Alternative and Appropriate Technology Development from Agricultural Waste Streams in Guatemala

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TechnoServe helps entrepreneurial men and women in poor areas of the developing world to build businesses that create income, opportunity and economic growth for their families, their communities and their countries.
Jatropha the Magical Fruit
Insufficient income generating opportunities

- Low production yields of sellable produce
  - Poor soil quality, erosion of soil
  - Deforestation
  - Steep slopes
  - Unsustainable agricultural practices
- No easy access to markets to sell goods
  - Consumption of firewood for h/h fuel
  - Limited access to seeds
  - Lack of market demand for alternatives
  - Lack of exposure and education to deforestation and alternative h/h fuels
- No bargaining power for selling goods
  - Limited access to electricity or gas for generators
  - Limited ability to process goods in order to create higher valued products
- No ability to process goods in order to create higher valued products
  - Lack of strong demand for local products
  - Lack of regional diversity of goods (quality and quantity) (not in Tachoche)
- No access to higher, more specialize, labor markets
  - Insufficient training and education
  - No knowledge or communication of jobs available

Dependency on men

- Workers vulnerable to exploitation
  - Can’t afford healthcare
  - Low production yields of sellable produce
- Inequality between men and women
  - Lack of education on proper ag practices
  - Lack of exposure and communication with other ag practices
- Make tortillas for whole life
  - Lack of organization between growers in community

People find labor outside of community

- No professional opportunities for women
  - Lack of knowledge of opportunities
- People find labor outside of community
  - Limited access to seeds
  - Limited growth

No bargaining power for selling goods

- No easy access to markets to sell goods
  - Limited access to seeds
  - Lack of exposure and education to deforestation and alternative h/h fuels
  - Lack of market demand for alternatives

Health issues associated with young girls giving birth

- Young pregnancies
  - Domestic abuse?
  - Alcoholism?
  - Rape?

No access to higher, more specialize, labor markets

- Insufficient training and education
  - No knowledge or communication of jobs available
- No diversity in local economy

Poverty, health problems, inequality, cycle of dependence

- Vulnerable to illness, injury, nat. disasters, climate change, etc.
- Cycle of poverty
- Illnesses associated with unclean water, indoor air pollution
- Cannot invest (No loans)
- Can’t investment to improve
- Cant afford healthcare
- Education
- Families with poor
- Workers vulnerable to exploitation
- Poor family structure/harmoney

Dependency on men

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- Make tortillas for whole life
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POVERTY, HEALTH PROBLEMS, INEQUALITY, CYCLE OF DEPENDENCE

Problem Tree

LACK OF NATURAL RESOURCES

- Insufficient use of fertilizer
- Insufficient of fertilizer
- Limited use of fertilizer

No economy

- Limited access to seeds
- Lack of market demand for alternatives

No money or access to markets

- More children, more workers
- Bare of money/income
Guatemalan waste streams

Source
- Urban/Landfill
- Rural/Agricultural

Raw materials
- Paper
- Jatropha Seedcake

Products
- Briquettes
- Raw
- Char
- Briquettes
- Briquettes
- Briquettes
- Briquettes
- Briquettes
- Fertilizer
- Fertilizer
- Water filter media

Raw materials and products from Guatemalan waste streams include:
- Briquettes
- Fertilizer

Briquettes and Fertilizer can be produced from:
- Paper
- Jatropha Seedcake
- Banana
- Coffee
- Corn
Jatropha as a Fuel
Jatropha as a Fuel
Jatropha as a Fertilizer
Problems

- Yield
- Toxicity

Jatropha Curcas is a species in the Euphorbicaea Family, which contains over 300 genera and 750,000 species.

Jatropha seedcake contains toxins and antinutritionals including trypsin inhibitors, curcin, tannins, saponins, phytates, and phorbol esters.

Phorbol esters act as tumor promoters and exhibit toxicity in a range of species when ingested or applied topically.
Benefits and Liabilities of Phorbol Esters

**Benefits**
- Fungicide
- Anti-bacterial
- Living Fences
- Pharmaceutical research
  - Co-carcinogenic

**Liabilities**
- Toxic to livestock
- Toxic to fish
- Toxic to humans
  (in doses > 0.2 mg/kg)
- Toxic to favorable soil bacteria
Unknown: Fate of Phorbol Esters in the environment

Where do they go?

What do they turn into?
Toxins in Fertilizer

1. Breakdown of toxins in fertilizer
2. Plant uptake of toxins
Toxins in Fuel

1. Measure emissions of raw jatropha
2. Measure emissions of charred jatropha
Limitations

We lack the capacity to do a thorough study of the fate of phorbol esters in soil, air, and water.
Conclusion

Finding appropriate uses for jatropha seed cake for rural entrepreneurs in Guatemala
Questions?