



High demand low supply: Strategies for increased utilization of new propolis products in Uganda



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Executive summary:

Propolis is a gum collected by bees to seal its hive has numerous medicinal values. It is one of the untapped high value bee product Ugandan beekeepers have under exploited despite its economic value. This policy brief highlights the current potential, product prototypes developed to stimulate private sector investment and general market response to the new products developed under the bee propolis project.

Introduction:

Over 80% of Ugandan beekeepers harvest honey and beeswax but only 1% venture into commercializing propolis (Amulen, 2017). Propolis is a gum collected by honeybees to protect themselves from diseases hence the medicinal properties (Santos, 2012). The application of propolis in human health is not new. Globally, various traditional and modern preparation of propolis is used to treat cough, wounds as well as boost immunity (Santos, 2012). In Uganda, crudely prepared ethanol extracts inform of propolis tincture dominates the market. However, the processes involved in the preparation of such crude extract remains unstandardized, hence raising serious quality and public health concerns. Similarly, not every prospective buyer of propolis tincture consumes ethanol, thus affecting the market penetration and value of Uganda's propolis products. It should be noted that propolis and its related products have the potential to generate higher revenues compared to conventional products such as honey. For example, a beekeeper can earn 34 USD per kg of propolis (data from this study) compared to 6 to 7 USD per kg revenue generated by honey (Aemera, 2014). One of the major constraints to increased utilization of propolis and its products is limited knowledge on production, processing and market potential. In a bid to stimulate private sector investment within the propolis value chain, this study sought to;

- a) document the current production potential, processing and uses of propolis,
- b) develop new propolis product and
- c) Assess the market potential and consumer attitudes towards the new products.

Overall this study presents two new propolis products in the Ugandan market with high demand and market potential. However, sustainable supply remains low, partly exacerbated by anthropogenic and climate change in beekeeper dominant areas of Uganda.

Approaches and results:

Mixed research methods were applied to capture data: Two field semi-structured questionnaire surveys were conducted;

a) First, a total of 112 beekeepers a cross four regions of Uganda (figure 1) i.e. Mid northern (Lira district) n= 43, Eastern (Soroti) n = 33, South western (Bunyangabo) n = 18 and North Eastern (Karamoja) n = 18 were interviewed. The list of beekeepers was obtained from the Uganda national Beekeepers association and the study participants were randomly selected. Information captured included production potential, processing and uses of propolis.

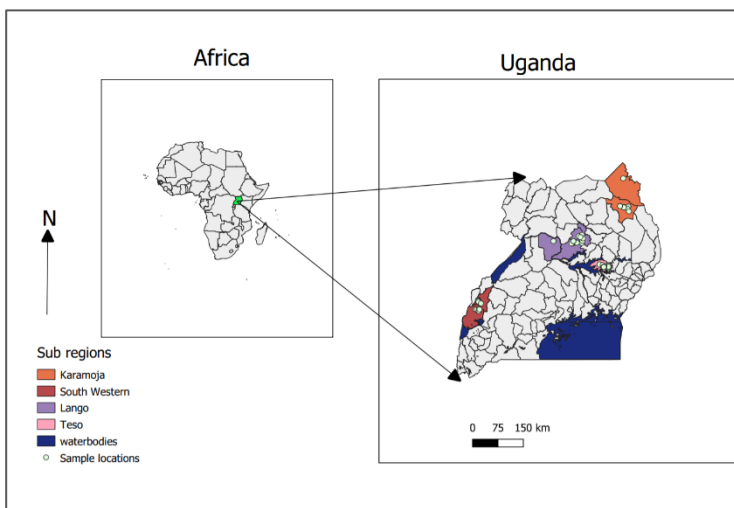


Figure1: Map of Uganda showing the location of beekeepers surveyed.

b) Second survey; a total of 199 potential consumers of propolis within Kampala city were interviewed. Participants were purposively selected based on age groups, income levels and family sizes. Majority (61% n= 199) of the respondents were female because women are responsible for most domestic purchases of food items. Two clusters of monthly income levels were including i.e. low-income earners (36.2%) with a monthly income between 58 USD -166 USD and high-income earners (31.2%) above 166 USD. Other perceptions about the propolis tea and powder were captured during the honey week-an annual event for

all bee stakeholders in Uganda organized by the project partner TUNADO.

400 kg of raw propolis was purchased through the network of the private sector partner, then propolis powder and tea bag developed at RTC laboratory at Makerere University. The propolis processing steps were documented and knowledge shared with the members of TUNADO. The data captured was analyzed using statistical tool SPSS and the results summarized into percentages and displayed in figures and texts.

Results:

Estimated propolis production potential:

The current level of production of propolis in the country is below the estimated potential. During collection of 400kg of raw material for product prototype development the team took eight months to generate the 400kg by contacting

all producers in the country. Yet, if all beekeepers are mobilized to collect propolis the country can produce between 325 to 870 tons of propolis annually. Based on available statistics the total beehive population in Uganda is estimated to be between 747,220 (UBOS & MAAIF, 2009) to 2 million (Kilimo Trust, 2012). Most (87%) of the beehives owned by beekeepers are traditional (UBOS & MAAIF, 2009) meaning there are between 650,000 to 1,740,000 local beehives. Propolis is used by honeybees to seal cracks, thus more propolis can be collected from local hives. The most common method of collection is scrapping using knives from the hive. Our field propolis collection data showed each hive is capable of generating an average of 0.5 kg per local hive per season. For each 150g of raw propolis, 17g of pure propolis powder is recovered upon processing. The low yield (11.3%) of processed propolis is due to manual shaking but the quantity can be increased by using automated mechanical agitator. The processed powder (Fig. 2b-e) can be used as a raw material for a wide range of food, medicinal and cosmetic products. For example, the processed powder can be infused with tea and packaged in tea bags (Fig.2f) or sold as tined propolis infused tea granules. In the propolis tea bag prototype, 200 g of tea is infused with 5g of propolis. To increase the volume of production of propolis at farm level to meet future demand, beekeepers needs to be continuously trained and on how to collect raw propolis and store them appropriately. During processing raw propolis to pure powder, crashing the propolis to small particles and manual agitation by shaking presented a big challenge. This presents opportunity to innovate a design of a specialized industrial cottage crashing, and semi-automated agitation & solvent evaporation (industrial rotary evaporator) equipment to for crushing & shaking large volumes of raw propolis, respectively. This innovation will significantly increase both the yield and the monetary value of raw propolis per kilogram. Furthermore, to increase the production of propolis per hive, we propose innovation of a new bee hive that blends attributes of both traditional and modern hives. Such a new bee hive technology will enable a bee farmer to harvest more propolis, while maximizing honey production at the same time.

Types of propolis based products and uses before the project intervention:

A survey of 112 beekeepers across the country revealed raw propolis and tincture as the only product on the market before development of propolis powder and tea bag developed through the propolis project (figure 2 e and f). Most of the people (42%) used propolis tincture for treatment of cough, “flue” (common cold) (31%) and as an immune booster (28%). For the first time, this project has been able to document two colors of propolis powder-the red and dark (figure 2b and c). Evidence from other countries like Brazil that have documented two colours of propolis, has indicated that composition and medicinal properties vary by colour (Regueira et al., 2017). Meaning the situation could be similar in the Ugandan case. The red propolis was mainly from Karamoja. Further research on chemical composition and pharmacological benefit of the two types of Ugandan propolis is recommended.



Figure 2: Raw propolis in pot hive and developed products from propolis

Market potential and consumer attitudes towards the new products.

Market survey revealed that tea is perceived as a healthy drink by most respondents (52.8%) while others drink it as a source of energy (226%) (Figure 3a). This perception towards tea by the respondent makes it easy to predict that Propolis infused tea bags can easily be marketed. All consumers were willing to utilize propolis powder and tea bag, with majority eager to try the products (figure 3c). This was made easy due to perceived immune boosting and healing properties of propolis (figure 3b). As such all consumers were very likely to recommend the product to another consumer (figure 3d). The challenge was the price at which consumers were willing to buy a tea bag was 2 USD dollars lower than the profit margin. Meaning the investor may have to find mechanisms of lowering production costs to increase returns to investments.

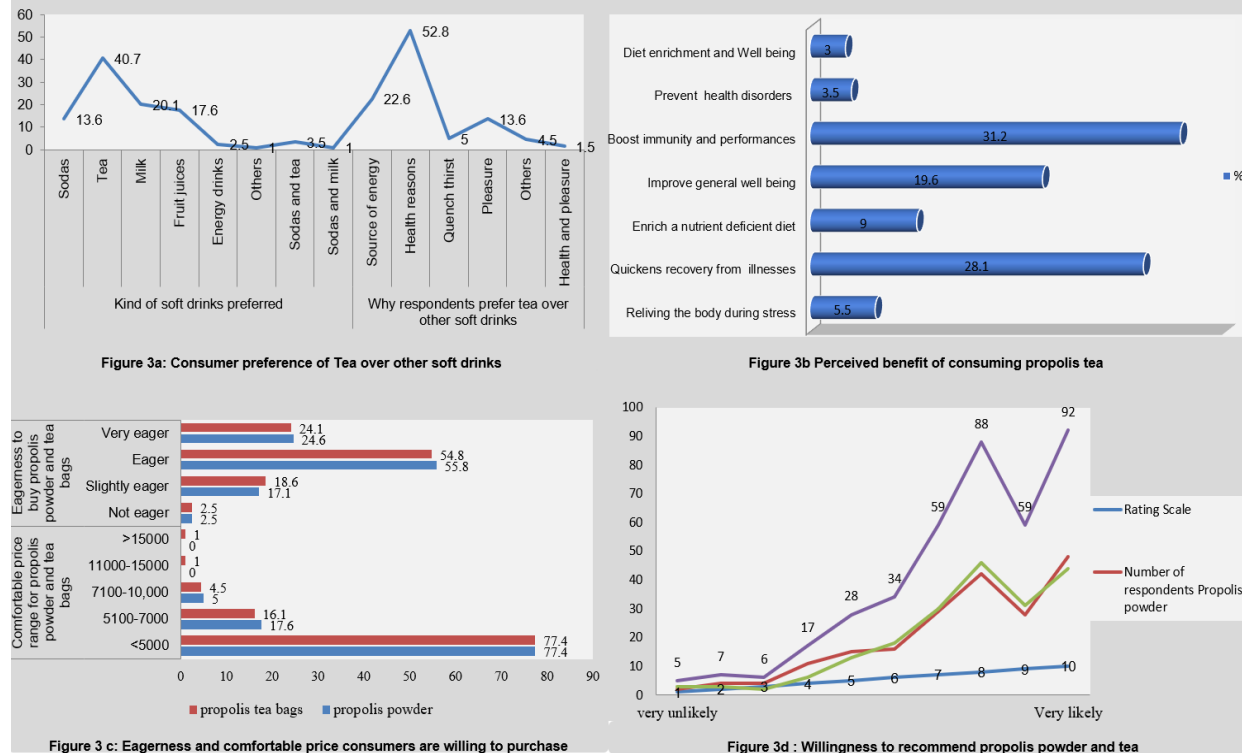


Figure 3: Consumer preferences and willingness to utilize propolis powder and tea

IMPLICATIONS AND RECOMMENDATIONS

- The demand for propolis is expected to increase exponentially due to diverse application of pure propolis in diverse product lines such as tea infusion, pro-biotic ice cream, cosmetics, and pharmaceutical preparations. There is need to mobilize producers through increased awareness to produce more quantity of quality raw propolis to feed the emerging cottage industries.
- Propolis tea bag and powders are completely new product in the Ugandan market and East Africa never developed before, meaning licensing could take longer that expected since the Uganda national Bureau of standards (UNBS) does not have standards. There is need for the Uganda National Bureau of standards to develop standards for propolis powder and tea bag against which the private processors will be evaluated.
- Since large scale crashing of the product was a challenge, there is need to design and innovate an industrial crashing machine to optimize yields. The research team could work with beekeepers. At raw propolis harvest, a specialized equipment to increase yield from 0.5kg to 2kg needs to be designed instead of depending on the crack's bees seal.
- To ensure constant supply of quality pure processed powder, RTC laboratory needs to be supported with additional resources worth 500,000 USD to build national capacity for industrial extraction/ processing of propolis. Through this investment, the lab will be able to process large quantities of powdered propolis to meet the demand by processors of propolis based cosmetics, beverages, and therapeutic products. The increased demand for pure propolis powder will ultimately spike demands for raw propolis, hence increasing the value and income obtained from propolis by bee keepers.
- Aspects of intellectual property and product licensing has not been completed the team will need support to fast track the process.
- The challenge now remains in building the capacity of the private sector and communities to scale up production of the developed product prototypes.



Conclusions:

The potential of Ugandan beekeepers to generate revenues from propolis exists and demand is present. Ability of beekeepers to explore this great potential depends on their level of organization, knowledge, investment capacity as well as designing of missing appropriate technologies like raw propolis harvester, industrial crashing, agitation, solvent evaporation of analytical machine to optimize and quality assure product development. Performance of the new product in the market shall be well-understand after the private sector partners has integrated new product development into their current product portfolio.

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