Cost-Benefit Analysis of Africa RISING Technologies in Ghana: Summary of Results

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1. Introduction

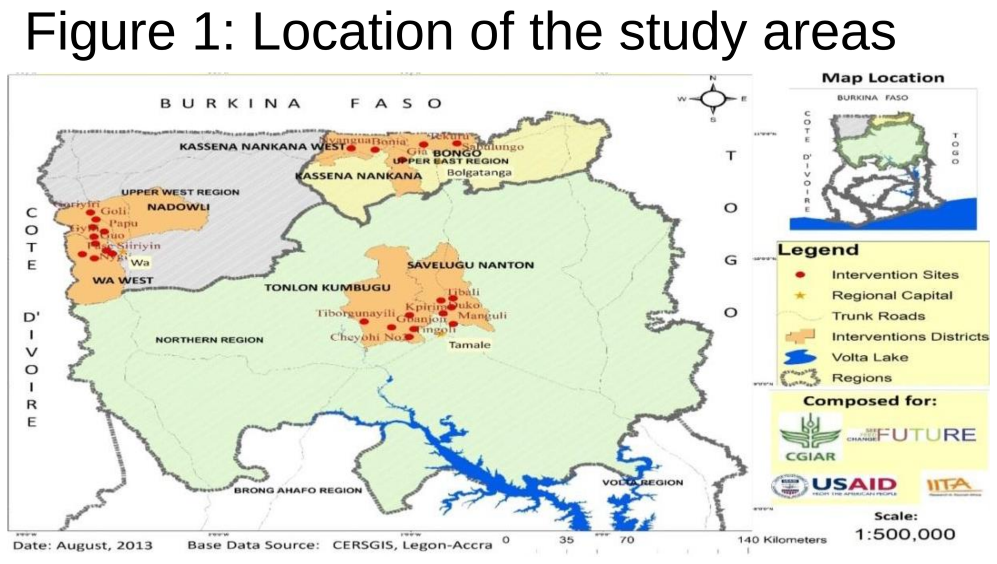
This paper provides a summary of cost benefit analyses conducted on various agricultural technologies being tested by the Africa RISING Program (AR) in Northern Ghana. The overall objective of the analyses is to assess the profitability of agricultural technologies from individual farmers' point of view. The studies try to answer two main research questions:

- Are the technologies better than the base technologies? (a relative assessment)
- How much profitable the technologies are? (an absolute assessment)

We considered 102 technologies under trial out of which 23 are base technologies. The remaining ones are technologies being tested by AR. Most of the base technologies are recommended practices exercised in the area, while some are farmers practices. The technologies have been selected for their contribution to productivity improvement among several crops, namely: maize, cowpea, soybean, groundnut, vegetables (including eggplant, okra, pepper, rozell, and tomato)

3. The Study Areas

Figure 1: Location of the study areas



3. Data Collection and Analysis

A total 1701 data observations from 10 separate agronomic trials were considered. We used both biological and economic data which include grain yield, grain prices, variable input costs, and land cost. Yield data were collected from agronomic trials. We used mean market output prices of the recent three months (December, January, and February). Costs of labor, land, and draft power were estimated from Ghana AR baseline data for the target crops while costs of commercial inputs (seeds, fertilizers and pesticides were collected from secondary sources for recent transactions.

We computed three economic indicators i.e. gross margin (GHC/ha) (GM), benefit-cost – ratio (BCR) ,and returns to labor (GHC/person day) (RL). We conducted sensitivity analysis with respect to output price changes, input price changes, and wage rate changes.

4. Results

Results show that most of the new technologies are as good as the base technologies in terms of the three economic indicators. Two technologies performed better than the base technologies in terms of GM and RL while only one is better in terms of BCR. The mean GM is GHC5113 per hectare and the mean BCR is 4.2 indicating that economic returns of the technologies are far higher than the breakeven point. The mean RL is 49.1 GHC/personday which is also far higher than the average daily wage rate in the study areas (i.e. 5.4GHC/per day). Table 1 shows disaggregated figures for the three groups of technologies.

Table 1: Performance of the technologies, by type

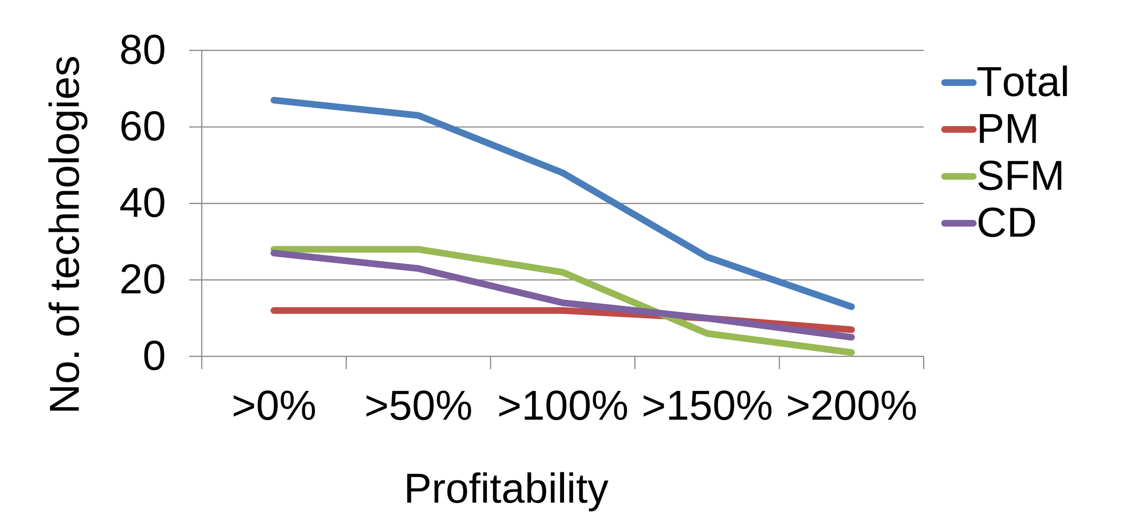
	GM (1000)		BCR		RL	
	Mean	SD	Mean	SD	Mean	SD
Pest management	4.9	7.6	5.4	0.6	51.1	6.0
Soil Fertility Management	2.8	1.9	2.7	1.4	34.8	20.3
Crop diversification	8.2	7.5	5.7	4.1	67.0	50.1
Over all	5.1	5.3	4.2	3.0	49.1	36.3

There are apparent differences among the three categories of technologies. It happens that CD technologies are of higher returns than the other two categories. This difference is statistically significant at 5% level. However, the average benefits of the other two categories of technologies are not significantly different from each other.

Most of the technologies have positive benefits (Figure 2). The degree of change apparently varies among the technology categories as one moves across the profit thresholds. For instance, there is, by and large, a non-declining pattern in the number of PM technologies indicating that most of the PM technologies could yield at least 200%.

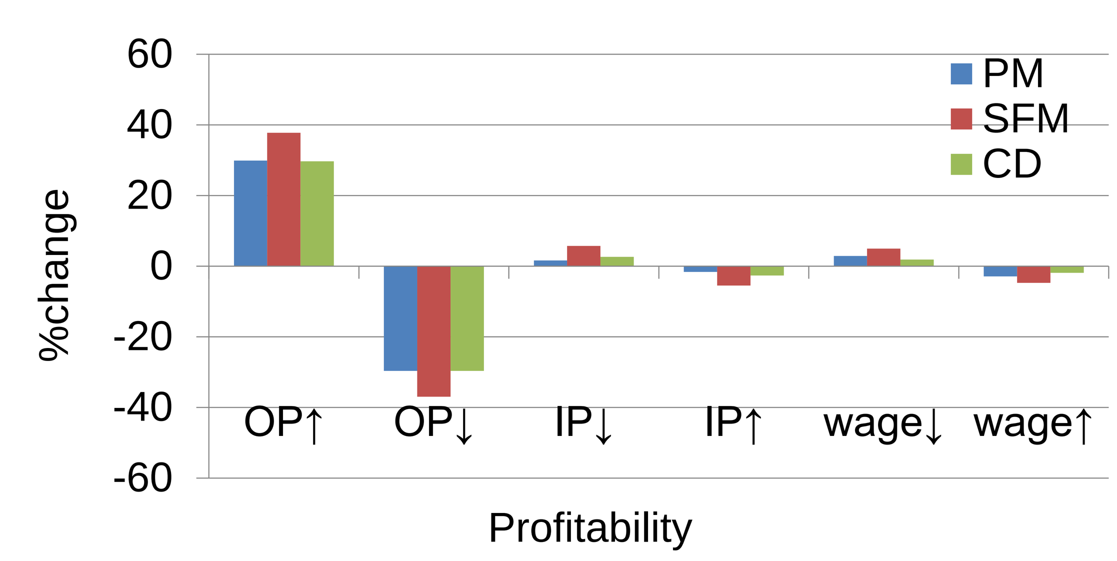
In contrast, there is a sharp decline in the number of SFM technologies after the 100% profit threshold.

Figure 2: No. of AR technologies by profit levels



Benefits are more sensitive to changes in output prices than to changes in input prices and wage rates (Figure 3). This appears to be similar across the three technology types. The degree of sensitivity to output prices is higher for technologies with high level of profits, while it is, by and large, homogenous with respect to input prices and wage rates.

Figure 3: Sensitivity of profits of AR technologies



Conclusion

Most of the technologies are as profitable as the base technologies. Profit levels are more sensitive to changes in output prices than changes in input prices or wage rates. The results are indicative but not conclusive as we used only a one-year data for most of the technologies. Moreover, benefits have been considered from individual farmers' point of view but not from society's point of view.

Acknowledgement

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Through action research and development partnerships, Africa RISING will create opportunities for smallholder farm households to move out of hunger and poverty through sustainably intensified farming systems that improve food, nutrition, and income security, particularly for women and children, and conserve or enhance the natural resource base.

The three projects are led by the International Institute of Tropical Agriculture (in West Africa and East and Southern Africa) and the International Livestock Research Institute (in the Ethiopian Highlands). The International Food Policy Research Institute leads an associated project on monitoring, evaluation and impact assessment.

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