

Value Chain Actors and Enhanced Freshness Formulation (EFF) Technologies

Agricultural value chains refer to the activities involved in bringing a product from the field to the consumer (Miller & Jones 2010: xv). Commodity chain analysis can highlight economic insecurity, labour insecurity, and other inequalities among participants along the chain, particularly those closer to the production side (Kaplinsky 2001; Dolan 2004; Nakazibwe & Pelupessy 2014), and can also offer examples of how to support producers (Kamya 2015). How might Enhanced Freshness Formulation (EFF) technologies create opportunities for increased economic security for the less powerful participants in agro-commodity chains?

Case illustrations from two participant countries, Trinidad and Tobago and Sri Lanka, demonstrate possibilities for increased food and economic security, including for those who are more vulnerable in the agricultural and food sectors. They also highlight factors that can make these possibilities more or less sustainable.



Picture showing the stage in which green papaya are used in the processing for substitution of potato in the school meal program in Trinidad and Tobago

Green Papaya, School Meals, and Nutrition

Do EFF technologies have possibilities for improving national food security and nutrition? The use of green papaya in Trinidad and Tobago offers some possible approaches to answering this question.

The National School Nutrition Program in Trinidad and Tobago provides no-cost breakfast and lunch meals to over 820 pre-primary, primary, secondary, and special schools. This amounts to almost 140,000 meals served each school day.¹ Menus aim to provide 1/3 of the recommended daily nutrients through lunch, and 1/4 of these daily through breakfast.² In 2015, The National Agricultural Marketing and Development Corporation's Deputy CEO, Calvin James, noted the high food import bills of the country, and indicated that locally-produced fruits such as cassava, breadfruit, and green papaya could be substituted for white potatoes in the school nutrition program.³ Trials of EFF spray for papaya demonstrate potential benefits for actors across the value chain, including small-scale producers, processors, caterers, and consumers, due to the potential to use green papaya as a potato substitute. EFF spray slows the ripening of the fruit, retaining the green colour that processors want to see when buying papaya to make value-added products.

¹ Government of the Republic of Trinidad and Tobago.

http://www.ttconnect.gov.tt/gortt/portal/ttconnect!/ut/p/a1/jdBNC4JAEAbgX-PVGZUN7ebBTA1C-9K9hMa2GuaKmbvzM29iWXOb4XnhZYBCCLSI24zHTSaKOH_vdHH2fBWJY2i49dFANXAUC4mn6Xu1B9EIBPaqBxZR1t5RQ8T_8vhlzJ_5HSvgBH5O2S6ZgGnNAcz0ciHyXCTDTyKzSDSdA63YIVWskh9Vf06bpqyXEkrYdZ3MheA5ky-xhJ8SqagbCEcQyvshfDo3krCb8wXuWoab/dI5/d5/L2dBISEvZ0FBIS9nQSEh/?WCM_GLOBAL_CONTEXT=/gortt/wcm/connect/GorTT+Web+Content/TTConnect/Citizen/Role/AParent/EducationandTraining/School+Nutrition+Programme

²Government of the Republic of Trinidad and Tobago. <http://moe.edu.tt/services/administration/units/national-school-dietary-services/itemlist/category/74-national-schools-dietary-services>

³ De Souza, Janelle. 2015. Grow Food, Grow Jobs. Trinidad and Tobago Newsday. Available online:

<http://www.newspday.co.tt/news/0,221538.html>

What kind of nutritional, economic and food sovereignty implications might this have?

For students, the replacement of potatoes with green papaya has the potential for reducing the intake of carbohydrates in the diet. In a country with a diabetes prevalence rate above 14%, developing a taste for green papaya early in life has immediate and long-term nutritional benefits. This would further recent national calls to make the school meals healthier. In addition, it could lower labour costs associated with the school nutrition program, without compromising on quality.

For producers, this widens the local market for green papaya, and allows for staggered production of the fruit. It also extends the shelf life for exporting to neighbouring islands like Barbados. Current export marketing arrangements are that farmers only get paid if the retailer receives an unspoiled product. These marketing arrangements systematically disempower farmers, and EFF therefore has the potential to help minimize these kinds of losses, and make income more predictable for producers.

For the country, the increased use of green papaya has the benefit of reducing dependence on imported goods and lowering national food bills, while supporting local farmers and their livelihoods.

Kaplinsky (2000: 131) argues that efficiency in value chains is in part dependent on scientific and educational innovation. As scientific innovations, EFF technology trials have demonstrated the potential for an overall gross reduction in post-harvest fruit losses, which can mean increased economic security for farmers, and the possibility of decreased food prices for consumers.

However, innovation does not have to rest solely within laboratories. Value chain members can also use new agricultural technologies to create localized innovations, approaches, and efficiencies.

Innovations in fiber and packaging



Picture showing the extraction of banana fibers and banana fiber based paper that are used in packaging industry in Sri Lanka. Over 70% of the workers in these operations are women

Can the application of EFF technologies allow for localized innovations using sustainable resources? While the project has focused on lab-based developments, innovators in Sri Lanka considered how banana plant waste could be processed to create a sustainable, biodegradable paper for extending storage life of fruits, for packaging export fruit, and for other purposes. This case shows the possibilities for increasing efficiencies through using plant materials previously considered 'waste' while at the same time highlighting the dilemma of an environmentally friendly product that remains 'on hold' due to various challenges faced by a small/medium-scale industry.

Have you ever noticed that in grocery stores, some high-valued fruits are wrapped in protective coverings? These are most often webbed polyethylene sleeves which are not biodegradable and that do not contribute towards a sustainable environment.

Banana fibre paper offers an alternative. It is made from the banana pseudostem, an agricultural waste product. Impregnating this paper with EFF technologies allows it to do double duty – protecting fruit from injury during transportation over long distances, and increasing shelf life. Results from simulated transportation and storage trials carried out at the Industrial Technology Institute (ITI), Sri Lanka, showed no significant difference in fruit quality between polyethylene sleeves and banana fibre-based wraps. Even better, this technology adds further value through employment and income-generating opportunities, especially for women who otherwise have limited employment options.

The processing factory that is part of this project is located in a major banana production region of the country, was already involved in fibre extraction, but had limited marketing options. The fruit wrap added another value-added product to this enterprise. ITI also introduced a microbial disinfection procedure into the production protocol to increase food safety.

What makes these kinds of innovations possible? Technology development is important, but the right conditions are needed to implement them effectively. In this case, the banana industry partner was entrepreneurial, and also willing to take innovation risks and invest his own funds to experiment with new methods. He also knew of the need for employment for poor rural women and men. The factory now employs seven women and three men who are the breadwinners of their families and do not own land for cultivation. The women workers are aged between 50-60 and started working at this factory only after their husbands either passed away, became unable to work, or left the families.

Other factors are important as well, including markets and networking. The entrepreneur has yet to find a steady market for the banana fibre products and the factory continues to operate by producing banana chips. While they have mastered the technology and can produce good quality fibre, paper, and rope, workers are aware that the lack of a market for the fibre could mean that the business will run at a loss, ultimately impacting their economic security and well-being.

What can these case studies tell us about scaling up, knowledge transfer, and sustainability for EFF technologies?

The potentials for EFF technologies to address food and income inequalities, and foster local innovations are promising. In order to ensure benefits for small and marginal farmers and the most vulnerable participants in agro-commodity chains, these technologies must:

- Remain financially accessible to farmers of all income groups, once licensed for sale in different countries.
- Come in package sizes that suit the different needs, farm sizes, and incomes of farmer groups. Small and marginal farmers are unlikely to buy in large quantities and keep excess material for successive seasons. Access to smaller packages that are affordable, and that can be used over a short period of time, is critical.
- Go hand-in-hand with continued education and training on the uses and benefits of the technologies for all relevant actors across product value chains. This might include approaches to initial financing for farmers ('try before you buy') to test the technologies for themselves for a season. These hands-on, farm-level experiences may be more useful for technology uptake than documentation and advertisements.
- Connect with organizations with marketing networks and/or civil society organizations so that entrepreneurial innovations such as banana fibre production are supported, expanded, and become sustainable practices.

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