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Opportunity cost of introducing orange-fleshed sweetpotato in the Mozambican agricultural farming system

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Background

- OFSP efficacious source of pro-vitamin A
- Can reduce VAD by 15%
- Currently many efforts to broadly disseminate OFSP in SSA
  - For its nutrition advantages
  - As an income generation alternative

- But little is known about the level of adoption after a widespread dissemination of OFSP and the economic impact of this adoption

Objectives

1) Determine under which conditions OFSP would be broadly adopted in Mozambique

2) Determine the potential effect of the adoption of OFSP on farm profits, returns to small holder resources and household food security

Analytical Methods

- Visited quarterly 84 randomly selected households in Zambezia province (06/07 & 07/08 growing seasons)

- Recorded detailed information for each individual plot managed by each household and every off-farm activity
    - Alternative cropping systems (area measurement)
    - Labor and other input use
    - Crop yields
    - Input and output prices
    - Calendar for labor and other input use

- With this rich dataset we built
    - Enterprise budgets for small and medium scale farmers
    - Estimate calorie availability of each cropping system

Enterprise budgets & calorie equivalent

	Net benefits (US$/ha)	Labor requirement (man-day/ha)	Calorie equivalent (Cal/ha)
Monocrops			
Rice	230	478	439
Maize	80	194	3,450
Cassava	49	294	1,549
OFSP	81	231	707
Intercropping			
1) Maize Cassava	155	265	1,988
2) Maize Cowpea	102	258	3,821
3) Maize Pigeonpea Millet	158	288	4,574
4) Pigeonpea Groundnuts	42	200	2,524

An economic model (2)

- To analyze the adoption of OFSP in Mozambique used an optimization model
  - 1) Small holder farmer (up to 1 ha)
  - 2) Medium scale farmer (3 to 5 ha)

- Objective functions: Maximize farm profits
- Subject to
  - 1) Food security constraint: produce at least 4,822,560 Cal
  - 2) Labor constraint: Labor demand < 75 man days per month

- Outputs: optimal acreage, farm profits, returns to land & labor

Results: base scenario for small farmer

	Rice	Maize/ Cassava	Cassava/ Pigeonpea	Total Farm
Area (ha)	0.46	0.20	0.54	1.20
Net revenues (US$)	83.8	18.3	92.1	194.2
Energy produced (Cal)	385,805	1,446,768	2,989,987	4,822,560
Returns to				
Land (US$/ha)	182.2	91.4	170.6	160.7
Labor (US$/man-day)	1.2	1.2	1.0	1.1

Opportunity cost of growing OFSP (0.25 ha): -8% of farm profits

Base scenario for medium scale farmer

	Rice	OFSP/ Cassava	Maize/ Cowpea/ Pigeonpea	Groundnut/Pigeonpea	Total Farm
Area (ha)	0.36	0.65	1.71	0.34	3.09
Net revenues (US$)	90.2	26.7	319.2	28.8	464.6
Energy (Cal)	337,579	2,073,701	6,365,779	675,158	9,452,217
Returns to					
Land (US$/ha)	250.2	41.0	186.7	84.8	150.4
Labor (US$/man-day)	1.4	0.8	0.8	1.2	1.1

Sensitivity Analysis

- For small holder farmer
  - 1) Free OFSP vines (subsidy)
  - 2) OFSP root price increase by 32%
- For medium scale farmer
  - 1) OFSP root price increase by 18%

Results of sensitivity analysis

Small holder farmers:

- 1) With no cost on planting material they would plant 0.36 ha of OFSP, that would increase farm profits by 4.6% and returns to labor by 13%
- 2) A root price increase of 32% they would plant also 0.36 ha of OFSP and increase farm profits by 0.5% and returns to labor by 7%

Medium scale farmers

A root price increase by 18% would make farmers to increase OFSP area in another 0.23 ha, increasing farm profits by 7% and returns to labor by 16%

Concluding Remarks

- Farmers in Mozambique make adoption decisions considering crop profits but also household food security and limited production resources

- Under current production and market conditions small farmers would not adopt OFSP. They would need either a subsidy for the planting material or a root price increase by 36%

- Under current conditions, medium scale farmers would adopt OFSP and would get an important source of energy from this crop. A greater root price would increase OFSP acreage and profits