

Development of automated solar powered fruity drying technology for smallholder's farmers in Ghana.
(W 08.270.302)



From outputs to outcomes

FruitProTech Consortium



Food & Business
Knowledge Platform

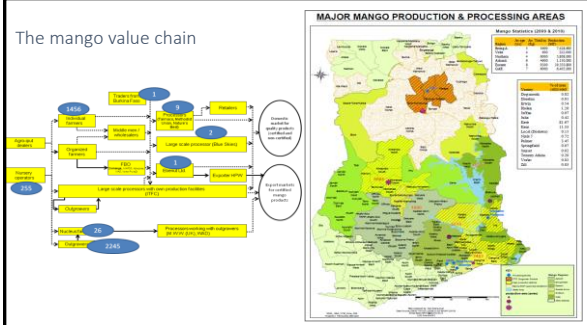


Eucharist Farms Ltd

The challenge

- In the Brong Ahafo region of Ghana, thousands of farmers have cultivated mangoes as means of earning long term economic returns and increasing their income.
- Lack of low-entry technologies for value addition
- No post-harvest terminal facilities
- Huge pre and post-harvest losses, estimated at 40 to 50% of biological yield.
- Harvested produce are wasted or sold at giveaway prices to few oligopolistic buyers available.
- These low prices and waste invariably leave the poor farmer with monetary losses and continue to deepen the already depressed poor living standards and thus perpetuate the cycle of poverty in the region.

The mango value chain



Our solution

Innovation:

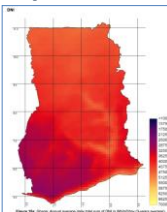
- To catalyze small scale fruit processing at the farm level using low-cost entry technology to reduce fruits post-harvest losses which currently is estimated at 40%, thereby Improving household income and nutritional status.

Major activities

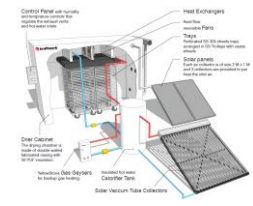
- Research into best suited designs for drying large volumes of fruits and developing technologies to remotely control processing parameters through the use of smartphone app.
- Development of a hybrid solar-gas dryer using water heaters and LPG gas
- Drying parameter of temp and RH are controlled remotely by sensors currently being researched.
- Creating partnerships, product aggregation and conducting market intelligence studies to explore local and international markets

Key outputs 1/4

- Development of suitable sites for solar drying of fruits and vegetables



- Research on existing dryers studied from Burkina Faso, South Africa and India.

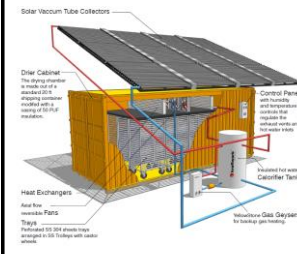


Key outputs...2/4

- Research on existing dryers studied from Burkina Faso, South Africa and India.



Key outputs..... 3/4 – Selection and design of appropriate dryer

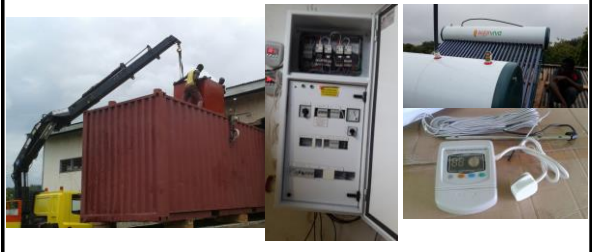


Dryer Specifications and Dimensions	
Size of the chamber	Length - 6000mm Width - 2400mm Height - 2400mm
Maximum temperature	70 deg. C
Heating	Hot water generated from solar collectors circulated into the casing through heat exchangers. Each LPG/ Bio gas heaters provided
Blowers	4 Nos of 2 HP each
Power Supply	240V Single Phase / 440 V Three Phase
Number of trolleys	12 Nos
Load per tray	3kg to 4kg
Tray material	SS 304
Tray size	600 x 900 x 25
Solar collectors	600 Vacuum tubes of 47 x 1400 mm arranged in 12 collectors.
Gas back up	6 Nos of YellowStone Gas cylinders connected to catalytic tank by a 0.5 HP pump
Control panel	Controls for hot water circulation pump, back up gas generators, humidity controls for exhaust fans

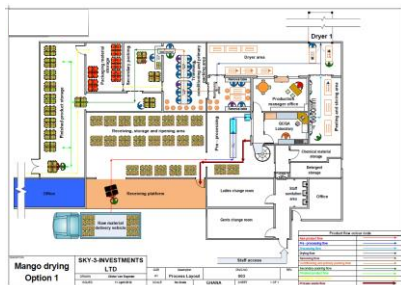
Key outputs.....4/4 –local artisans trained



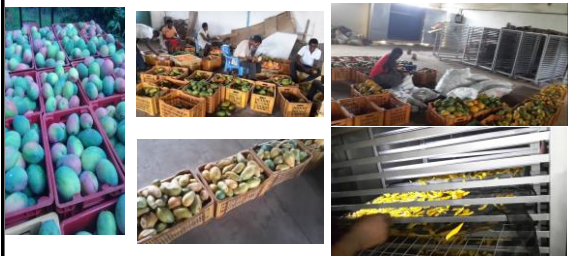
Key outcomes.....1/5 – adapted dryer developed & installed



Key outcomes....2/5 standard factory designed



Key outcomes....3/5 – test processing



Key outcomes....4/5- high quality dried fruits produced

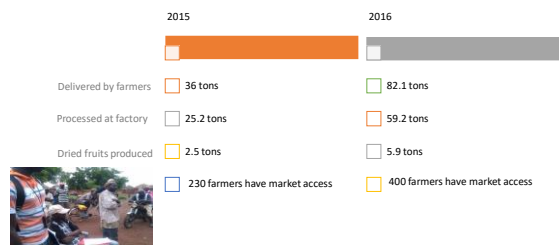
Chemical analysis									
Label	TTA (K)	pH	TSS	Vitamin C (Mg/100g)	TSS/TTA Ratio				
R1	1.792	4.37	11.8	7.98	6.58				
R2	1.792	4.37	11.7	8.23	6.53				

Proximate analysis									
Label	% Fat	% Moisture	% Ash	% Crude Fibre	% Protein	% Carbohydrate	% Dry Matter		
R1	1.0	11.0	1.04	3.51	0.54	82.91	89.0		
R2	0.5	11.5	1.10	3.63	0.54	82.73	88.5		

Mineral composition						
S %	Mg %	Ca %	Fe (ppm)	K %	P %	
0.38	0.10	0.10	0.14	0.26	1.08	

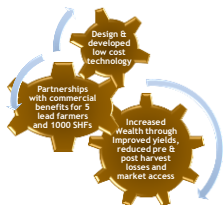
Microbial analysis							
Label	Total Coliforms	Faecal Coliform	E. Coli Count	Staph. Count/ml	Pseudo. Count/ml	Mould & Yeast Count/ml	Salmonella Count/ml
M. Chips	Nil (cfu)	Nil (cfu)	Nil (cfu)	2.87×10^2	Nil (cfu)	2.51×10^2	Nil (cfu)

Key outcomes....5/5 – fruits processed and farmers reached



Partnerships and theory of change

The main objective of this study is to develop a low-cost entry automated drying oven for smallholder mango farmers to sustainably increase household income, improve nutritional status and reducing poverty.



Thank you

