# SEPARATION AND PURIFICATION OF THE PROTEIN CONTENT IN *GARCINIA KOLA*

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## Introduction

*Garcinia kola* on its own, is a tree that is often called the 'wonder plant' because all of its parts, from the roots to its seeds, including the bark, leaves, fruits, sap and wood can be used in some beneficial manner. Nonetheless, the seeds are considered to be the most important product of the plant and is the focus of this study. The seeds aid digestion and have been used to treat cough, gastric problems, diarrhea, constipation, abdominal pains, headaches, malaria, bronchitis, laryngitis, gastroenteritis, rheumatism, asthma, liver diseases and menstrual cramps.[1]

While there has been some research done to understand and characterize plant proteins – in this case *Garcinia kola* – the information and data obtained from these studies are far from being comprehensive. The published results from various authors regarding the composition of crude protein in *G. kola* kernels widely vary from 0.58% to 11.27%, expressed as a weight percentage of the product. Plant proteins are more difficult to extract because they are protected by a thick cell wall that contains a variety of interfering agents. Interfering enzymes like proteases, as well as starch and other complex carbohydrates present in seeds, can drastically decrease protein extraction, and even change protein variety. Hence, the objective of this study was to extract and purify the protein and polypeptide components in the seeds of *Garcinia kola*.

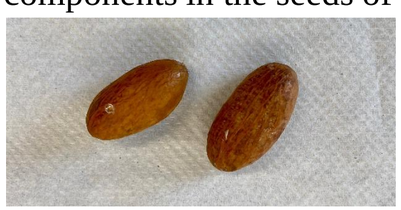

Figure 1. Two Garcinia kola seeds prior to sample preparation. [Source: author's archives]

## Methodology

To extract and purify the proteins in the seeds of *Garcinia kola*, we followed the following procedures consecutively – sample preparation via slicing, oven-drying and grinding, defatting, protein extraction using the urea/thiourea solubilization method, dialysis and protein precipitation using the ammonium sulfate precipitation method. This was to be followed by SDS-PAGE analysis on the protein isolates to determine the molecular weights of the extracted polypeptides, and Bradford Assay to determine the protein content of the samples.

## Results and Discussion

- The kernels of the seeds had a protein content of 0.0009% while the hulls were discarded.
- The 8-kDa polypeptide band may be from a non-specific lipid transfer protein (nsLTP) fraction, based on literature findings.[2] This group of proteins play a role in membrane stabilization, cuticle formation, cell wall organization, signal translocation, seed development and germination, nodule organogenesis and as plant allergens. The nsLTP family includes 7 to 9 kDa monomeric proteins which are bound by four disulfide bonds.
- Additionally, in terms of amino acid composition, a study performed by *Revilleza et. al* suggests that the 8 kDa band observed on the gel contains methionine and cysteine and was characterized by high contents of glutamic acid, aspartic acid, and arginine.[3]

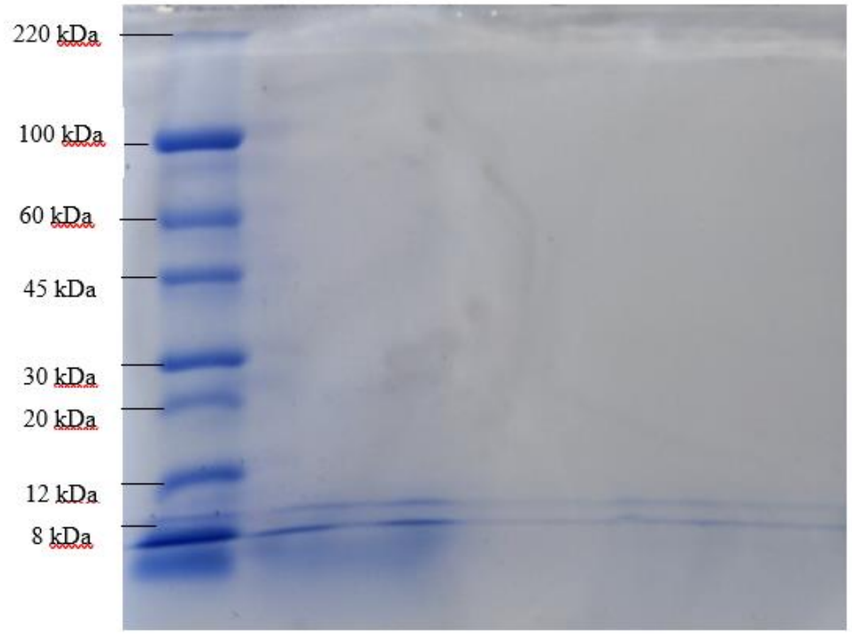


Figure *2*. SDS-PAGE profile of the Garcinia kola seed proteins extracted using the urea/thiourea solubilization method.

## Conclusion and Future Directions

From this study, we successfully proposed an extraction technique that worked effectively. The results obtained here would be useful in looking at the total nutritional worth of the proteins in *G. kola* seeds, as well as their potential for additional applications such as bioactive peptide production and food texture modification. Further research may wish to perform extraction on a larger scale to obtain more tangible and useful results.

## References

1. Mazi, E. A. et al., 2013, *J. Nutr. & Food Sci.*, https://doi.org/10.4172/2155-9600.1000218
2. Liu, F. et al., 2015, *J. Exp. Bot.*, https://doi.org/10.1093/jxb/erv313
3. Revilleza, M. J. et al., 1996, *J. Agric. Food Chem.*, https://doi.org/10.1021/jf960063u