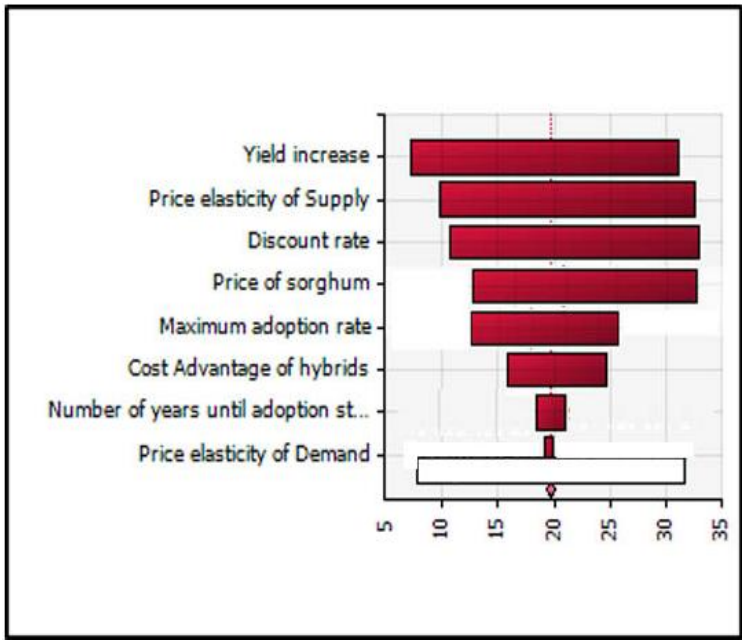


Factors influencing variation in NPV

PPB-F

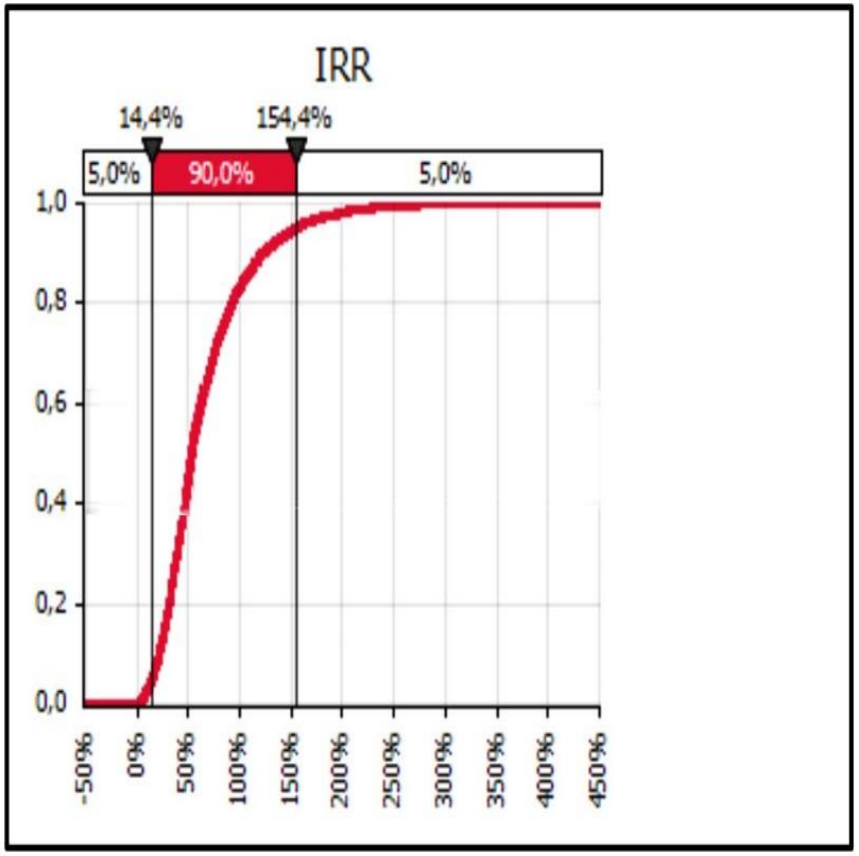


FPB-S

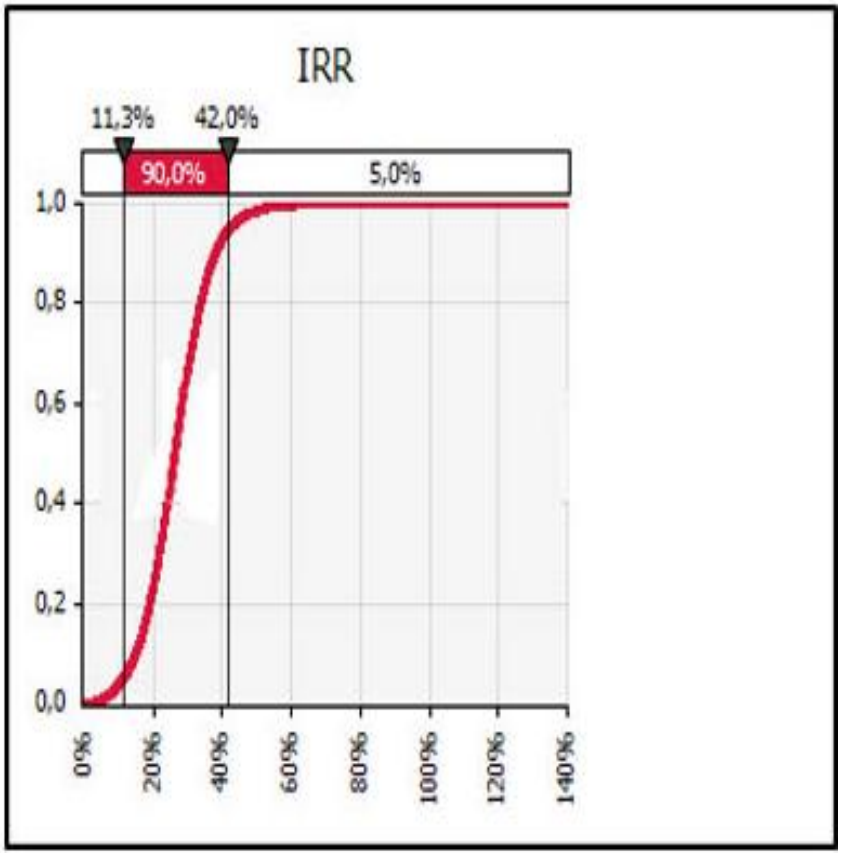


Comparison of IRR for Scenario PPB-F and FPB-S

PPB-F



FPB-S



Conclusions

- PPB-F on sorghum hybrids in Mali is a sound investment: NPV and IRR are superior

- Total surplus variability depends more on yield advantages and price elasticity of supply in either paradigm

Implications

- To continue large-scale diffusion of hybrids throughout the Sudan Savanna
  - continued support for a decentralized farmer-managed seed system
  - close research collaboration
  - enlarge the network of farmer unions engaged in seed production and dissemination
  - encourage exchange and coordination among the growing number of seed producers